URBAN SPACE IN ECONOMIC HISTORY

TOKYO AS ASIA'S FIRST MEGACITY 1945-1970

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Front matter

Abstract

This dissertation addresses the role of urban space in the postwar economic history of Tokyo. It argues that the Japanese capital followed a peculiar pathway to urbanization in this period and did not adhere to conventional and Eurocentric models. Mixed-use neighborhoods, permissive zoning and an intense use of space particularly benefited the successful small and medium sized manufacturing sector. Embedded in the urban fabric, these factories employed a substantial amount of the workforce broadly across the city. Its production processes were labor-intensive but remained competitive as Japan experienced rapid economic growth and underwent industrial upgrading. The territory of the city, here defined as the 23 central wards of the Tokyo prefecture, was also an egalitarian space. There was little to no spatial stratification, while some differences between the wards even declined, particularly in the case of living standards. There were both organic and broader institutional forces at play: As the city expanded, some generic neighborhood features reproduced themselves automatically, e.g. a set of private commercial establishments that allowed residents to economize on limited space. The Tokyo Metropolitan Government (TMG) was a powerful intermediate layer of government that redistributed from rich to poor wards. However, TMG did not have the financial and human resources to spend on and oversee large-scale urban planning. This left Tokyo to grow haphazardly, with many of its neighborhoods being upgraded *in situ.* By drawing on ward-level statistics, this dissertation presents its data on a more granular scale than traditional economic history analysis. It also utilizes variability metrics that deepen our understanding of socio-economic processes taking place across cities. This allows for a reevaluation of Tokyo's experience from 1945-1970 with a spatial lens, which has implications for the urban development discourse in other Asian megacities and beyond.

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I dedicate this work to her.

Statement of Originality and Copyright

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1: Introduction

In 2007, the global urban population outnumbered the rural population for the first time in mankind's history (United Nations Department of Economic and Social Affairs Population Division, 2018, p. 7). It is no exaggeration to call the 21^{st} century the "urban century", especially as this urban growth shows no sign of abating, particularly in the developing world. By 2050, the UN projects two thirds of the world's population to live in cities. An ever-larger share of the world's problems, but also of its opportunities, have taken on an urban dimension: Cities are at the forefront of development; slums and urban poverty are the most visible manifestation (Davis, 2006). At the same time, urban population densities and infrastructures may yield the only viable per capita carbon footprint a growing global population can afford in order to avert the catastrophic effects of climate change. Cities are "at the center of the political and economic processes and social relations that shape and define the contemporary world" (Stevenson, 2013, p. 1).

The 21st century is also an 'Asian century'. According to the Asian Development Bank (ADB), the continent is in the midst of a historic transformation, one that may see its share in global GDP reclaim levels it had last seen before the onset of the industrial revolution in the West (Asian Development Bank, 2006, p. 3). Rapid urbanization is a universal companion of this growth across the continent: By 2050, it is predicted that Asia's urban population will almost double from the current 1.6 billion to 3 billion people. Although a similar trend is underway in Africa, the scale of the transition is larger in Asia, with both higher income levels and larger populations.

[Insert Table 1 here]

Another watershed moment, perhaps less noticed and reported, was marked in 2010. Asia had 17 cities (56.7%) in the list of the world's 30 biggest cities by population, almost commensurate with its share in the global population (59.6%). This is a significant increase compared to 1950, when only seven Asian cities were in the top 30 (Jedwab & Vollrath, 2015). By 2030, the UN expects 20 out of the 30 top global cities to be Asian. Delhi is expected to replace Tokyo at the top of the list. Looking back in time, this only marks the reversal to the pre-modern period, when, for example in 1700, 17 out of the top 30 cities were Asian. The 21st century may be more fittingly called the "urban Asian century".

This study contributes to the historical narrative of this transformation, i.e. of Asia undergoing rapid urbanization and reclaiming a more proportionate representation in the ranking of the world's top cities. In this, its central point of departure is that much of urbanization theory and, in fact, the history of urbanization remains steeped in a "northern" (Parnell, 2012, p. 11) or "Eurocentric" (Sheppard, Leitner, & Maringanti, 2013, pp. 4–6) experience. Urban development is thought to take place along "some kind of transition from underdevelopment to development" (McGee, 2009, p. 4), essentially "imagining places as bounded territorial units progressing at different speeds along the same linear development trajectory, following the advice of those ahead of them" (Sheppard et al., 2013, p. 4). This continued centrality of what is a primarily Western experience is at best inadequate in explaining historical pathways of Asian cities and at worst inhibiting progress in addressing their contemporary development challenges.

The case study of this thesis is Tokyo, Japan's capital and Asia's first megacity. Tokyo and its urbanism are not frequently compared to Singapore or Shanghai. This is because the non-Western city is usually theorized in a post-colonial discourse (Greve, 2012), leaving Tokyo to be compared to other "world cities", e.g. New York and London (Sassen, 1991). Within Tokyo, we focus on the 23 wards, the area with the longest history of urban contiguity that retained its pivotal role well into the postwar period. For the purposes of this work, the postwar period marks the timespan between the years 1945 and 1970. The city's urban transformation mimicked in its pace the breakneck economic growth Japan was experiencing during this time. The 'Japanese miracle' was therefore also an 'urban miracle'. Growth rates of the magnitude recorded in terms of national output and urbanization were unprecedented. A systematic reading of Tokyo's postwar history may provide new perspectives for the urban development discourse today, in Asia's growing megacities and beyond.

The main driver of Tokyo's economy between 1945 and 1970 was the city's manufacturing sector. It was dominated by competitive small and medium sized factories, which became increasingly fixed capital and human capital intensive. Spatial factors help explain these companies' success in catering to a diversified set of customers. Mixed-use neighborhoods, agglomeration effects and intense use of land and urban space are among them. Concurrently, and despite a fast-growing population, living standards in the city improved in an egalitarian manner, which means that differences across Tokyo's 23 wards became less pronounced as time went by. Again, spatial factors help explain this phenomenon: These include certain neighborhood characteristics that reproduced themselves with the growing city. The urban form was almost universally medium-density, low-rise and was built to a large degree using wood. A distinct set of private commercial infrastructure accompanied this typology's extension across the space of Tokyo's 23 wards, and comprised bathhouses, construction establishments and small food retail outlets. The role of the Tokyo Metropolitan Government (TMG) is also important in understanding the egalitarian nature of Tokyo's postwar development: On the one hand, TMG actively redistributed from rich to poor wards and thus ensured equal social spending. On the other hand, TMG failed to carry out comprehensive urban planning, thus avoiding some of its pitfalls, focusing its limited resources on retrofitting. Many of Tokyo's mixed-use residential neighborhoods upgraded themselves *in situ*.

This study contributes to the literature in three main respects: First, it establishes space as a factor of production that can account for the pervasiveness and success of labor-intensive industrialization during periods of rapid urbanization. It is found that small and medium sized labor-intensive factories can be more competitive vis-à-vis their larger peers in cities, as they make more efficient use of urban space. We thereby add to the literature on labor intensive industrialization and Japan's "dual structure" by situating these phenomena in the burgeoning cities of postwar Japan. We contend that labor-intensive industrialization in cities is synonymous with space-intensive industrialization. Intensive spaces are created in unplanned mixed-use settings, areas with narrow streets and agglomerations of factories in the same industry groups.

Second, by collecting and analyzing data on the distribution of socio-economic conditions across the 23 wards, we find that rapid urbanization does not necessarily have to translate into spatial stratification, i.e. the increasing polarization of urban space by income and other indicators, as suggested by the literature. Instead, what we term space egalitarianism, i.e. the narrowing of differences across geographical units, represents an important pathway of urbanization that has to date received little attention. Space egalitarianism does not mean the total absence of distributional differences across space per se. However, these spatial differences can be small and, crucially, decrease during periods of rapid urbanization. Egalitarianism therefore denotes the absence of some of the main driving forces behind stratification that one typically associates with rapid megacity growth.

Third, history and institutions matter. The economic geography of a city is conditioned over many decades, if not centuries. The relatively narrow period of one's study therefore needs to be put in the context of this history in order to understand the importance of long-term trends and the significance of variations in these trends. Political institutions governing cities, too, are determined in long historical processes. Their study is important for us to comment on continuities and changes, as well as the idiosyncratic factors in a city's development. Such an understanding cautions us to adopt one-size-fits-all models. In the case of Tokyo, it challenges largely Eurocentric theories of urban development.

The innovative approach of this thesis is twofold. On a fundamental level, we aim to complement economic history analysis with insights from urban studies and therefore make space a more relevant category of inquiry. The literature dealing with space, "for all its richness and historical resonance… has never been given sufficient attention by historians." At the same time, "urban historians have much to gain, and much to offer, by interrogating the proliferation of 'spaces' that appear in scholarly literature" (Arnade, Howell, & Simons, 2002, p. 515).

Our approach to data analysis in such an economic history study is also novel: Rather than consuming data at an aggregate level, we have collected it on a ward level and can therefore comment on diverging and converging trends across the city. This reflects a growing interest in spatial inequalities within cities in the development literature, to which we contribute an important longitudinal study. In this we have drawn on significant amounts of primary data published by official bodies during our period of observation, focusing on information that is available at the granular, local municipal ward l level. For an overview of the sources, please refer to dedicated section in the annex. Finally, for our analysis, we have calculated coefficients of variation, Theil indices and Gini coefficients. Please consult the annex for a detailed description of the methodology we use.

Finally, we hope to contribute to an understanding of Tokyo's "charge". Much has been written, primarily by architects, about the features of the Japanese city in general and Tokyo in particular that explain their long-term success (Jinnai, 1995; Maki, Wakatsuki, Ohno, Takatani, & Pollock, 2018; Shelton, 1999). Tokyo is not a city of architectural harmony and big urban gestures, but instead one of almost metabolic properties; "though geographically sprawling, the city is an agglomeration of tiny pieces" (Maki et al., 2018, p. 9). The average age of buildings is low, and a culture of "scrap and build" is pervasive. Greenery pops up in unexpected places throughout neighborhoods, whose layout is determined by a set of narrow roads. Works by architects and urban scholars have often limited themselves to such observations or—by relying on maps, plans and drawings—engaged in micro neighborhood studies. This study, therefore, is an attempt to quantify what had previously been thought of as qualities that could not be "captured analytically", but only "felt and acted on by experienced practitioners" (Sevtsuk, Ekmekci, Nixon, & Amindadarbari, 2013, p. 552). We show that these spatial qualities had a demonstrable impact on the economic history of the city.

Why 23 wards and why 1945-1970?

Tokyo is usually referred to as the most populous city in the world. Its urban agglomeration counts around 38 million people as of 2015, but as the definition goes, it includes the population "within the contours of a contiguous territory inhabited at urban density levels without regard to administrative boundaries" (United Nations Department of Economic and Social Affairs Population Division, 2018). The Tokyo urban agglomeration therefore stretches out several miles west into its eponymous prefecture and the neighboring prefectures of Chiba in the east, Kanagawa in the south and Saitama in the north of the historical core of the city. Yokohama, Japan's third-largest city by population, inadvertently also becomes part of Tokyo under this definition, although its center is about 30 kilometers south of Nihonbashi Bridge, a landmark often used to designate Tokyo's geographic heart. To speak of Tokyo as the biggest city in the world is therefore somewhat misleading.

The other ready entity to be used to conceptualize Tokyo is the Tokyo Metropolis, an administrative unit created in 1943 and one of Japan's 47 prefectures. Besides the 23 wards, it includes the Tama area and several small islands, which together comprise 26 cities (*shi),* five towns (*machi)* and eight villages (*mura*), and which have about four million inhabitants as of 2015. While many of the 26 cities of the Tama area, especially those bordering the 23 wards, have become almost indistinguishable in urban form from more central parts of Tokyo today, the westernmost areas remain mountainous and predominantly rural. With a distance to Nihonbashi Bridge of 50 kilometers and more, they are no longer part of the Tokyo urban agglomeration as detailed above.

The 23 wards in turn are roughly identical with the former administrative entity of Tokyo City (1889-1943, *Tōkyō shi)* and include the historical core of Edo/Tokyo, whose geographical center was the Imperial Palace in today's Chiyoda ward. While this chapter does not discuss the city's institutional history, for which the reader is referred to chapter four, a few words are required here. Tokyo's 15 original wards were created with the passing of the Reorganization of Counties, Wards, Towns and Villages Act in 1878. Before that, Tokyo's governance was centralized under the Tokyo prefecture (*fu* as opposed to *ken),* which was roughly identical to the administrative entity of Edo. The 15 wards cover only the most central of today's 23 wards, i.e. those of (or parts of) Minato, Shinjuku, Bunkyō, Chiyoda, Chūō, Taitō and Kōtō. The remaining wards and therefore the outer boundaries of today's ward area were by and large determined through the merger of 82 municipalities into now "Greater Tokyo" (*Dai-Tōkyō*) in 1932. This led to an increase in the total number of wards to 35, a figure later consolidated to 22 (1943) and eventually 23, due to the creation of Nerima ward in 1947.

The 23 wards therefore both inherit the pre-20th century Edo/Tokyo (the original 15 wards) as well as the 20th century modern growth area of the neighboring municipalities (the new 20 wards). One example of this was Ebara county (*gun)* in the south of the 15 ward-area, which included the future wards of Meguro, Shinagawa and Ōta. Population growth in parts of this periphery had for a while already exceeded that of the historical core. By 1940, the population residing in the former territory of the 15 original wards only represented one third of the entire population in Greater Tokyo. Meanwhile, however, many of the new wards were still partly rural or peri-urban and would see their growth accelerate only after World War Two.

[Insert Table 2 here]

The importance of the 23 wards to the analytically ambiguous entity of Tokyo can be demonstrated using the numbers in Table 2: The 23 wards (whose individual populations were recalculated by TMG back to 1920) accounted for about 90% of the prewar Tokyo

Prefecture. While the war led to a relative temporary shift to the Tama area, the wards still accounted for about 80% of the prefecture's total population by 1945, a figure that increased to almost 90% again in 1955. By 1970, it was still as high as 77.5%, compared to about two thirds today. Records for the entire urban agglomeration following the UN definition only exist from 1950 onwards. The 23 wards accounted for about half of the population of the agglomeration, a figure that, after decades of higher population growth outside of the historical center, has reduced to about one quarter today. TMG also regarded the 23 wards as the central locus of urban planning in the immediate postwar period, a thread that will be taken up again in the fourth chapter of this thesis.

There are methodological advantages of using the 23 wards as the primary locus of this thesis's analysis. Statistics have continuously and coherently been published, given that the boundaries of the wards were stable throughout the period of observation (in fact, they have been stable until today). From 1955 onwards, all aggregate ward densities exceeded the criterion for a "densely inhabited district" (DID) with more than 4,000 inhabitants per square kilometer. By 1970, only some very small parts of Nerima, Adachi, Edogawa and Setagaya had pockets left below this level (Population Census, 1970, Volume 3, Part 13, Annex). The ward area was therefore much more coherent in form (i.e. by way of population density) than what was inside the boundaries of Tokyo's urban agglomeration from 1945-1970, which at this stage was still interspersed with rural and peri-urban patterns of settlement.

The 23 ward-area can of course not be seen in isolation, neither from its agricultural hinterland in the Kanto Plain, the large suburban swathes in the neighboring Tama region and adjacent prefectures, nor the locations of heavy and chemical industries as well as port infrastructure enveloping the Tokyo Bay. Nonetheless, the ward area represents the legitimate heir to the historical core of Edo and Tokyo. It also encompasses the physical space in which most of the immediate post-war growth and urbanization occurred. It is therefore the most appropriate spatial unit for the analysis presented in this thesis, especially in chapter three, in which we discuss inequalities between the wards.

Why does this study focus on the period between 1945 and 1970? A periodization of postwar, or in general, 20th century Japanese history, is challenging. Different authors have chosen different timespans for their analyses. In their study of the postwar economy, Kōsai and Goble defined their period of observation as covering the years 1945 to 1973 (Kōsai & Goble, 1989). Other authors regard the immediate postwar period from 1945 to 1954 as too distinct from the high-growth era that started in 1955 and ended with the oil crisis in 1973 (Sadahiro, 1991). They suggest that from 1945-1954, the economy was largely confined to recovery growth, merely restoring Japan to its prewar level, while the "Japanese economic miracle" began thereafter. Other authors, meanwhile, attempted to stress the continuities of postwar Japan with the prewar period and consequently chose longer timeframes, e.g. Chalmers Johnson in his seminal work on MITI from 1925 to 1975 (Johnson, 1982). For a range of other scholars, the postwar period extended further than the 1970s, even until the end of the Cold War in 1990 (Gordon, 1993), which also coincided with the bursting of the bubble and the onset of the Lost Decade(s).

For our period of observation, we have decided to include the immediate postwar period and substantial periods of the high-growth era, because both hold substantial insights for today's developing cities. We believe the Occupation period laid the institutional foundations for the subsequent configuration of urban governance, even though it was by no means a full Allied imposition. The city's economic geography was shaped significantly during this period, too, especially as war-time reconstruction led to further dispersal and decentralization of both population and industrial activity. It was during the high growth era when Tokyo and Japan "graduated" into the ranks of the advanced, industrialized nations, a process that unleashed in the city unbridled energy as well as unprecedented stresses.

We do agree that our narrative could be extended beyond 1970. Although the oil crisis of 1973 it is usually interpreted as a turning point for the national economy, it is a relatively arbitrary marker in terms of Tokyo's urban history. A more opportune final year for the period of observation relevant to Tokyo is 1979, the final year of Minobe Ryokichi's tenure as Tokyo prefecture's governor. His governorship is important to the argument of this thesis as his policies solidified and codified many of the trends this thesis detects in the period leading up to his election in 1967, in particular a relatively egalitarian improvement of living standards. His cornerstone policy was the so-called "civil minimum", which set out minimum standards of urban life. Many of his administration's initiatives were aimed at defining and quantifying life in megacities. It would have therefore been interesting to track these institutional developments further into the 1970s. In order to limit ourselves to a long enough but digestible period of observation, however, we decided to analyze a quarter century from 1945 to 1970, and in this to only provide a short preview of Minobe's governorship towards the end of this dissertation in chapter four.

We therefore span our analytical arc over the earlier growth period, when Tokyo's urban agglomeration became Asia's first "megacity", i.e. an area of contiguous urbanization with more than 10 million inhabitants. In this, Tokyo's postwar experience was unprecedented in terms of the speed at which an already large, multimillion population expanded in tandem with economic output: Its population more than doubled until 1970 and per capita incomes more than quadrupled. The most important site of this megacity growth were the 23 wards. Their study during this period may reveal important lessons for developing megacities in Asia and beyond, which is one of this study's main intentions. What follows is a short discussion of the "megacity", as well as of the aspects in Tokyo's postwar history we deem important for a better understanding of its discourse.

[Insert Table 3 here]

The table above underlines the importance of Tokyo's postwar moment by showing which cities experienced megacity growth similar in magnitude from 1950 onward. In order to be included in this table, a city needs to fulfil two conditions: The first is the growth condition: It has to double its population over a 20-year time period. This means its average population growth must exceed 3.5% per annum (p.a.). Second, the city has to have a large population to begin with in order to qualify the "megacity" condition. We set the initial population condition at four million inhabitants. There is only a select group of cities that fulfil both conditions between 1950 and 2030, which is divided into 20-year periods with a distance of five years between them. Several cities appear in the list more than once: This does not mean that they see their population grow by factor four or six. Instead it shows that these cities sustained population growth rates in excess of 3.5% p.a. over a longer time frame than just 20 years.

In 1950, the Tokyo agglomeration had a population of 11.7 million people. It had already passed the megacity marker some years before this.[1] As of 1950, Tokyo was still slightly behind New York's urban agglomeration, which counted 12.3 million inhabitants at the time. From here until 1970, the average annual growth rate in the population of the Tokyo agglomeration was 3.6%, which meant that its population more than doubled during this this period, eventually far outstripping that of New York. The only two other cities sharing this experience in this period, i.e. having an already sizable population and recording growth averaging in excess of 3.5% p.a., were the Osaka agglomeration (7.0 million inhabitants in 1950, 3.9% average growth p.a.) and Los Angeles (4.0, 3.6%). As can be seen, most of the cities that experienced rapid megacity growth (and will experience it until 2030) are situated in Asia, primarily in China (7) and South Asia (4). Towards the end of the period shown above, sub-Saharan Africa enters the fray with four cities, attesting to the continent's important demographic transition.

The study of megacities is increasingly important. They are forecast to grow in absolute numbers substantially. While there were only two megacities in 1950, already 23 agglomerations had a population of more than 10 million as of 2010. This number is expected to increase further to 41 in 2030. Collectively, megacities will account for a growing share of the world's urban population. New York and Tokyo represented 3.2% of the world's urban population in 1950. In 2010, the population of megacities accounted for 10.4% of the urban population and in 2030, it is expected to account for 14.4% (UN, 2014).

[1] When exactly is hard to tell due to the lack of data at the agglomeration level before 1950.

As a result of their growing importance, megacities are often analyzed as a separate unit. This is because their enormous social and environmental challenges differ from other, smaller cities due to their sheer size and complexity. In the developing world, they tend to exhibit extreme levels of "poverty, vulnerability, and social-spatial fragmentation" (Kennedy, Steward, & Facchini, 2015, p. 5985), while relatively high-income inequalities are also evident in some of the developed world megacities.[2] All megacities face challenges in providing adequate infrastructure for their populations, given the high institutional capabilities required for their installation and maintenance. Finally, megacities account for a disproportionate amount of global GDP (i.e. their contribution to GDP is higher than their population would suggest) and waste. But despite their higher wealth, they consume energy largely commensurately with their share in the global population (Kennedy et al., 2015). Consequently, a large body of the literature considers high-density conurbations one of the key solutions in the battle against climate change and environmental degradation (Glaeser, 2012).

Other than it being a trailblazer, how does Tokyo between 1945 and 1970 contribute specifically to our understanding of megacities? First, 1945-1970 Tokyo blurs the boundaries between developed and developing city. The main motor of the 23 wards' economy in this period was the manufacturing sector, employing almost 40% of the labor force at its peak. It comprised a majority of labor-intensive small-scale producers engaged in what was initially relatively low value-added work. In this, early postwar Tokyo aligns with our understanding of today's developing cities, whose comparative advantage is explained by the abundant availability of cheap labor. In Tokyo, industrialization and

[2] In fact, city size is positively correlated with income inequalities in the United States (Baum-Snow & Pavan, 2013) and in China (Chen, Liu, & Lu, 2018).

urbanization went hand in hand. The city moved up the value chain quickly. It achieved this while maintaining a high proportion of small and medium sized enterprises. In other words, the urban manufacturing sector with its small factories was part and parcel of the technological upgrading. Tokyo thus represents an important arena in which the Japanese economic miracle took place.

The urban manufacturing sectors in contemporary developing countries share some aspects with the Tokyo's 1945-1970 period, but also diverge in some important respects. In India, for example, there has been a notable outmigration of large-scale manufacturing outside of the cities, while small informal workshops have generally become more urban (Ghani, Goswami, & Kerr, 2012).[3] This is not entirely dissimilar to Japan's experience, however it appears to occur at much earlier levels of development. Moreover, the valued added per worker in the informal urban manufacturing in India represents only ten percent that of the formal sector (Sharma, 2009). Besides low competitiveness of their manufacturing sectors, today's developing megacities also have smaller manufacturing sectors to begin with. This is a function of a small manufacturing sector at the national level (e.g. India), or reflecting the dispersion of large-scale manufacturing to suburban locations and special economic zones, e.g. in China, in line with an increasingly international division of labor. In China, about 20% of the urban workforce is employed in manufacturing as of 2014 (Lardy, 2015). The study of Tokyo's experience between 1945 and 1970 may therefore lay the groundwork for later comparative work on urban

[3] Official employment figures from Mumbai underline this: In 1971. 41.0% of the city's official employment was in manufacturing, a figure which has subsequently decreased to 25.7% in 2001 (Singh, 2010). Note that these figures have to be seen against very low overall work participation rates, which are a result of a large informal sector that is not captured in official statistics. We therefore need to use caution in comparing these numbers between cities. What we can deduct from them, however, is an indication of the trend in urban manufacturing employment.

manufacturing sectors in developing megacities at different points in time, aligned for their stage of development. This appears at least complementary, if not preferable to a methodology that lumps cities together only because of their similarly large populations. Table 58 in the Conclusion returns to this question and will present some preliminary findings regarding a comparative-historical research approach to the Asian megacity.

Second, and related to the point above, is that the 1945-1970 period was marked by comparatively low living standards. Despite the difficulty of comparing living standards across time and space, some authors have described the Tokyo of the postwar period as having the phenotype of a "slum" (Echanove & Srivastava, 2013). This relative poverty was a shared experience among the inhabitants of the ward area. Contrary to the megacity discourse and urban development theory, rapid urbanization did not lead to spatial stratification here. In other words, living standards did not differ too widely between different parts of the city. In fact, as will be shown later, the differences between the 23 wards in terms of living space per capita and other important indicators even declined. Therefore, Tokyo's experience fits relatively uneasily with that of other megacities today.[4]

The reading of TMG publications from the late 1960s and early 1970s suggests that the authorities' frame of reference for Tokyo's urban development were primarily Western cities. This can be gleaned from consultancy reports written by LSE professor Robson, from self-critical publications in the late 1960s and early 1970s and from statements by governor Minobe. All lamented Tokyo's inadequacies across a whole range of issues,

[4] Even today, the city is a clear outlier in the regression of city size and intra-city inequality (Adomaitis, 2013). In other words, Tokyo should be much more unequal based on its vast size.

from lack of sewerage, low housing standards, congestion and pollution, to bad transportation. While such a focus is understandable with the demands of the electorate in mind, we believe that it may cloud our vision of the city's positive experiences in the 1950s and 1960s, particularly when we compare Tokyo to developing cities.

Third, Tokyo offers a unique case study of the institutions governing megacity growth in historical context. Today, megacities are "characterized by the pressing nature and the magnitude of policy problems as a consequence of rapid growth" (Kübler, 2012, p. 8). They are usually hard to govern due to governmental fragmentation (a multitude of administrative layers), a lack of resources (capital investment requirements are biggest here), weak institutions (the informal sector and business wield outsize control) as well as the interference of national governments in their matters (Kübler, 2012). With this study, we present a historical case study from the world's first megacity that defied some of today's governance pitfalls at a time when the scale of its socio-economic transformation was akin to that of today's developing megacities. TMG, an intermediate layer of government, redistributed scarce resources between the wards, gradually upgraded the physical infrastructure of the city and did comparatively little planning due to a lack of resources. Tokyo's experience thus challenges mainstream views on fiscal decentralization and institutional planning capacity.

Fourth and finally, we provide an attempt to historicize the discourse on megacities, which is still in its infancy. While there are important similarities between today's megacities in terms of their size, organizational complexity and socio-economic challenges, there are important contextual differences that are best assessed using a historical approach. In some countries, megacities are primate cities, while in others, several megacities have developed in tandem. Many megacities exist in increasing isolation from their hinterland, while others are entangled in a close relationship with other cities or regions in their country. Traditionally, urbanization has coincided with industrialization, and the European or American experience has been the yardstick with which to analyze other parts of the world, especially as this model has been exported around the world. However, while many of today's megacities are also colonial cities, there are varied paths to industrialization, affecting the way that this process has defined cityscapes very differently in different parts of the world. Finally, contemporary urbanization is often driven by other factors than industrialization and increasingly takes place without growth, particularly in Africa and parts of South Asia (Jedwab & Vollrath, 2015). By devoting a sizable proportion of this dissertation to the urban (economic) history of Tokyo's postwar period, we can contribute to the history of megacities and offer much room for future comparative work.

Which date constitutes the most opportune starting point for our historical review until the start of our period of observation with the end of World War Two in 1945? We have decided to move a relatively complete urban economic history to the supplement section of this introductory chapter. Here, we go back to the founding of Edo in 1590 AD and focus on the changing economic geography of the city. We are interested in seeking continuities and highlighting change. Besides the intuitive legacies of the Edo period, such as the division of the city into *yamanote* and *shitamachi* areas, there are other, more subtle continuities that played out in the economic, political, social and environmental spheres. In the economic realm, small craft-based producers were organized in clusters and catered to a large urban market with unrivalled purchasing power. Politically, the Tokugawa period established the centralization of power in Edo/Tokyo, not least via the system of alternate residence that required prefectural domains to maintain large presences in the capital. Socially, small neighborhoods were largely left to govern themselves, leading to a unique mentality in the lay quarters of the city. Finally, environmentally, the Tone River rerouting established a pattern of man-made alterations of the physical environment in the Kantō region that would have a profound influence on the development of the city later on.

The Meiji era coincided with Tokyo's first wave of urban industrialization, which proceeded alongside different pathways than those observed in the West. Large model factories sprung up along the Sumida river and spawned the concurrent growth of small and medium sized workshops surrounding them, acting as suppliers. Towards the end of the Meiji period, industrial growth would further disperse from the traditional craft centers to the periphery of the north, northeast and south of the ward area. This process was accelerated by the 1923 Great Kanto Earthquake, which destroyed a disproportionate part of the old *shitamachi* part of the city. However, traditional craft centers in the old industrial wards continued to exist and even grow in numbers and overall employment, albeit not at the pace of the newly-industrializing areas. As a result, industry in Tokyo became more decentralized.

The interwar economy was increasingly geared towards large-scale enterprises in the weapons and ammunitions sector. This process spurred the development of the southern part of the 23-ward area, and largely determined the economic geography of the postwar era. A bigger share of the manufacturing workers now had to commute to their workplace, helped by improvements in the public transportation network. This network would provide the backbone to the city's postwar growth. With high population densities in the central and old industrial wards, and low densities in the periphery, Tokyo's density pattern was much more in line with today's megacities.

The Allied Firebombing of 1945 was the second *tabula rasa* moment in Tokyo's history and the reconstruction would further disperse both population and industry across the 23 wards. It would take several years until a large drop in population due to large-scale evacuations and loss of human life was recovered. However, while people moved back to the most affected wards, densities here would not recover to prewar levels. Meanwhile, population growth in the peripheral wards was higher also as new migrants who arrived from the countryside settled primarily here. It took several years before the most war-affected wards regained their industrial strength. Meanwhile, new industrial centers primarily in the north and east of the ward area grew in importance.

Summary of the dissertation

Following this introduction, chapter two provides an analysis of the ward area's manufacturing sector and the process of labor-intensive industrialization in an urban setting from ca. 1950-1970. It is split into two sections. The first descriptive section shows that, in terms of employment, the manufacturing sector was more important in Tokyo than in Japan as a whole. We then provide details on the composition of the sector, by firm size, industry and location in the ward area. We find that small firms dominated, while heavy industry diminished in importance. Growth industries included the printing and publishing sector as well as fabricated metals. There was little spatial stratification in terms of manufacturing employment. In terms of profitability and capital intensity, small firms managed to close the gap between them and larger factories to a larger extent than what was observed in Japan as a whole. This was valid for both factories in the "advanced" and "sundry" sectors.

The second part of the chapter develops a model of how space impacted the trends observed in the first part. Following some theoretical work on the subject, we develop land, or space, as a factor of (urban) production. The success of small and medium sized factories shown in the first section can only be understood by appreciating these firms' better use of space. To prove our hypothesis, we present evidence on the mixed use of dwellings and neighborhoods. This suggests that small and medium sized factories were using space more efficiently as their owners' living conditions blurred the boundaries between living and working. They also made more intensive use of space for production. Finally, by way of their central city locations, small and medium sized factories were embedded in spaces of a higher urban intensity than their larger peers outside the ward area. This allowed them to benefit from information spillover and other positive effects of agglomeration that are not necessarily captured by economic models.

The chapter continues to discuss some of the spatial dimensions of another factor of production, i.e. labor. Here, too, we notice the importance of home-based work. Moreover, we detect relatively equal compensation and education levels across the 23 wards. Small firms in Tokyo benefited from this compared to their national peers, and in some cases, even compared to their larger peers in the 23 wards. The same is true when we look at some spatial dimensions of demand, the final section of this chapter. Small firms in Tokyo had access to unparalleled demand from within the world's largest city. A dense network of wholesalers also bought their products for distribution beyond the confines of the metropolitan area. The evolution of small and medium sized factories is inadequately explained without a discussion of subcontracting. This process integrated these firms into increasingly complex supply chains, including those manufacturing for export.

Chapter two contributes to our understanding of labor-intensive industrialization in an urban setting. We contend that this peculiar path of development positively interacted with the concurrent process of space-intensive urbanization, whose egalitarian nature is discussed in chapter three. Small and medium sized factories were relatively equally distributed across Tokyo and therefore had an important contribution to make to this egalitarianism. Due to the confines of this dissertation, we do not cover the equally important contribution small and medium sized retailers and distributors made to this development path.

Chapter three inquires into the nature of living standards in Tokyo between 1945 and 1970. Living standards were improving slowly but relatively equally across the 23 wards. The reasons included the reproduction of some typical neighborhood features that prevented stratification. The chapter is also split into two parts, a descriptive and an analytical section and thus mirrors its structure the preceding chapter two. We begin by reviewing the literature on living standards and their application to an urban context. We note that particularly urban dimensions of life are well understood conceptually, although standardized measurements remain rare. The next review section discusses intra-urban spatial inequalities. Spatial inequality in cities appears to be a universal phenomenon in developing countries generally and in megacities in particular, where slums are prevalent.

The descriptive section describes private living standards in Tokyo's 23 wards by way of looking at tatami per capita. We note a generally improving situation in living space per capita, although this trend is more pronounced for owning households rather than the renting population. There is no spatial stratification occurring across the wards, i.e. the differences between them are not becoming bigger; in fact, they decrease across a range of metrics. The same can be said for some other indicators of private living standards, e.g. sanitary standards and the proportion of the population living in crowded conditions. Moreover, the distribution of certain status consumption items becomes more egalitarian, too. The next section discusses the gradual improvement of public space across health, education, culture and safety. A similar trend of improving and equalizing conditions is apparent when looking across the 23 wards.

The chapter proceeds to its analytical part by assigning some spatial characteristics to this egalitarian improvement in private and public living standards. It is found that with the expanding city, a certain type of commercial infrastructure reproduced itself. This is shown via density figures for Japanese bathhouses (*sentō*) as well as food retailers, restaurants and furniture shops. They helped households economize on living space and are an important reason for Tokyo's spatial efficiency. Finally, construction establishments became denser throughout the period of observation and helped Tokyo's metabolism of "scrap and build". The building material of choice was wood. It was ideal in that it was affordable and easily replaceable if the economic fortunes of the owners changed, which they did at tremendous speed.

Another important reason for equally improving living standards is to be found in chapter two, i.e. the distribution of manufacturing activity across the 23 wards. While some industries experienced stratification, i.e. clustering, most manufacturing segments remained relatively well-dispersed across the city, specifically in the "sundry" segment. Along with an equal distribution of other small firms, e.g. in the retail trade, the prevalence of these small and medium sized companies across the ward area is an important reason for the equal distribution of living standards. This chapter represents the first attempt at systematically showing the spatial distribution of living standards in Tokyo during its rapid megacity growth in the postwar period. It challenges conventional urbanization theory by showing that rapid urbanization and spatial egalitarianism are not mutually exclusive.

Chapter four provides an institutional analysis of the Tokyo Metropolitan Government and represents an attempt to historicize the arguments made in the previous two chapters. Chapter four is split into two major sections. The first one discusses fiscal redistribution between the different wards and in how far TMG ensured relatively equal financial conditions for wards with very different economic profiles. The second section provides an institutional history of Tokyo's urban planning. It argues that in place of transformative, large-scale plans, the city developed and expanded largely without design. We start the chapter by providing a history of Tokyo's urban governance, allowing us to contextualize the postwar sequence of decentralization and recentralization in center-local relations.

The section on fiscal redistribution represents the first major section of chapter four and is drawing on ward income and expenditure data from several years during the period of observation. We first find that both metropolitan and ward tax incomes are highly unequal across the wards, reflecting the presence of large corporate tax payers and more affluent taxpayers in the central business wards. We then show that via equalization transfers, TMG fiscally redistributes from rich wards to poor wards in order to equalize their financial conditions. This allows the wards to spend very similar amounts per capita, in particular on education. In fact, the wards with lower tax raising ability spend slightly more on education per capita toward the end of the period of observation. Furthermore, TMG redistributes through active social spending with a spatial bent, i.e. it spends disproportionately on social welfare and public housing in poorer wards. Coupled with fiscal redistribution, TMG's policies helped prevent socio-economic stratification of the wards.

The next section discusses the role of urban planning for Tokyo's urbanization pathway. We begin this section by reviewing the history of urban planning throughout Tokyo's history from 1868 to the late 1960s. There were several continuities. The central government exerted strong control but often did not release the funds necessary to carry out ambitious plans for urban redesign. The two great cataclysms of the 20th century, the 1923 Great Kanto Earthquake and the 1945 Firebombing, were initially thought of as opportune moments to rebuild the city from scratch following modernist and rational principles. However, reconstruction in both cases took place without major plans. Land readjustment, specifically after the 1923 Earthquake, proved to be the more pragmatic strategy to rebuild select parts of the city.

The postwar era, too, produced a raft of transformative plans. The Ishikawa Plan foresaw a control on Tokyo's overall population as well as the construction of satellite cities interspersed by green belts. The rapid recovery in population meant that this plan, soon, became unrealistic, too. The speed of the economic transformation and urban growth thwarted further attempts at citywide urban planning. The Olympic Games in 1964 represented the first time that significant resources were spent on an upgrade of the physical infrastructure. However, most of these investments did not fundamentally alter the life of the average ward resident. The official urban planning method of choice was once more land readjustment, which was to widen roads and facilitate urban growth in some parts of the periphery. However, unplanned urban sprawl remained the most common form of urban expansion in the ward periphery.

The section concludes by discussing the civil minimum, which was Socialist governor Minobe’s flagship policy enacted after his election in 1967. It defined minimum standards for urban life and entailed detailed plans on how to achieve these by public investments in social infrastructure.

2: Labor-intensive industrialization: Tokyo's competitive small and medium size factories

The nature of Tokyo's manufacturing sector is one important factor explaining the growth of the city in the postwar period. The sector was dominated by relatively small factories.[5] We will argue that these small labor-intensive factories moved up the value chain by closing gaps in their performance and capital intensity vis-à-vis their larger peers. They were tightly interwoven with and embedded in the urban form and can therefore help explain Tokyo's successful urbanization during the period of observation. This narrative shares important continuities with the prewar period but adds factors that make this a distinct postwar model of labor-intensive industrialization.

This chapter is structured as follows: First, it briefly reviews the literature on labor-intensive industrialization, focusing in particular on the work that has been done to situate the concept in the burgeoning cities of prewar Japan. We then provide some contours of Tokyo's manufacturing sector in the postwar period. With this context in mind, we can show how small factories closed both performance and capital intensity gaps vis-à-vis larger firms. The second part of the chapter lists several reasons why small factories were so successful: We establish urban space as a factor of production and provide a spatial context with which we can better analyze labor. We also give reasons why small and medium sized factories were successful from a demand perspective.

[5] We will use the terms small factory and small and medium sized factories somewhat interchangeably. We follow a broad distinction of factories, setting small and medium sized factories apart from large factories. There are no universally accepted thresholds underlying these terms. However, we suggest that a small factory has less than 20, a medium sized factory less than 100 workers.

Labor-intensive industrialization and Japan’s “dual structure”

Different factor endowments of land, labor and capital in the various world regions have historically shaped economic structures. Sugihara has argued that a labor-intensive variety of industrialization emerged in Japan before reaching other parts of Asia and the world. Labor-intensive industrialization “means a preference for maximizing the ratio of inputs of labor to inputs of cooperating factors. It is therefore manifest in choice of production technique and in the way in which other resources (land or capital) are handled” (Austin & Sugihara, 2013, p. 2). Labor-intensive industrialization as a concept also focuses on a continuous improvement of labor as the major production factor (Frankema, 2015).

Japan’s pre-modern Tokugawa period (1603-1868) experienced an “industrious revolution” in rural agriculture. Facing a shortage of land, it was through an increased amount of invested labor that rice yields rose, thus sustaining larger rural populations (Hayami, 2015, p. 98). Later, in the eighteenth century, this strategy was extended to rural cottage industries. Largely household-based, these new activities had the effect of absorbing surplus labor, increasing household income, and in turn increasing demand for the consumer products of this “proto-industrialization”, creating a virtuous circle. Setting the Japanese variant apart from the pre-modern cottage industries of Britain and the European mainland (De Vries, 2008), these workshops were staffed and operated by owner-farmers themselves and their family (Saito, 2005). Japanese households also continued to rely primarily on their seasonal agricultural production as opposed to fully specializing in a cottage trade, e.g. weaving. The Japanese peasant household was an institution with very specific organizational principles, often described as the *ie* (family) system. It entailed a stem-family with single inheritance and a socially-accepted division of labor by gender (Tanimoto, 2006).

Industrialization is linked closely to urbanization. However, the literature on Japan's labor-intensive industrialization is rooted primarily in an analysis of the agrarian, pre-modern Tokugawa period. This missing link has been pointed out by Tanimoto. He agrees that the peasant economy and family farming are important explanatory variables in Japanese industrial history and sets out to answer how these agrarian features were retained in a non-agrarian setting during the modern period. He suggests that population growth in the countryside was absorbed by the urban owner-operated small-scale industries, primarily by employing non-inheriting men in live-in apprentice positions. In effect, this "reproduced peasant households in urban settings" (Tanimoto, 2013, p. 172).

With relatively little capital employed per worker, these small workshops were labor-intensive. However, their competitiveness did not only stem from them paying their workers lower wages. They also benefited from their skills and ability to flexibly respond to changing market conditions. In addition to these endogenous factors of organization, several other external factors help explain the success of the small-scale industry in the prewar urban setting. Tanimoto cites economies of agglomeration as well as institutional support. Agglomeration refers to the clustering of merchant organizers within very small areas in the city, e.g. metal toy manufacturers in the interwar period being concentrated in three blocks within Honjo ward. Institutional support came from a nascent patent system, which played an important role in a system "lacking the intimate social relationships found in rural communities" (Tanimoto, 2013, pp. 170–171).

Small workshops played an important role in driving Japan's early urban industrialization. Waley describes how many of these workshops were integrated in complex production chains. Few large plants along the banks of the Sumida River "were surrounded by a rapidly increasing number of small and micro plants. Many of these factories, especially the smaller ones that were bound into the *ton'ya* system of wholesale-managers, relied on the urban market for their sales" (Waley, 2009, p. 15). The *ton'ya* system refers to the coordinating activities of an agent, who shares the characteristics of a merchant and an organizer. He could oversee the production process of a final good that was split into many intermediary steps. It took place across a variety of firms, e.g. factories, small workshops, and domestic workers (Tanimoto, 2006, p. 42). This process dispersed production across space, as opposed to combining all steps under one factory roof. Densely populated mixed-used districts in Tokyo were providing agglomeration effects for these networks to work efficiently (see below), but they had also existed in the Tokugawa-era putting-out system of rural cottage industries (Tanimoto, 2006, p. 9).

Usually, the discussion of small and medium sized enterprises in Japan's postwar period centers on the so-called "dual structure" of the economy. The term refers to the coexistence of pre-modern and modern forms of economic organization during industrialization, i.e. modern, large, and capital-intensive factories coexisting with backward, small and labor-intensive firms. Hirschman had pointed this out for underdeveloped countries and described it as a natural phenomenon of modernization (Hirschman, 1957). In a transitional phase, the perseverance of small, labor-intensive firms could be the best use of an economy's scarce resources, as these firms absorb a large part of the labor force and may even compete with the industrial, capital-intensive sector on the basis of their lower wages (Hirschman, 1957, p. 559). Writing in the 1950s, Hirschman also thought dualism to be justified in certain sectors that are by definition labor-intensive, e.g. furniture, apparel, bricks, ceramics, cigars, food processing, and construction services. In these sectors, "the advantages of modern industrial methods apparently are not decisive enough to overcome the traditional or small-scale way of doing things" (Hirschman, 1957, p. 560). A developing country should concentrate its investments in new sectors in which there would be no competition from small-scale operators.

It was at about the time of Hirschman's article that the persistence of a low-wage small-scale sector became to be regarded as a problem in Japan, which still experienced a labor surplus with large shifts of rural population to the cities. Due to their lower earnings, workers in small firms had a lower standard of living "even if they had the same experience and abilities, and were also exposed to the danger of unemployment should their company go bankrupt or reduce its size" (Nakamura, 1995, p. 166). The prevalence of small-scale operators and "traditional" methods of production showed that "Japan and underdeveloped countries in Asia have something in common" (Miyazawa, 1964, p. 147). However, in Japan, there were crucial differences.

A significant reason for the growth in small-scale firms was Japan's subcontracting system, whose roots stretched back to the *ton'ya* system described above. The subcontracting system that developed from the 1920s onwards, however, was different, in that its initiative came from large firms seeking to exploit the wage differential between them and small firms, and not from merchant organizers. However, wage differentials were not the only reason for the emergence and subsequent growth of this subcontracting system, especially in the 1950s. The most important reason was the spreading of risk.

When business conditions were poor, large firms would drop their subcontractors or lower their payment terms (e.g. by increasing the days payable). There were also advantages for small firms of being subcontractors, in particular being on the receiving end of a technology transfer (Nakamura, 1995, p. 167).

Therefore, "large modern enterprises and traditional medium and small enterprises are in a complementary relation, the latter depending on the development of the former." Furthermore, "large enterprises use the cheap-labor products of medium and small enterprises and regard them as a cushion against business fluctuations" (Miyazawa, 1964, p. 148). Structurally lower interest rates for large firms and the continued availability of cheap labor for small firms were thought to be the main reasons why this dual structure solidified and persisted (Miyazawa, 1964, p. 168).

Subsequent scholarship broadened the debate and took account of the changing conditions of the Japanese economy, which became increasingly labor-scarce, depressing the relative price of capital. The decreasing availability of low-wage labor for labor-intensive work meant that small firms were shifting their production toward more capital-intensive processes toward the mid-1960s (Nakamura, 1995, p. 173), helped by the growing availability of credit for small firms (TMG, 1972b). Small factories also began to close the productivity gaps between them and larger firms, from about 1:4 in 1953 to 1:2 in 1970 (small firm to large firm valued added ratio).

However, the differences in capital intensity remained higher than those in productivity, suggesting that "small firms were competing with the large firms by raising their capital turnover rates and taking advantage of their maneuverability" (Nakamura, 1995, p. 170). The diversity of management in small firms was another reason to account for their success. Small firms had a much greater variety in profitability and a "high start-up, high failure rate" (Nakamura, 1995, p. 175). Some small firms were doing exceptionally well, attracting newcomers to join. Young men chose to start small businesses not only out of a lack of alternative or the inability to join a large firm, but in order "to be independent in the future" (Nakamura, 1995, p. 176).

More recent work has tried to reconcile the two strands of the literature of labor-intensive industrialization and the dual structure under the banner of "the role of tradition in Japan's industrialization" or "indigenous industries" (Tanimoto, 2006). The authors of this study argue that non-factory workshops were a much more important source of employment in Japan than in other industrializing nations and that "the western style factory system played a comparatively limited role" (Tanimoto, 2006, p. 5). Important reasons include the structure of the pre-modern agricultural sector, which was "characterized by the prevalence of small-sized framing households" (Tanimoto, 2006, p. 21). This in turn led to "domestic industry and other sideline business opportunities [being integrated] into the maintenance and development strategy of the peasantry" (Tanimoto, 2006, p. 22).

Subsequently, and despite the widespread adoption of Western technology, Japan's industrialization for the most part relied on a production system other than mass production. Small factories developed on a pathway of "flexible specialization", describing a craft-based process that was based on skill rather than just low wages. However, other factors besides skill must also be considered in accounting for Japan's experience of industrialization, e.g. the "managerial ability of putters-out and merchants, labor allocation strategies of peasant and urban small business households and the undertakings of the central and local governments, and the existence of regional community" (Tanimoto, 2006, p. 34).

In other words, the existence of small firms was not the expression of "backward" and traditional aspects of the economy, but part and parcel of Japan's industrialization process. The character of Japan's industrialization changed throughout the 20th century, and the postwar period saw the country develop rapidly while moving up the value chain across a whole range of industries, including heavy and chemical industries. However, small factories prevailed, not only in terms of numbers. They also became more competitive. This competitiveness of small firms had already caught the imagination of foreign observers in the 1980s (Amjad, 1981). They were intrigued by the lower relative distance between small and large factories in terms of their capital intensity and productivity in Japan compared to ASEAN countries.

This chapter represents an attempt to embed this story in the context of rapid postwar urbanization. The first section will argue that a peculiar model of labor-intensive industrialization underpinned Tokyo's rapid postwar growth. The city's manufacturing sector employed a larger proportion of the total workforce vis-à-vis Japan and became characterized by small and medium sized firms toward the end of the observation period. These firms caught up with larger firms in terms of their productivity, a result of both employing "better" labor and becoming more capital intensive. By the end of the period, in 1970, the difference in terms of capital intensity between small and large firms was smaller in Tokyo than in Japan as a whole, as were some other important operational efficiency ratios. Therefore, what Amjad observed for Japan as a whole was even more valid in Tokyo.

Consequently, this section adds an important aspect to the literature of the "dual structure" and labor-intensive industrialization. By presenting performance and balance sheet data for Tokyo, by ward, by industry and by firm size, we add an important component to the analysis of small-scale factories. This allows us to set the stage for the second part of this chapter, in which we ask which spatial factors might explain the relative success of small factories over their larger peers.

Some contours of Tokyo's manufacturing sector ca. 1950-1970

The questions this section intends to answer are: How important were factories for the 23=ward economy; what was their average size; what industries were they producing in; and where were they situated in the city? This will provide the necessary context for the ensuing section, which will analyze firm performance in terms of productivity and capital intensity. Where possible, the comparator for the data presented is the national level. It will allow making relative statements, e.g. "Tokyo's small and medium sized factories paid relatively more in compensation to their workers than at the national level".

[Insert Table 4 here]

Table 4 shows the importance of the manufacturing sector for Tokyo's early postwar economy, as well as how its role began to decline in the 1960s. In 1951, the manufacturing sector employs 31.9% of the labor force (excluding agriculture and government) nationwide as compared to 35.9% in Tokyo. Both figures rise to their peak in 1960, to 34.8% and 39.5%, respectively. The increase in manufacturing employment in the 1950s is more rapid in Tokyo than in Japan as a whole. In contrast, the 1960s see a more rapid relative decline of manufacturing employment in Tokyo than in Japan. By the end of the period, at 31.7%, Japan's manufacturing employment levels have surpassed those in the capital (28.6%).

Average firm size increases more rapidly in Tokyo during the 1950s than in Japan as a whole but decreases faster thereafter. At the beginning of the period in 1951, the average manufacturing establishment employs 11.2 workers in Japan as a whole compared to 11.7 in Tokyo. Japan's average firm size in the sector increases to 16.2 workers in 1960 and stays at roughly these levels throughout the 1960s. Meanwhile, in Tokyo, the peak in average establishment size is reached in 1960, at 19.9 workers, at a time total employment in the sector also reaches its peak. From here, it decreases steadily, to 15.6 workers by 1972, i.e. it has become lower than the average establishment in Japan at that time. Tokyo's growth spurt in the 1950s, therefore, was characterized by a rising share in both manufacturing employment as well as growing average establishment size. Both trends were similar, but more pronounced than those observed at the national level. The 1960s saw a faster decrease in manufacturing employment in Tokyo than at the national level, coinciding with a decrease in Tokyo's average firm size. Here, trends between capital and nation diverged: Average firm size in Japan as a whole stayed stable throughout the 1960s.

[Insert Table 5 here]

The table above sheds light at the relative changes in employment shares by firm size, comparing Japan with Tokyo. Overall, we note that for Japan as a whole, and in line with the increase in average establishment size (see Table 4), small firms with less than 30 workers see their share in employment decrease while larger firms increase their employment share between 1950 and 1970. Meanwhile, trends in Tokyo are different. Here, the smallest firms with 1-9 workers see their relative employment share fall during the 1950s but increase robustly in the 1960s. The medium sized and larger factories with 30-99 and 100-299 workers peak in their relative employment levels in 1960, from where they recede in the decade after. Altogether, only the smallest and largest firm brackets increase their relative share in manufacturing employment between 1951 and 1970. By 1970, we see that Tokyo's manufacturing sector has a substantially larger small firm segment than Japan as a whole.

[Insert Table 6 here]

Table 6 provides another, indexed, view of the data from the previous table, and compares Tokyo's manufacturing sector with the national level by firm size. Note that the index's base year is 1960 given that statistics for 1950 were not as granular in the large firm size brackets so as to calculate the index from here. In Japan as a whole, there is a relatively broad-based growth in number of firms across the different size brackets from 1950 to 1970. Notable exceptions are slow growth records of the 1-9 segment during the 1950s as well as stagnation in the number of establishments between 20-29 workers in the 1960s. The largest firms, with more than 100 workers, record the largest overall growth during the period.

In Tokyo, the absolute changes in number of manufacturing establishments by firm sizes are different. The fastest growth takes place in the number of the smallest firms with 1-9 workers in the 1960s, with their number more than doubling. All other firm size brackets stagnate in their numbers during the same period, their rapid growth having already taken place in the 1950s. The above confirms Tokyo's manufacturing sector development between 1950 and 1970 as being divided into two distinct sub-periods. The 1950 saw employment growth take place across the board except for in very small firms. The share of the sector in overall employment increased until its peak in 1960. The 1960s then saw a decline of the manufacturing sector. This was evident in falling overall employment levels as well as fewer establishments in the larger firm segments. However, a peculiar countertrend also emerged: The number of very small establishments increased rapidly, and disproportionately so when compared to the national average.

Some explanation for these changes is needed here, because these significant changes in the composition of firms in Tokyo has a bearing on the performance and capital intensity analysis further below. There are several potential explanations for the relatively large proportion of small and medium sized factories in Tokyo's 23 wards toward the end of the period of observation. One of them has to do with the relative decline of large factories: They faced an acute scarcity of land in the urban setting and the corresponding land price inflation the most. This has "made it impossible to construct large factories or enlarge existing factories" (TMG, 1972b, p. 122). It is further argued that large firms moved out of Tokyo due to stricter pollution regulations as well as the enforcement of zoning ordinances from the late 1960s (TMG, 1972b, p. 123). The institutional aspects of this will be discussed in chapter four of this dissertation. Another explanation for the decreasing firm size in Tokyo was that these "smaller and petty factories aim at specialization by means of manufacturing a large variety of products at higher grade in small quantities". Finally, an intuitive explanation could also be that some of the larger firms were simply "decaying into undertakings of smaller scale" (TMG, 1972b, p. 126).

However, the data presented in this chapter challenges these narratives. The tables above suggest that firms in the large size bracket with more than 300 workers employed in fact a growing share of the manufacturing workforce and just about stagnated in their total number of firms between 1960 and 1970. It could still be that the most polluting of the large firms, as well as those requiring large amounts of space, moved their production outside of the 23 wards, e.g. into the neighboring prefectures or further afield in Japan.[6] In the hypothetical situation of the most successful and capital-intensive companies moving out of the 23 wards, the decreasing gap between small and large firms may be related to this shift that would only lead to relative improvements in performance of small and medium sized factories vis-à-vis their larger peers, *ceteris paribus*. The data presented above cannot definitely answer this question. However, data on firm performance shown further below will highlight the absolute as opposed to the relative improvements in performance of small and medium sized factories. This, at least in aggregate, also contradicts the argument that the increase in the number of small firms was due to the decay of firms in size brackets above.

[Insert Table 7 here]

An important explanation for the shifts in firm size and employment across the city may be explained by changes in the industrial structure of Tokyo's manufacturing sector. Table 7 above shows the changes in firm numbers as well as employment shares for some consolidated categories of manufacturing sub-sectors in Tokyo between 1952 and 1970. Sundry industries (e.g. textiles, leather, and ceramics) become less important both in terms of number of firms (falling from 39% in 1952 to 29% in 1970) as well as employment (from 25% in 1952 to 19% in 1970). Equally, firms in heavy industries, e.g. chemicals and steel, are accounting for a smaller proportion of total factories and employment when comparing 1970 and 1952. Conversely, electrics and equipment are

[6] We refer to footnote 30 in chapter four for more details on factory relocation in the 1960s and 1970s.

becoming more important, as are paper and printing and "others". The changes in overall manufacturing employment figures outlined in Table 4 are accompanied by relative changes by firm size segment (Tables 5 and 6) as well as intersectoral shifts amid a changing industrial landscape in Tokyo. The trend that average firm sizes first increased in the 1950s and then decreased in the 1960s is valid in a view across the different industries, too. The largest firms operate in the heavy industries as well as the electrics and equipment industry. It is of particular note that the fabricated metal firm size is the smallest on average, with 10.0 workers in 1970.

We confirm our observation from above that firms in the heavy industries decrease in both number of firms as well as workers employed. What is surprising is that they already appear to be markedly shifting out of the 23 wards before 1962, long before stricter zoning and pollution regulations began to be enforced in the late 1960s. And while a law promoting the relocation of industry had been enacted in 1959, its effects remained limited as it only applied to new firms with more than 1,000 square meters production site size. [7] The growing importance of small and medium sized factories in the 1960s is therefore not due to the demise of the large firm in central Tokyo but due to the strong growth of small firms in both absolute numbers as well as employment levels. This is particular true for the growth industries as highlighted above.

[Insert Table 8 here]

Next we analyze the spatial distribution of manufacturing employment across the 23 wards. The simplest way to do this is to show the different wards' share in overall factory

[7] For a more detailed discussion of the institutional context of the area of observation, please refer to chapter four.

employment and chart changes over time. Note that factory employment is distinct from manufacturing sector employment to control for white-collar administrative work taking place in manufacturing firms, particularly in the headquarters in the central business districts. The wards have been divided into several groups in Table 8, in line with the criteria established in the annex. We detect slight shifts in the geographic distribution of factory jobs during the period of observation. Most notably, the southern industrial wards (Ōta, Shinagawa and Meguro) increase their share in total factory employment from 1952 to 1960, from 20% to 26%. This share subsequently decreases to 23% in 1970. The northern and eastern industrial wards outside of the traditional 15-ward area (Kita, Adachi, Katsushika, Edogawa, Arakawa and Itabashi) account for the largest share of factory employment, which stays around 30% throughout the entire period of observation. The old central industrial wards (Sumida, Kōtō, Taitō and Bunkyō) see their share in the 23-ward total factory employment fall from 26% in 1952 to 22% in 1970.

We introduce here measures of variability across the 23 wards by way of coefficient of variation and Theil Index.[8] The comparability of these indicators across different datasets is not of primary concern. Instead, we can capture how much spatial stratification took place across time. We are therefore interested in broad trends in either of these series. The coefficient of variation for the dataset above captures the variability among the wards' shares of total factory employment, not weighted by the wards' respective population. The increasing figure from 1952 to 1960 suggests that there is some spatial stratification taking place in the 1950s, i.e. differences between the individual employment shares across those two points in time getting bigger. Between 1960 and 1970, the coefficient of

[8] For a complete discussion of these two metrics, their benefits as well as their shortcomings, please consult the Annex.

variation decreases, suggesting an equalization, or levelling, of these differences across the territory of the 23 wards. The Theil Index, another measure of inequality that is weighted by the size of its constituents, confirms the reading of the simpler but perhaps more intuitive coefficient of variation. By the end of the series in 1970, the variability in employment shares across the 23 wards has almost returned to levels observed in 1952. This is not to suggest that there is an evenly spread distribution of manufacturing jobs across the 23 wards. In fact, some wards in the west of the 23 wards account for very little of the total manufacturing employment. However, what the data above suggests is that these differences did not further increase during Tokyo's rapid postwar growth period.

[Insert Table 9 here]

The table above shows the average firm size in geographical terms, using the same classification of wards as presented in Table 5. The old industrial wards have the smallest average firm size, corresponding to their image of the base of the small workshop economy, with a high proportion of owner-operated factories. In 1970, the average manufacturing firm here employed 10.1 workers. The central business wards, on the other hand, exhibit the largest average firm size with 23.6 workers in 1970. The same trends as observed above can be detected in this view, too: First, average firm size increases across the board during the 1960s, before it then decreases again in the 1960s. The variability metrics also echo the observations from Table 8: A period of some mild stratification in the 1950s is followed by a more even distribution of firm sizes. The differences in how big firms were across the 23 wards were becoming less pronounced in the 1960s.

Another important characterization of Tokyo's manufacturing sector will be discussed below, where we will analyze the significant clustering of certain industries, i.e. their spatial concentration, across the different wards. Some industries had very important centers that amassed a substantial proportion of the 23 wards' total number of their factories. Printing and publishing, for example, was concentrated in the central wards with a high number of universities and proximity to government institutions. Other industries that clustered, primarily in the southern wards, were machinery and transport equipment. In contrast, there were industries exhibiting little spatial stratification, e.g. heavy industries and fabricated metals. Moreover, as the analysis will show, some industries experienced centrifugal and others centripetal forces between 1952 and 1970. Outward-looking industries integrated in increasingly complex and (inter-)national supply chains tended to cluster, while those producing for the urban market became less spatially stratified.

This chapter has so far shown that manufacturing accounted for a disproportionate share of employment in Tokyo. Average manufacturing firm size increased during the 1950s, then decreased in the 1960s. Towards the end of the observation period, firms on average became smaller than at the national level. The period of observation witnessed some structural shift away from sundry and heavy industries into paper and printing as well as electrics and equipment. Small fabricated metals workshops accounted for the second largest contingent of factories. In terms of geographical concentration of manufacturing activity, the 1950s saw some spatial stratification away from the old industrial wards closer to the center to those in the south of the 23-ward area. The 1960s, in turn, saw a levelling of these differences.

The competitiveness of small and medium sized factories

We have outlined and contextualized the changes taking place across Tokyo's 23 wards and its various industries during the postwar period above. We can now move on and give evidence of firm performance accompanying these changes. We contend that small and particularly medium sized factories caught up with larger firms in terms of their productivity and capital intensity during the period of observation. In making this argument, this section relies on several efficiency ratios as computed from manufacturing census and other primary data. Tokyo's manufacturing census only started to include fixed asset data from 1969 onwards, i.e. right at the end of this study's period of observation. Before that, it was limited to profit and loss items. Moreover, firm size thresholds over the different census years vary, making comparability within Tokyo as well as vis-à-vis Japan somewhat challenging.

Several important metrics are introduced. Value added equates net sales (gross sales minus cost of goods sold) divided by the number of workers engaged in the realization of these sales. This is an efficiency metric that allows drawing some conclusions regarding the utilization of labor. Increases in value added can have three reasons: One, the quality of the labor has increased, e.g. by firms hiring more qualified staff. Two, the amount or quality of capital, e.g. machinery, has increased. Three, a new technology, standard, or invention is employed in the production process. While such technology is often embedded in either capital or labor, there may be some exogenous, unexplained residual improving the factor combination over time (often referred to as total factor productivity, TFP). Compensation refers to total labor remuneration divided by the number of workers and allows comparing wage levels and developments. Total labor cost shows what percentage of net sales (the "top line") accrues to the payment of labor. The interplay between these two indicators is intuitive: For example, if compensation increases faster than value added, total labor cost increases, and vice versa. Rather than analyzing absolute values only, we also present them indexed to a base year so as to allow for easier comparisons across industries and across time.

None of these indicators allow us to make definite inferences with regards to factor intensity, e.g. how intensively labor or capital are being used, and how this changed over time. How does one measure capital intensity? The capital-labor ratio (K/L) is the broad macroeconomic identity normally referred to. There is no single way of calculating it for manufacturing firms using manufacturing census data consistently over time. However, a good indicator should characterize the quantity of fixed production assets on a per-worker basis. Fixed assets net of depreciation are a good proxy for the former, although some unproductive assets may be included here.

There are no universally agreed upon values or thresholds that define labor or capital intensity (Amjad, 1981, p. 3). Again, the aim of showing their values in this section is to compare industries, firm sizes or points in time with one another rather than making definite statements on how capital or labor intensive a certain industry or firm size bracket was. We complement capital intensity with fixed asset turnover to establish whether productive assets are used (more) efficiently (over time). The question one can answer with this value is "how many yen of sales did a company or an industry generate from each yen of its assets?" A declining turnover ratio may have several reasons. It may suggest that an industry is upgrading its plant and equipment, or that its fixed assets are not used as efficiently anymore as before, perhaps by being operational for less hours on a given day.

Why would one expect different levels of capital intensity depending on firm size? Smaller firms face factor prices “which more closely reflect scarcity prices of capital and labor” (Amjad, 1981, p. 4), primarily because they do not have access to the same concessions as larger firms. These concessions include tax holidays, accelerated depreciation allowances and institutionalized credit markets, offering them lower interest rates compared to their smaller peers. On the other hand, larger firms are often subject to stricter minimum wage legislation while smaller firms can usually pay lower salaries. As a result, larger firms are incentivized to utilize more capital-intensive production techniques compared to smaller firms.

There are significant limitations in showing labor or capital intensity by way of a simple capital/labor ratio. We have already alluded to the limitations of a two-sector model in capturing exogenous total factor productivity or other constraints on production (e.g. managerial capacity, foreign exchange limits). Further conceptual difficulties relate to the market price valuation of both labor and capital (Amjad, 1981, p. 4). For example, there may be a significant mispricing of capital goods in relation to their scarcity value due to government policy (artificially high exchange rates, low interest rates, accelerated depreciation allowances, etc.). The valuation of long-lived fixed assets can vary substantially depending on the method employed (market prices, acquisition value minus accumulated depreciation, etc.). Finally, and crucial for the purposes of this paper, a two-sector model limiting itself to the two factors of production labor and capital omits the potential explanatory power of land. Alternatively, as this chapter will ask, what role does "space" play in explaining economic outcomes? It will be argued further below that small firms managed not only to catch up in terms of capital intensity. They were also able to produce with more space intensity than their larger peers, explaining their success in Tokyo's 23 wards.

[Insert Table 10 here]

To begin with, we establish the national baseline against which to compare Tokyo in Table 10 above. We observe increasing capital intensity in Japan between 1951 and 1972, growing from JPY 0.11 million per worker in 1951 to JPY 2.46 million in 1972. Expressed as an index with 1960 as the base year, capital intensity increases from 19% of 1960 values in 1951 to 413% in 1972. This trend is consistent with "industrial upgrading", i.e. Japan moving up the value chain into higher productivity sectors that employ more advanced technology and, as a corollary, more capital on a per worker basis.

Concurrently, fixed asset turnover decreases, i.e. the increase in capital intensity outweighs simultaneous increases in value added. However, this trend takes place mainly in the 1950s. One yen of fixed assets generates 1.39 yen in value added in 1950 and only 0.74 yen in 1960. From here on, fixed asset turnover stays broadly stable, moving sideways to 0.66 yen in value added per yen of fixed assets in 1972. This suggests that relatively more fixed assets employed in the production process did not lead to higher productivity per unit of fixed asset employed as they did in the 1950s. In other words, increases in production in the 1960s are explained by relative increases in the factors of production, while in the 1950s, they were primarily exogenous in nature. Absolute compensation per worker increases rapidly, in line with fast GDP and wage growth. Given that value added does not increase as rapidly as compensation per worker, total labor cost (as percentage of net sales) increases from 41.1% in 1951 to 52.9% in 1972.

[Insert Table 11 here]

Table 11 provides further details for the capital intensity of various industries in Japan and Tokyo's 23 wards. The 1970 MITI Census of Manufactures provides fixed asset data for both firms with 19 or less and 20 or more workers, a fairly crude but useful separation between small and larger firms. The table shows fixed assets employed per worker in millions of yen. In the small-firms segment, we see that firms in the 23 wards are only marginally less capital intensive than their national peers. There are two outliers, heavy industries on the one hand (small firms in this segment in the 23 wards only employ 60% of the relative capital of their national peers) and electric equipment on the other hand (small firms in the 23 wards employ 135% of the capital of their national peers). The distance in capital intensity between the 23 wards and the national level is higher in firms with 20 or more workers. Once again, heavy industries (37%) and electric equipment (95%) are the two outliers. Interestingly, at 66% of national capital intensity, the important printing and publishing segment in the 23 wards is significantly more labor intensive than firms in Japan as a whole.

[Insert Table 12 here]

Table 12 provides data on the performance of Tokyo's manufacturing sector by firm size, using 1960 as the base year (thus representing 100% across all firm sizes and performance indicators). In line with Table 11, which showed this data for Japan as a whole, we present here total labor cost, compensation per worker as well as valued added per worker. This profit and loss data is readily available from 1955 onwards. Most firms, irrespective of size, increase their total labor cost between 1955 and 1965, but then manage to reduce them in the five years leading up to 1970. The only exception to this are small firms with 10-19 workers, which see their total labor cost increase from 1965 to 1970. Compensation grows fastest in the smaller firms in relative terms. Likewise, value added increases relatively faster the smaller the firm is. This suggests that the biggest relative productivity gains between 1955 and 1970 occur in Tokyo’s smaller manufacturing firms with 10-29 workers. Comparing Tokyo’s total figure in the last row to the nationwide data, we find that compensation in Tokyo, too, outstrips value added growth (382% of 1960 values in 1970 for compensation compared to 366% for value added). Value added increases faster in Tokyo than in Japan as a whole. While we do not have data for 1970 for Japan as a whole but only for 1969 (279%) and 1972 (367%), we can infer this value lying somewhere in the middle. Tokyo, therefore, looks like being two years “ahead” of Japan in value added growth, a significant difference, especially when taking into account that small firms account for a substantial part of this productivity growth.

[Insert Table 13 here]

Table 13 presents the data from Table 12 as absolute values. We also insert here a measure of variability, which shows an increasing homogeneity of the various firm sizes regarding some of their profit and loss metrics. This is captured by the coefficient of variation, which declines markedly for compensation and value added between 1955 and 1970. This suggests that the differences between small and large firms were becoming less pronounced during the period of observation, as is evident from their diverging growth rates seen in Table 12 (e.g. smaller firms growing faster in terms of their value added than larger firms). The most important driver of this trend is the firm segments with 10-29 workers. These are catching up fastest to the overall average in terms of labor productivity from 1960 to 1970 as discussed above.

The analysis above challenges some popular narratives. The first holds that it was primarily under the governorship of Minobe starting in 1967 that progressive policies in the environmental field led to heavy and polluting industries shifting out of central Tokyo. We recall from the analysis above (contours of the manufacturing sector in Tokyo) that many large firms, particularly in the heavy industries segment, had already left the 23 wards by 1960, from where their numbers remained broadly stable. Another belief holds that the decrease in the difference in productivity between small and large firms is primarily due to successful large firms leaving Tokyo's center, leaving behind relatively unproductive large firms that operate much more akin to smaller firms, e.g. with more labor intensity. While we can neither fully prove nor refute this view due to a lack of detailed data, we have observed that overall, value added performance for firms in Tokyo outstripped that of Japan. This suggests that at least compared to the national level, small firms in Tokyo remained competitive. It is also noteworthy that the most important catching up in terms of relative productivity between small and large firms had already taken place by 1965.

[Insert Table 14 here]

How did firm performance evolve depending on industry between 1955 and 1970? Table 14 presents major industry categories and their profit and loss metrics using 1955 as the base year, for which absolute values are shown. In total, Tokyo's manufacturing sector increased its compensation and value added by 522% and 523% between 1955 and 1970, respectively, as can be seen in the bottom of the first column. Meanwhile, labor cost stayed relatively stable throughout the period, at around 40% of value added. Note that the differences in these values to Table 13 stem from the fact that firms with less than five workers are included in Table 14, bringing down the averages somewhat as these small firms are less profitable and pay lower wages. There were relatively few outliers in terms of industry during this period in terms of compensation and value added growth, with the notable exception of transport equipment manufacturers. These did increase value added (to 705% of 1955 values by 1970) and decreased their labor costs (to 74% of 1955 values by 1970) disproportionately compared to the average. It is also noteworthy that sundry industries keep up with the average in terms of compensation and value added growth during this period, albeit starting from a lower base in 1955. Fabricated metals and machinery record disproportionately fast productivity growth between 1955 and 1960, but lag behind the average growth somewhat thereafter during the 1960s.

[Insert Table 15 here]

We now move into the analysis of one particular year in time, i.e. 1970. We choose this year for obvious reasons. On the one hand, the period of observation of this study comes to an end here. On the other hand, for the first time, we can present detailed and comparable fixed asset data for the 23 wards which help contextualize capital intensity in the capital. Comparing Japan with Tokyo in 1970, we see that for all firm sizes, Tokyo's manufacturing sector is significantly less capital-intensive than the national average; assets are also turned over almost twice as fast compared to nationwide levels. Moreover, the difference in capital intensity between the smallest and the largest firms is less pronounced in Tokyo than Japan as a whole, driven primarily by significantly less capital intensity in large firms in the latter compared to their national averages. Wage levels are higher in Tokyo than nationwide across all firm sizes. Total labor costs are also higher in Tokyo than in Japan as a whole, particularly for smaller firms. Meanwhile, despite employing less capital, firms in Tokyo are more productive in terms of value added, a major finding so far. Another important finding in this presentation of the data is that the distance between small and large firms' performance is significantly less pronounced in Tokyo than in Japan as a whole, except for total labor cost. By way of coefficient of variation analysis, we see that this is particularly the case for capital intensity and compensation.

[Insert Table 16 here]

In a more detailed view of Tokyo in 1970, we can access more granular information available for different firm sizes. We see once more that capital intensity is increasing with larger firm sizes. Fixed asset turnover is decreasing with increasing firm size. Compensation shows relatively little variation across the different firm sizes; firms with 1,000 workers and more pay 28% more than the average worker compensation. Total labor cost decreases with increasing firm size, in line with growing capital intensity. All throughout, coefficients of variation have been calculated to show the variability of these corporate indicators across the 23 wards. There is the tendency for variability to increase with increasing firm size. This means that the smaller the firms, the more uniform they are in most of their corporate metrics across the geography of the 23 wards. However, in several of the indicators, firms between 30 and 99 workers are in fact the most homogenous group.

The above has charted the development of Tokyo's urban manufacturing sector with reference to that of Japan as a whole. Aggregate employment figures for the sector were complemented by a more granular firm size bracket view as well as a split by industry and geographic location within Tokyo. Manufacturing was more important in Tokyo than in Japan during the 1950s and most of the 1960s. The sector's growth is a key explanation for why Tokyo outperformed Japan as a whole in terms of economic growth during the 1950s. While this growth took place with larger firm sizes in Tokyo than in Japan initially, smaller firms became more important in Tokyo than in Japan as a whole in the 1960s. This together with a changing sectoral composition did not lead to spatial stratification across the 23 wards.

We have identified several other distinctive features of Tokyo's manufacturing sector. It paid higher wages, perhaps no surprise given the capital wage premium that attracted people to the city in the postwar period. This wage premium led to higher total labor cost for firms in Tokyo compared to Japan as a whole. This may have been one reason for the relatively lower capital intensity with which businesses were being run in the capital compared to Japan as a whole. Nonetheless, firms across the board became more capital intensive as time went by. Most notably, the difference in capital intensity between small and large firms was not nearly as high in Tokyo as it was in Japan as a whole. The same applied to profitability. This may suggest that small firms remained competitive thanks to moving up the (more capital intensive) value chain. This occurred across a range of industries, not just the modern and increasingly outward-looking machinery and electronics sectors. The intuitive contrasts of "modern" vs. "sundry" and "big firms are capital intensive, small labor intensive" therefore require serious qualification in Tokyo's case.

Towards a model of postwar labor-intensive industrialization

What explains the success of the small factory in postwar Tokyo, particularly in the 1960s? The following section will list and develop several factors that helped small firms prosper compared to their larger peers.

First of all, we must highlight the numerous continuities with the prewar period, going as far back as the Tokugawa period. Many of them are discussed in the history chapter supplement and need not be dealt with in detail here. Small manufacturers benefited from their proximity to one of the largest urban markets in the world. This was, and continued to be, a market with sophisticated and varied consumer preferences as well as shorter product and commodity cycles than compared to other urban centers in Japan. Small factories in Tokyo also benefited from a flexible and relatively well-educated labor force. Moreover, Tokyo had a rich tradition of home-based work, i.e. affording the small manufacturing sector flexible locations across a broad geographical spectrum of the city's urban space. Small factories were more successful than larger ones in adapting to some changing institutional constraints, in particular regarding zoning (and later environmental) regulations. A sizable proportion of small firms also exported their goods abroad and thus had to satisfy foreign customer preferences, which increased their competitiveness at home.

The postwar period saw some important modifications and additions to this successful growth model. We have already identified above that small workshops became more capital intensive as time went by. We infer from this that they employed better technology and, as a corollary, required more skilled labor. These firms were part and parcel of the "upgrading" of the Japanese economy due to their adoption of new technology as well as increasing innovative capacity. This did not just occur in growth sectors such as machinery and electronics, but across the board, including in what are widely held to be "backward" segments of the manufacturing sector. Many of these small firms were increasingly integrated into a regional, national and eventually (albeit primarily beyond this study's period of observation) global network of production, no longer producing predominantly for the urban market (K. Fujita & Hill, 2005). Home-based work remained important; not in the form of live-in apprentices but increasingly company dormitory residents.

This section is split into two parts. The first main part focuses on the supply side of the labor-intensive industrialization model. I employ a factor of production approach and (re-)introduce land (or, alternatively, space) as a factor of production distinct from capital. This will help describe an environment that favored small factories over their larger peers. There were also intrinsic advantages small factories faced with regards to the supply of labor. On the demand side, we will describe how the urban agglomeration's large market made smaller firms more competitive vis-à-vis their larger peers. We also show that small factories increasingly exported their goods, helped by their growing integration into more complex production chains toward the end of the period of observation.

Space as a factor of production

Urban land

Factors of production—primarily thought of as land, labor and capital—are the resources that are employed to generate an output of goods and services.[9] Agricultural production

[9] B. Xu and colleagues refer to S. Xu's six-factor theory of production (1965), which includes the factors of production labor forces, physical forces, financial forces, natural forces, transport forces and time forces.

represented the bulk of total economic output in pre-modern times, which is why early economic theory regarded land as the most important factor of production. This led to a focus on the quality of inputs into agricultural production, e.g. soil, seeds, technology, water, which then explained variations in agricultural yield. With the onset of industrialization and urbanization in the nineteenth century in Europe, labor and capital instead became the focus, with land increasingly marginal to explaining economic processes, at least in the eyes of the dominant economic theorists. The neoclassical revolution further cemented this neglect in the twentieth century by equating land with capital.

Many economists have taken issue with this. According to them, land and capital are intrinsically different, even mutually exclusive factors of production. For example, Gaffney argues that, in contrast to capital, land is not reproducible and its supply fixed. Land is also immobile in space and has no uniform use to a firm (Gaffney, 1994, p. 58). Land is by its nature heterogeneous, i.e. no two parcels are alike. Differences arise because of natural characteristics, e.g. size, shape or topography. Other differences exist because of institutional factors, e.g. zoning (see below) or the provision of tax breaks within export-promotion zones.

Taking these differences into account, Metzemakers and Louw have theorized how to (re-) establish land as a production factor, primarily if it is used as a site for manufacturing activity. To them, land can be considered in terms of its location or in terms of its quantity. As regards location, because land is physically immobile, fixed in space and has location-

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This hints at a potentially promising body of research in Chinese, with whose help spatial characteristics of cities may be analyzed more fully (Xu, Chaudhry, & Li, 2009, p. 221).

specific attributes, its suitability for hosting industrial production varies. Secondly, the quantity of land is important not in terms of a point in space, but regarding the amount of land which is used for production, therefore allowing inferences as to the intensity with which it is being used (Metzemakers & Louw, 2005, p. 18). These points are important for explaining the success of small factories in postwar Tokyo. First, industrial land in Tokyo benefits from its proximity to the other production factors labor and capital, as will be shown below (location). Second, land in the 23 wards is limited and production sites generally smaller than outside of this area, making land use more intensive per unit of output (quantity).

While land continues to be absent from the mainstream body of economic theory, it was the renewed focus on the environment that brought the analysis of the characteristics of land back into the frame of several academic sub-disciplines of economics, i.e. agricultural and land economics, environmental and resource economics as well as spatial economics (Hubacek & van den Bergh, 2006, pp. 22, 36). Spatial economics drew support from the increasing frustration of some economists that by the late 1980s, "mainstream economists were almost literally oblivious to the fact that economies aren't dimensionless points in space—and to what the spatial dimension of the economy had to say about the nature of economic forces" (Krugman, 2010, p. 1). Spatial economics generally avoids talking about land as a factor of production per se, instead preferring terms like "location", "region" or "space". We will look at each of these in turn.

New economic geography is most closely associated with the first term, "location". The sub-discipline focused on the economies of agglomeration, i.e. the positive effect physical proximity to each other has on the performance of firms, particularly in cities. Cities also offer positive externalities, e.g. modern infrastructure, a highly specialized labor force and specialized input services, and firms benefit from their relative distance to these, offset by the disadvantages of congestion and higher cost (M. Fujita & Thisse, 2002, pp. 2–9). Among the key questions asked are "Where is the land situated with regards to other factors of production?", or "How does the physical location and its distance to other economic factors affect total factor productivity, i.e. portion of output not explained by the quantities of labor and capital (and land)?"

Regional economics puts the focus on the "region". Dubey has defined the discipline as "the study of differentiation and interrelationships of areas in a universe of unevenly distributed and imperfectly mobile resources with particular emphasis in application on the planning of the social overhead capital investments to mitigate the social problems by these circumstances" (Dubey, 1964, p. 29). An important tool of enquiry is the study of spatial inequalities between regions, usually between structurally weak areas within a country or sub-region and relatively affluent areas. Regional economics have been at the forefront of developing the tools and methods not only regarding the measurement of spatial inequalities, but also for the redistribution of resources with a spatial focus, i.e. via fiscal transfer mechanisms between regions, or regional subsidies.

Finally, in a narrow sense, "space" as employed by spatial economists is perhaps most closely associated with the word "distance", and therefore similar to the "location" introduced above. However, "space" as a wider concept echoes through the academic disciplines and defies an easy definition. The two most important Marxist theorists of the concept are David Harvey and Henri Lefebvre. Lefebvre's *The Production of Space* elaborates the French philosopher's understanding of the social rather than the physical elements of space. Contrary to a strict scientific understanding of the qualities of space and time, both their experience is determined largely by the conditions under which they were encountered (Lefebvre, 1992). In other words, "space is not only a passive recipient of meaning" but becomes its generator (Arnade et al., 2002, p. 518). This makes space as much a productive force as technology, capital and labor. This is particularly the case in cities: One of the reasons they have grown historically is the development of capitalism. At the same time, forces of urbanization have also shaped the development of capitalism.

David Harvey further contributes to our understanding of spaces in an urban capitalist setting. His *Social Justice and the City* proposes a tripartite division of space (Harvey, 1973). The absolute space is the scientifically observable, "Newtonian" space. The second, relative, concept of space suggests that there are multiple ways with which to measure space, and which one we choose depends heavily on who (where, and when) we are. The third, relational, concept of space is associated with Leibniz, who claimed that there "can be no such thing as space outside the processes that define it" (Harvey, 2004, p. 4). In other words, "[I]f I ask the question: what does Tiananmen Square or 'Ground Zero' mean, then the only way I can seek an answer is to think in relational terms" (Harvey, 2004, p. 5).

According to some authors, the differences in the conception of space between these two authors were significant, and "while Lefebvre promoted the development of a comprehensive theory of the production of space, Harvey pursued a more narrow project: a political economy of space" (Schmid, as cited in Goonewardena, Kipfer, Milgrom, & Schmid, 2008, p. 8), which is primarily about (the effects of) spatial differentiation: For him and other Marxist geographers, the spatial relations of human geography had to be understood as a result of an uneven material production and resulting social structures.

What can we derive from these two authors regarding our study of Tokyo's labor-intensive industries, or beyond this chapter, other socio-economic aspects of the 23 wards? The measurement of space becomes harder the more we move toward a relational understanding. People's conception of space may be far more complex than its physical attributes or our reading of indicators may suggest. We will later describe how difficult it is to compare living standards across time and space, also because the understanding of space (e.g. "crowding") differs depending on who (and when) the observer is. The relational aspect is also important in explaining why people may put up with low living standards as long as their (spatial) distribution is relatively equal, which is something we will also touch upon in the third chapter.

The important, non-absolute features of space with regard to small enterprises are perhaps most closely linked to small and medium sized factory owners and employees and their relationship with the spaces they inhabit. Many of these qualities are hard to quantify: They are conditioned by people's shared history, values and culture; they determine how space is popularly perceived; and they imprint social capital in space. As regards the latter, in a study of Dutch entrepreneurs, it was found that strong local ties and social capital are positively correlated with firm success (Schutjens & Völker, 2010). Despite this, "traditional models in urban economics do not consider the presence of social interactions and social capital in cities" (Patacchini, Picard, & Zenou, 2015, p. 2). Social capital is an elusive concept and not directly observable other than via its manifestations (e.g. levels of trust) or behavioral consequences (Radnitz, Wheatley, & Zürcher, 2009). Nonetheless, although this study is no attempt to measure manifestations of social capital, we seek to go further in explaining the success of small and medium sized factories than by only referring to its economic causes. Mixed-use, home-based work and urban intensity are some of the sections in the ensuing text that must be thought of in this way, and can perhaps best be summarized by the term "industrial community" (Takeuchi, 1985, p. 42).

Having elaborated on the properties of location, region and space, we will employ these three concepts to reestablish land as a production factor in an urban setting, specifically for Tokyo's 23 wards between 1945 and 1970. We will use "urban land" and "space" interchangeably and contend that space was an important explanatory variable that, besides capital and labor, accounted for the superior performance of small and medium sized factories. Accounting for the blurred notion of the terms, especially space, we cannot strive to provide an exhaustive list of these characteristics for the 23-ward area. However, by presenting some of them, we may contribute to the methodological treatment of space for economic history.

For our analysis of postwar Tokyo, we will highlight the following characteristics of space that explain why small and medium size factories were more successful than their larger peers. First off, as the supply of urban land is highly limited and as a result land is subdivided into relatively small plots, Tokyo has a long tradition of mixed-use dwellings. These "tool houses" served as the prime locations of small factories. Their owners' economic success improved the look and feel of a neighborhood much more than in a segregated use scenario, i.e. in which they lived and worked in separate locations. These small firms benefited from a permissive zoning regime that allowed different uses (primarily residential and industrial) to co-exist in close proximity. This was not only important for tool houses but also for small and medium size factories adjacent to residential dwellings. As a result of this, these firms could enjoy several locational advantages over their larger peers, access to the large urban market being one of the most important one. Furthermore, they benefited from a whole array of agglomeration benefits, as the second segment of this section will show. The third segment will describe the concepts of land and space efficiency, respectively. This section concludes with a discussion of the relatively novel concept of urban intensity.

Mixed use, the "tool house" and permissive zoning

The relative scarcity of urban land has historically led to an efficient use of space in Tokyo. As described in the historical supplement, this entailed the mixed use of dwellings for residential, commercial and industrial purposes. This pattern was maintained in the postwar period, as data from two housing surveys in the 1960s shows.

[Insert Table 17 here]

In 1963, 14.1% of all dwellings in Tokyo combined residential with commercial or industrial uses (no split is available for these two categories), compared to 13.4% in 1968. National data is available from 1968 onwards, only. In Japan as a whole, 10.8% of all dwellings were used also for commercial or other purposes in this year (Statistical Survey Department 2008). Tokyo, therefore, had a higher share of mixed-use dwellings than Japan. The table above has further details on how the share of mixed-used to total dwellings varied across the 23 wards. We see that the central business districts have the highest share of mixed-use dwellings, also explained by the area's large contingent of retail and other commercial establishments. There is likely more industrial co-use in the old industrial central wards of Kōtō, Sumida, Taitō and Bunkyō. Here the mixed-use percentage is 26.7% and 26.0% in 1963 and 1968, respectively. These wards also have the highest share of small firms as was shown above. Such small factories were often owner-operated and family-owned.

The share of mixed-use dwellings remains relatively stable throughout the 1960s across the different ward groupings, and the variability between the wards in terms of mixed-use percentage of total dwellings declines, i.e. the relevant coefficient of variation decreases from 67.1% in 1963 to 61.6% in 1968. Despite a fall in overall manufacturing employment levels, mixed use of dwellings therefore remained important. More detailed data is available for 1963 as to what share of the overall population lived in mixed-use dwellings (not shown in table). With both larger household sizes in the traditional industrial areas as well as often more than one household sharing the dwelling (due to live-in apprentices and other boarding employees), the share of the population living in mixed-use dwellings as a proportion of total population was even higher, at 18.7% (compared to 14.1% of mixed-use dwellings as of total dwellings).

Urban theorists have elaborated on the importance on mixed-use dwellings in postwar Tokyo, conceptually establishing them as “tools of production”, or “tool houses”. In postwar Tokyo, many houses built were based “on the template of the traditional Japanese house, in which a single structure can serve as a shop, workshop, dormitory or family house – and possibly all of those things at once” (Echanove & Srivastava, 2013). These tool houses represented a response to the land scarcity and were home to the smallest of factories, primarily in the segment with one to four workers. Nakabayashi found that, as of the early 1970s, 81.7% of business owners in the *shitamachi* area either lived in the same building as their business, on the same site, or in walking distance (Nakabayashi, 1978, p. 165). The mixed-use pattern was tightly imprinted into neighborhoods and could not be easily unwound when environmental regulations became stricter in the late 1960s: "It is impossible to purify the mixed area without burning. Nevertheless, it is surprising that the fundamental policy in Katsushika ward until 1975 was to expel factories and to make residential districts full of sunshine and trees. This way of thinking was common to all wards" (Takeuchi, 1985, p. 41).

Japan's first zoning regime was part of the 1919 city planning system (Sorensen, 2002, pp. 114–118). It had three types of land uses, i.e. residential, commercial and industrial. The system was never intended to rigidly separate land uses which the term "zoning" implies today. Instead, the Japanese system was conceived to be flexible, formalizing existing uses rather than inhibiting them. The only restriction was that heavy industry was confined to industrial zones. Apart from this, intermixtures continued. The 1919 regime was not implemented in Tokyo until 1925, when it was incorporated into the city's reconstruction plan following the 1923 Great Kanto Earthquake. In the zoning regime's 1929 revision, factories using motors with 3 horsepower (hp) or more were prohibited in a residential zone. This limit was 15 hp in commercial zones and 50 hp in industrial zones. A "zone not yet specified" allowed motors up to 50 hp. Until 1936, this system was only enforced on the extension and construction of new factories (Imaizumi, Ito, & Okazaki, 2016, pp. 55–57). Until 1968, the prewar zoning regime remained more or less intact, the major restriction remaining that the largest factories were permitted only in industrial areas. In residential areas "virtually all uses from small factories to department stores were allowed, and housing continued to be built in industrial areas" (Sorensen, 2002, p. 230). The permissive nature of the system is further evidenced by extensive “grandfathering”, i.e. the confirmation of existing uses rather than their prohibition going forward.

Another peculiar aspect of Japanese zoning regulation even after a new and more elaborate system was promulgated in 1968 and put into force in 1969, was that zones tended to be small. Therefore, it was common that residential zones were immediately adjacent and in effect, intermixed, with commercial and industrial districts (Sorensen, 2002, p. 221). While this also had negative effects, primarily the existence of residential areas next to heavy industrial areas with the associated health risks for residents, the positive aspects of mixed-use particularly in the ward area have been widely noted:

> The fragmentation of urban space in Japan has thus primarily positive connotations, for this guarantees variety, liveliness, color, variability and contrast with simultaneous integration in a common network which makes for cohesion. (Hohn, 2000, as cited in Sorensen, 2002, p. 222)

The zoning regime was in practice of little relevance to factories with less than 15 workers, and highly permissive to medium sized factories unless they were heavy polluters, particularly toward the end of the period. This gave them a clear advantage over their larger peers. The authorities’ *de facto* indifference to small factories was mirrored in the perception of the inhabitants. Wards with a high density of very small factories saw proportionately fewer complaints about their noise, pollution or other associated nuisance (TMG Statistical Yearbook, 1970, p. 479). This may suggest the long acceptance of a dense living environment among the traditional *shitamachi* residents. The mixed-use character of Tokyo’s neighborhoods may therefore be considered the city’s default typology in large parts of the 23-ward area.

Agglomeration effects

We have already established above that Tokyo's 23 wards hosted a variety of industries (see Table 7). We can therefore speak of Tokyo as a "diversified city", as opposed to a "specialized city" (M. Fujita & Thisse, 2002, p. 119). Historically, cities were diversified due to higher transport costs, which made importing products more expensive the further away they were being sourced from. With the emergence of modern transportation technology and resulting lower trade costs, one could expect the growing specialization of cities due to increasing returns to scale. What, therefore, accounts for the continued growth of diversified cities? Fujita and Thisse list three main factors, all of which are relevant to Tokyo's long-term success (M. Fujita & Thisse, 2002): The first one relates to economies of scale associated with a large number of common intermediate goods and public services and which two unrelated industries may benefit from if they co-locate. As this co-location requires more workers, commuting times increase, which puts upward pressure on wages and productivity. The second factor is the diversified city's resilience to industry-specific shocks. If one sector is disproportionately affected by a downturn, workers can move into other industries more easily. The third reason echoes Jane Jacob's 1969 *The Economy of Cities* and refers to the innovation inherent in diversified cities. New producers learn through observing other production processes, they can borrow and adapt them for their own products (J. Jacobs, 1969, p. 57).

Besides being a diversified city on aggregate, we have also highlighted that Tokyo's manufacturing activity was relatively evenly distributed across the city, and more importantly, did not spatially stratify over time. However, some industries "clustered" in certain wards, as the next section will highlight. In other words, there were significant spatial concentrations of *specific* manufacturing activities, and these also changed throughout the period of observation.[10]

The benefits of certain locations to economic activity can be viewed from the micro (urban economics) as well as the macro level (new economic geography). The micro level usually focuses on the benefits of co-location to individual firms. The macro level usually looks at agglomeration effects and positive externalities. Externalities include but are not limited to mass production, availability of specialized input services, a highly specialized labor force and the existence of modern infrastructure (M. Fujita & Thisse, 2002, p. 8).

In Tokyo's case, why did small firms benefit more from this clustering than large firms? To answer this question, we need to understand the traditional production processes in these clusters. The *ton'ya* wholesale merchant system was already described earlier in this dissertation. In short, it entailed the coordinating activities of an agent who oversaw a production process split into many intermediary steps which took place across a variety of firms. This led to the emergence of small and highly specialized companies focusing

[10] A concurrent trend must be highlighted. The headquarters of national companies increasingly clustered in the three central business wards toward the end of the period of observation. These did not house any substantial manufacturing activity, but coordinated nationwide and increasingly international production processes from here. We argue that these two aspects, i.e. the egalitarian distribution of manufacturing activity across the 23 wards on the one hand, as well as clustering of certain activities and the growth in central headquarters on the other hand, were not mutually exclusive trends, but in fact supported one another. The increase in value-added accrued disproportionately to firms in sectors that were showing agglomeration tendencies. In this, Tokyo's experience adheres to the theoretical argument that spatial agglomeration accelerates industrial development in an urban context (M. Fujita & Thisse, 2002). Moreover, in Tokyo's case, large companies headquartered in the central business wards also coordinated successful small factories via subcontracting relationships. Most of the employment in manufacturing, however, was accounted for by other industries which were spread much more evenly across the 23 wards. This directly contributed to a more equal distribution of income, increasing the purchasing power in the ward area, further aided by a large pool of well-paid white-collar work in the central headquarters. Together, these two factors helped increase demand for locally-produced manufactured goods, primarily in the sundry sectors. Given Tokyo's size, this also had important ramifications for aggregate demand at the national level.

on a specific part of the production process, e.g. pressing, cutting, molding and forging in metal and iron works. This specialization allowed for a high degree of horizontal labor mobility: The skills needed for one production process were usually highly relevant to different, but related products, allowing for rapid adaptation amid changing technology, market situations and product specifications.

This "adaptive flexibility" was also inherent inside the small factories: They could react quickly to new orders from larger manufacturers that began to outsource a growing share of their production process to smaller firms, in order to save on costs. The availability of basic mechanics was crucial for the construction of first-step machines. Small firms often also became market leaders in a highly specialized niche and drove the innovation process for the product lines they were supplying. Small factories may have been helping each other to clear a backlog, perhaps in the event of a bulk order. In this, they relied on "friendship and bicycle networks". Small factory owners co-locating in a cluster knew each other growing up and were often possessing an overlapping social network. The physical proximity to one another reduced the transportation time of parts to another small factory that would use them together with its own product for intermediary assembly. Subcontracting, on which we will comment further below, was also benefiting from physical proximity.

In Kamata, the output of these firms was often low-volume and highly customized. With time passing, it frequently became related to research and development and prototype development, further benefiting flexible small factories. Certain locational factors also explain the success of this particular part of Tokyo. The Tama River and national highways, the newly-opened *shinkansen* high-speed train connection to Osaka (opened in

1964) as well the proximity to Haneda Airport (with its high demand for timely manufacturing and maintenance jobs) all supported the area's industrial development throughout and beyond the period of observation. They cemented the area as a cluster for fabricated metals, machinery, electric equipment and transport equipment (K. Fujita & Hill, 2005).

In 1972, the Tokyo Metropolitan Government (TMG) published a booklet on "minor industries and workers in Tokyo" in both Japanese and English translation. It quotes survey results that more than 60% of minor enterprises said their geographical location was beneficial because of other, related industries being concentrated in their neighborhood. This was particularly the case in the central wards as well as the area immediately surrounding them. The printing and publishing industry showed the largest response rate to this question, followed by the leather and leather product segment (TMG, 1972b, p. 91).

[Insert Tables 18 and 19 here]

Clusters can be small and stretch only for several blocks, such as the Honjo ward metal toy example above.[11] Tables 18 and 19 show the concentration of certain industries by ward for the years 1952, 1960 and 1970 in terms of factory numbers. The first table notes the clusters per ward. We note a geographical clustering of sundry industries in the three old industrial wards of Taitō, Sumida and Kōtō as well as Arakawa. These clusters are stable throughout the period of observation. The second table allows us to confirm that the spatial distribution of sundry industries remains overall stable across all 23 wards, as

[11] In a study of Kōtō and Sumida wards, Kikuchi develops a methodology to calculate the sub-ward concentration of industry. He subsequently described the historical context of the three major agglomerations here, i.e. Fukagawa, Jyoto and Mukojima (Kikuchi, 1958).

evident from stable coefficients of variation and Theil index figures. The latter does increase marginally during the 1950s.

The paper and printing industry was concentrated in the central wards of Chiyoda, Chūō and Bunkyō, later also Shinjuku. Chiyoda (and particularly traditional sub-centers such as Jinbōchō) was the most noticeable printing cluster: Of its 570 factories, 466 were in the paper and printing industry in 1960, and they together accounted for 7.8% of the factories in this sector. Locational factors, e.g. universities as well as proximity to the government, explain the spatial concentration of this industry in these wards. There were no notable clusters for heavy industries, and their spatial concentration also decreased throughout the period of observation. Fabricated metals clusters were in Sumida and Katsushika, and later also in Ōta. Their spatial distribution across the 23 wards was largely stable. Machinery, however, saw some mild spatial concentration between 1952 and 1970, while Ōta remained the only notable cluster in this sector. Electric equipment was already highly stratified in the beginning of the period in 1952 and took place primarily in Shinagawa, Meguro and later also Ōta. Ōta was also the only cluster for transport equipment, whose concentration increased between 1952 and 1970. In contrast, “other” industries (including warehousing) were clustered in ever fewer places.

From the above it can be seen that between 1952 and 1970, most segments of the manufacturing saw no change in their spatial stratification or even experienced a “de-clustering”. This is in line with the findings presented in Table 8 above, which showed a decrease in manufacturing employment concentration across the 23 wards during the 1960s. The only industry segments seeing more concentration were machinery and transport equipment. These two industries also experienced the highest increase in their value-added between 1952 and 1970 as shown in Table 14 above. Therefore, clustering here coincided with economic success and contributed to Tokyo's competitiveness beyond the confines of the 23 wards, e.g. in Ōta.

The clustering of certain industries occurring alongside a more egalitarian distribution of manufacturing activity across the 23 wards should not be seen as contradictory. On the one hand, it is industry-specific as discussed above. On the other hand, Tokyo's sheer size and its urban market allow for the production of identical goods in different parts of the city. This is evidently the case for sundry goods such as *tatami* mattresses that are being produced close to the final consumer. Together with the growth of corporate headquarters in the central business wards, a unique picture emerges for the Tokyo of the observation period: Agglomeration growth poles in the south and east of the ward area are, via subcontracting (more on which below), increasingly integrated into complex production processes coordinated by their mother firms. The growth in value-added allows for a substantial rise in white-collar and blue-collar compensation. These, in turn, enable the growing urban middle class to consume locally-manufactured consumer goods, which spur the development of a thick layer of intermediary goods producers as well as wholesalers and retailers.

Spatial efficiency

Metzemakers and Louw define spatial efficiency as the efficiency of land use in the production process. A firm is regarded as "spatially inefficient when it is using more land than necessary for its level of output" (Metzemakers & Louw, 2005, p. 15). These firms can also be termed "extensive" users given their large ownership of land relative to the amounts of capital and labor used. Firms may grow up to a point at which spatial constraints prohibit their further expansion on their factory site. The costs of relocation are being weighed against the net gains from increased sales and economies of scale. Land as a proportion of fixed assets is usually rather small: It represented 5.0% of 1970 fixed assets in Japan, compared to its peak of 10.1% in 2002. (Unfortunately, this information is not readily available for Tokyo's 23 wards.) Relocation cost are usually far higher than just the cost of land. Therefore, firms may engage in land-banking, i.e. purchasing land for possible future expansion.

[Insert Table 20 here]

Table 20 shows the ratio of firms' investments in land over their fixed assets, split between firms with 19 or less workers and those with 20 or more. This data allows making some statement about how land-intensive Tokyo's firms in the two segments were compared to their national peers. All things being equal, we would expect an urban land price premium to affect both small and large firms in the 23 wards to the same extent. However, we note that it is large firms that have a noticeably higher relative outlay in land investments than small firms.

Firms with 19 or less workers spent the equivalent of 1.6% of their total fixed assets on land acquisition in 1970. Small firms in the 23 wards spent just 3% more, or the equivalent of 1.7% of their total fixed assets. The situation was different depending on the industry: The differentials between Tokyo's 23 wards and the national level were the widest in the heavy industries (firms in the 23 wards spent much more, i.e. 166% of what firms in Japan as a whole spent) and transport equipment (firms in the wards spent much less, i.e. only 46% of what firms in Japan spent).

Firms with 20 or more workers in the 23 wards spent the equivalent of 2.4% of their fixed assets on land investments, 33% more than the 1.8% firms spent at the national level. This suggests larger firms were facing a much higher land premium in the 23 wards. More specifically, firms in the heavy industries faced the highest 23-ward premium, investing 63% more in land compared to what their national peers did in 1970. However, their investments in land in the wards were small on an absolute level (1.2% of total fixed assets), suggesting that firms in this sector invested in much less in land, i.e. their expansion than others. Firms in the fabricated metals segment, on the other hand, invested only 72% the resources in land than their national peers.

What does this suggest regarding land intensity? We have already established that small firms in Tokyo were more productive than their national peers. They managed to achieve these productivity gains on less land than their national peers. On the one hand, plot sizes were smaller in Tokyo. On the other hand, the co-location of industrial and residential uses allowed for economizing on space. The most illustrative industry for this is perhaps the fabricated metals segment: Firm sizes in this segment were comparatively low in Tokyo (see Table 7), with home-based workshops forming a large proportion of factories in Sumida and Ōta (Whittaker, 1999). This reduced the need for investing in dedicated land for production, making the use of land much more efficient.

Urban intensity

To conclude the section on land as a factor of production, we discuss the concept of urban intensity as recently explored by several urban studies scholars. This section is the most speculative of the four discussed in this part because the concept of urban intensity as such is new and does not have standard definitions and calculations. Nonetheless, we can theorize in how far it applies to Tokyo's 23 wards between 1945 and 1970. Data presented in other parts of this dissertation partly serves to describe this intensity and will be referred to throughout. We will also show some original data on road characteristics.

There are two concepts of urban intensity introduced here. One of these deals with macro variables for entire cities, while the other one goes into the micro environment of specific neighborhoods. The first (macro) urban intensity concept has been introduced by Rowe (Rowe, 2014) and subsequently applied to Chinese cities in the Zhejiang Province by Guan and Rowe (Guan & Rowe, 2016). In their work, urban intensity is defined as comprising the four related spatial concepts of compactness, density, diversity and connectivity. Compactness describes the urban built-up areas and their distribution across space. A town with a built-up area concentrated in its center will be compact in form whereas a town with built-up and unbuilt areas next to each other will be decentralized. A built footprint conservative in perimeter is to be preferred. Density, the number of people or buildings per area, is "favored in higher (…) degrees in order to lessen wasteful spread and to heighten potential spatial connections among activities" (Guan & Rowe, 2016, p. 22). Diversity refers to the amount of functions of buildings and is also favored in higher degrees, a combination of residential and commercial uses being one example. Finally, connectivity is defined as the ability of interaction between two or more spatial units. Uniform increases across these four measures do not unequivocally yield the best results, and there appear to be "sweet spots" as well as "non-linear relations" (Guan & Rowe, 2016, p. 23). For example, compactness and monocentric high density is often associated with "overcrowding, dilapidation and congestion" (Guan & Rowe, 2016, p. 22). Diversity may also show negative returns on urban intensity, in that a highly-developed economy may require single, large and dominant enterprises in order to achieve its full potential.

The micro concept measures urban intensity at the neighborhood level and has been developed by Sevtsuk et al. They distinguish between arithmetic features of density and intensity. While density refers to "the amount of people or elements of urban form (e.g. dwelling units, floor area)", intensity relates to the "spatial interactions", in their example social interactions (Sevtsuk et al., 2013, p. 553). For their analysis, the authors use an accessibility metric that is determined by three features of the urban form: One, the more voluminous a building, the more business establishments (destinations) it can accommodate. Two, a denser spacing between buildings increases the reach to these destinations. Three, accessibility to these destinations increases if the street network is more interconnected; for example, corner plots have a better accessibility than middle plots (Sevtsuk et al., 2013, p. 554). Beyond these urban form features, the authors also analyze the spatial quality of streets in their research area in Singapore: The amount of spatial interactions is positively correlated with the number of outside doors. Wider setbacks (i.e. the distance between the pedestrian path and the building entrances) are associated with less spatial interactions. Variations in building age "contribute to the perceived intensity of urban spaces" (Sevtsuk et al., 2013, p. 555).

We do not have ward-level empirical data for most of the attributes of urban intensity as per the above. We also lack a comparative case study we could draw on to make relative statements as regards the level of urban intensity in the 23 wards during the period of 1945-1970. Nonetheless, we can infer some qualities of Tokyo's urban space that have contributed to its intensity. Consequently, we believe this intensity made small factories more competitive.

As regards the first hypothesis, Tokyo's 23 wards are described as having a uniform medium-density typology elsewhere in this thesis (chapter three). This means that the variability of population density between the 23 wards was relatively low as well as declining, making most of the 23-ward area comparatively dense and compact. Due to the mixed use of neighborhoods, diversity was high: A large number of buildings had both residential and commercial uses (see section on the "tool house" in chapter two). As regards connectivity, the city relied on an intricate network of buses, streetcars, public and private rail lines as well as a growing number of subway lines, which eventually replaced streetcars in the 23-ward area. Tokyo's historical development has been characterized as rail transit-oriented (Calimente, 2012).[12]

Besides the important role of rail-based transportation, the road network also grew considerably during the period of observation. The per capita road length, as shown in Tables 43 and 44 in chapter three, increased from a low 0.6 meters per capita in 1952 to 1.2 meters in 1970, suggesting a disproportionate growth in roads compared to the population, increasing connectivity. New widened trunk roads and a metropolitan expressway system were also constructed during the period of observation, significantly enhancing connectivity in the ward area. However, most new roads were very narrow. This was primarily the case in new urban land in the wards' periphery, as will be shown

[12] This means that the growth of the city was conditioned by the construction of railway lines, primarily in the west of the city. Private rail companies followed a business model of integrated growth. They bought large swaths of land adjoining their railway lines and began to open retail outlets at the stations. An intricate bus network would bring commuters to the stations. A significant degree of the postwar development in the western wards can be explained this way.

in chapter four. Elsewhere, and in the absence of land readjustment, narrow roads were largely maintained. Small firms benefited from the growth in the road network but also the maintenance of a narrow street grid, given that their light work vehicles were able to pass, while heavy trucks and machinery remained virtually banned from a large part of the ward area.

[Insert Table 21 here]

The table above shows what percentage of buildings were facing streets with certain widths by year of the buildings' construction. We note that the calculated average[13] increases steadily from prewar building stock to those built between 1976 and 1980 (from 4.1 to 4.9 meters). However, the difference in terms of street width between prewar buildings and those built in the immediate postwar period is very small, suggesting that Tokyo's street typology was by and large maintained despite the destruction wrought upon by the Firebombing. Almost half of all new buildings were built along narrow roads less than four meters wide. Less than a quarter of all roads were wider than six meters. The change in street widths over the next periods is relatively smooth, suggesting the gradual change of Tokyo's streets to a wider typology. Apart from putting small factories in a physically advantageous position, these narrow roads also helped maintain urban intensity at the micro level.

We now attempt to characterize the urban intensity of the 23 wards following the approach of Sevtsuk et al. Due to relatively fragmented land holdings and low building heights, building volumes in the 23 wards were relatively low. However, the spacing

[13] Note that this average is not the observed street width average but a calculated metric (adding the products of the different percentages with factor 0 for the category "no street", 1 for the category "<2m", 3 for the category "2-4m", 5 for the category "4-6m" and 7 for the category "6m>".

between these small buildings was low in order to maximize floor area. The street network was characterized by a large number of narrow roads connecting these small plots in the residential neighborhoods as was shown above. While a grid system dominated in the central and eastern wards, a more "organic" network developed in the other parts of the 23 wards depending on the varied topographies present (Jinnai, 1995). Both systems produced a large number of junctions and intersections spread out equally over the territory (Takatani, 2018, p. 67), increasing the amount of possible interactions.[14]

There are no numbers available for outside doors or width of setbacks, but we can estimate the first to be rather large given the low average height of buildings: If tenants or businesses are on the second or higher floor, they usually share their street-facing front door with other units above the ground floor. Setback can be estimated to be small, too: In order to maximize the floor space of buildings, plots were usually filled up to the maximum permissible level right up to the street. In fact, setbacks began to increase markedly only towards the end of the period of observation in the wake of the *manshon* boom, which will be discussed in chapter four (Imai, 2018).

Lastly, the 23-ward area had a relatively low diversity in the age of buildings, for which there were two main reasons: One, the double catastrophes of the 1923 Great Kanto Earthquake and the 1945 Firebombing destroyed a large part of the city's historical building stock. Two, the average age of buildings in Tokyo has traditionally been low due to pervasive "scrap and build" as well as a reliance on wood as the primary construction material (see chapter three). As of the 1963 Housing Survey, more than three quarters of buildings had been built after 1945 (77.5%) and were thus less than 20 years old by the

[14] We provide further comments on road characteristics in chapter four.

time of the survey. By 1968, the proportion of postwar dwellings as of total dwelling stock had increased to 84.8%.

To sum up, Tokyo's 23 wards fulfilled several criteria of high urban intensity, in particular related to its uniform population density, low-rise typology as well as unique rail and road network. Other factors slightly offset this, e.g. low average volume of buildings as well as low diversity in building age. We argue that the degree of urban intensity in the 23 wards proved beneficial for small and medium sized factories. Following Guan and Rowe's methodology (compactness, density, diversity and connectedness), we speculate that the combination of these four concepts in the 23 wards was well-balanced, and therefore able to achieve "superior outcomes in urban formation" (Guan & Rowe, 2016, p. 23) regarding "resource consumption, economic opportunity, social integration and environmental performance" (Guan & Rowe, 2016, p. 22).

Tokyo's density and compactness, in particular its narrow network of roads, made small factories with their small aggregate output easier to reach with small trucks and three-wheelers. A permissive zoning regime and a tradition of mixed use accommodated small and medium sized factories in (co-)residential neighborhoods. Increasing transport connectivity across the territory of the 23 wards allowed for a decentralized distribution of manufacturing activity, not least because workers could easily commute to points outside the traditional centers of white-collar employment thanks to a superior public transportation network.

Rather than just a description of the physical urban form, Sevtsuk et al.'s methodology allows to better understand socio-economic activities taking place in an urban context which "may potentially have crucial impacts on the commercial intensity of the area"

(Sevtsuk et al., 2013, p. 560), and to analyze the “charged void”, i.e. the “set of place qualities that shape the activities and happenings that occur, or have a potential to occur, between a city’s buildings” (Sevtsuk et al., 2013, p. 552). While the authors study area in Singapore is primarily comprising commercial and retail facilities, the argument can be extended to centers of traditional small-scale urban manufacturing such as the model taking place in the 23 wards: Factories can better cooperate in complex product chains if they are visible to each other’s owners (e.g. by being street-facing), physically close and mutually accessible by bicycle. In fact, “bicycle networks” of factories are well described for Ōta ward (Foreign Press Center Japan, 2013). The amount of spatial interactions is maximized the more diverse activities take place here, including small-scale manufacturing.

This section has reviewed the concept of urban intensity as developed by some urban scholars recently. The two main studies cited above have suggested quantifying what had previously been thought of as qualities that could not be “captured analytically”, but only “felt and acted on by experienced practitioners” (Sevtsuk et al., 2013, p. 552). It is particularly the Sevtsuk et al study that echoes the work of some architects in Tokyo during the 1970s. Suzuki Shigebumi of the University of Tokyo conducted surveys in old and new neighborhoods to “determine which spatial elements encouraged close neighborly relations” (Sand, 2013, p. 66). Their results suggested that (the perception of) “neighborliness” was a function of some of the traditional features of the urban form, e.g. narrow alleys and sliding-door entrances opening up directly to the road (Sand, 2013, p. 67). With a plethora of arrows denoting human interactions, the graphic representations of the surveys are further proof that a low-rise and street-facing typology supports intensity as per the reading of both Guan and Rowe as well as Sevtsuk et al. Suzuki and his students lamented the threat to and the loss of this traditional model, most applicable to the *shitamachi* area, but at least in variants found in most other parts of the 23 wards. This model was intricately connected to the presence of small-scale manufacturing, which disproportionately benefited from the 23 wards' urban intensity.

Space and labor

We have described the first factor of production—space, or urban land—and in how far small and medium sized factories could use space more efficiently than their larger peers in the 23 wards during the period of observation. In the following section we add a spatial dimension to one of the two other factors of production, in our case labor. We have already commented on the relatively even distribution of firm characteristics across the territory of the 23 wards. We will make a similar argument in what follows: There was a lack of spatial stratification of certain features of Tokyo's labor force, which helps explain the success of the labor-intensive industrialization model. An example of this is the relatively equal level of education, one that became more equal as time passed. At the same time, certain spatial features such as home-based work were more prominent in certain wards than in others.

Flexible and well-educated labor force

Labor in small firms is generally thought of as more flexible, as opposed to more specialized labor employed in larger firms. "Flexible specialization" has been a popular concept describing production processes in a post-Fordist age (Piore & Sabel, 1984). It has readily been applied to Japan, where a multi-skilled workforce cooperated with management in an "alternative craft system of shop-floor control" (Piore & Sabel, 1984, p. 116). However, Japan's economy is also dependent on flexible mass production in large firms (K. Fujita, 1991, p. 269; Kenney & Florida, 1989, p. 143), and it is the interplay between these two modes of production in small and large firms that may offer a more comprehensive account of Japan's postwar business history. The comparative flexibility within small firms is complemented by horizontal flexibility, which describes the ease with which employees can switch firms or, more importantly, set up their own company. We have already discussed how this flexibility thrived in a setting of urban agglomeration.

Compared to Japan as a whole, Tokyo's labor force was comparatively well-educated. Relatively large differences across the territory of the 23 wards existed, larger than those between prefectures at a national scale. However, these differences became less pronounced as time went by. By 1970, the differences between Tokyo and Japan persisted, whereas the differences between the wards with the highest and lowest levels of education had decreased. The availability of a well-educated labor force was one of the factors allowing Tokyo's small factories to be more competitive than their national peers.

[Insert Table 22 here]

The above table presents the calculations of a custom index that captures educational attainment of the population of the 23 wards compared to that of Japan as a whole from 1950-1970. The index is calculated simply by multiplying the population shares holding different educational attainments with successively larger factors depending on the years of schooling. For example, the population share only holding a primary school leaving certificate is multiplied with factor "1", that with youth training school certificates with factor "2", middle and high school "3", junior college "4" and university "5". The share of the population that did not finish school is multiplied with "0", while that never having attended school to begin with is multiplied with "-1". The data for 1960 and 1970 are presented in relatively uniform way, whereas some adjustments had to be made for the year 1950. Here, only the educational attainment for the population above 25 years is taken into account. As there tend to be far fewer pupils in this age bracket than in the 15 years or older equivalent, we have reduced the overall educational attainment for the year 1950 to make this set of data comparable.

We find that inhabitants in the western wards have the highest educational attainment in 1950 and 1960, while by 1970, the central business districts have caught up with their improved level. The old industrial and northern / eastern industrial wards, meanwhile, have the lowest educational attainment in all survey years. By 1970, we also see that Tokyo has a more educated labor force (2.2) than Japan as a whole (1.9). Most importantly, the variability in educational attainment between the 23 wards is decreasing over the period of observation, from an already rather low 14.5% coefficient of variation in 1950 to 11.0% in 1970. We can infer from this that the quality of labor became more uniform as time went by. There were no spatial stratifications in terms of educational attainment of the population, which could be explained by an uneven development of certain parts of the city, e.g. the persistence of poverty and sub-par educational infrastructure compared to a well-off and better-equipped ward with superior educational facilities. This allowed small and medium sized factories in the traditional industrial centers of Tokyo to draw on a relatively well-educated, locally-based workforce.

This becomes more ever important toward the end of the observation period, when the manufacturing sector's small and medium sized enterprises move up the value chain considerably and require more skilled labor with some foundation in formal engineering education. Until then, the availability of skilled labor for manufacturing is perhaps not best captured by formal education attainment, but by how they acquired their skills in a "learning by doing" fashion.

Home-based work

We find that a large proportion of Tokyo's workforce lived where they worked, a fact explained by small firm sizes, lax zoning restrictions, a history of combining uses as well as traditional employment patterns in owner-operated firms. This analysis is limited by scant data availability, i.e. TMG surveys and investigations were being conducted in a one-off way rather than as a regular feature of statistical publications. Nonetheless, we can infer from this several characteristics of Tokyo's labor-intensive industrialization: First, the large share of home-based workers in the total workforce embedded manufacturing activities in their locale, especially for small firm sizes. Networks between firms could thus be built more easily. Second, this large degree of home-based work and mixed-use dwelling took some pressure off the public transportation system, which during the 1950s, was still ruefully underinvested in. Third, the renovation of living and work place went hand in hand, leading to the incremental upgrading of neighborhoods in line with improving business prospects. The latter two points will also be taken up in the next chapter.

[Insert Table 23 here]

A large part of the labor force lived where or very near where they worked. This held true somewhat more for manufacturing work. A total of 26.2% of the workforce worked where they lived as of 1960, the year for which detailed census information in this category is available. This compares to 25.1% of the total workforce working from home. Home-based manufacturing workers are split into several categories as Table 23 details. Home handicraft workers account for 9.4% of the total, family workers for 19.4%. Who are these family workers? The 1965 Population Census contains some more information on them, revealing that across the 23 wards, an average 73.7% of them are women employed, in most cases by their husband's firm.

In his study of interwar Tokyo, Tanimoto thought of family labor, particularly that of the employer's spouse, as a significant explanation as to why these workshops had the adaptability to both respond flexibly to changes in labor demand as well as to the varied kinds of work performed here. It can be argued that much of this reasoning remained valid after the war, too and that "the spouse played an indispensable role in the survival of the small workshops" (Tanimoto, 2013, p. 159). How important was this family labor across the 23 wards? Perhaps unsurprisingly, the smaller the average firm size was, the larger family workers were as a proportion of the total manufacturing workforce. In 1965, across the 23 wards, 7.1% of the manufacturing workforce consisted of family workers. Sumida (11.7%), Taitō (11.3%) and Arakawa (10.9%) were the wards well in excess of that figure. Whittaker writes that in 1985, 45.7% of Ōta's factories had housing attached, primarily that of the owners (Whittaker, 1999).

While family workers constitute a significant part of the home-based manufacturing workforce, by far the largest proportion (69.4%) is accounted for by home-based private business employees, i.e. live-in employees or company workers who are residing on company grounds in corporate dormitories. More granular information on these is available in the Population Census of 1960 and 1970, respectively. Their very nature of being neither exclusively residents nor workers puts them in the category of "quasi households".

[Insert Table 24 here]

The table above shows the share of quasi household members to total household members in the 23 wards from 1950 to 1970. Quasi households consist of various sub-categories, the most sizeable being one-person quasi households (e.g. long-term lodgers in a boarding house), company dormitory residents and live-in employees. It is noticeable that quasi household members accounted for a growing share of the total population in the 23 wards until reaching their peak of 8.9% in 1965. The two census years for which detailed information on quasi households is available show that the majority of these consisted of live-in employees and company dormitory residents. In 1960, they accounted for 63.1% of all quasi household members, which in turn accounted for 8.7% of Tokyo's population. By 1970, this number had decreased to 7.0%, largely due to the sharply decreased number of live-in employees.

Live-in employees are primarily housekeepers living with their employer. However, we can infer from the detailed ward-level data that in the central business wards (Chiyoda and Chūō) as well as two traditional central manufacturing areas of the city (Sumida and Taitō), the large share of live-in employees to total population (around 5%) was also be due to live-in apprentices and other workers in small factories. Tanimoto has written about live-in apprentices in pre-war Tokyo and concluded that "domestic needs such as boarding and other facilities for a live-in apprentice were directly related to the performance of the workshop" (Tanimoto, 2013). The large drop in live-in employees observable between 1960 and 1970, therefore, can be ascribed to a decrease in the tradition of employing domestic, live-in servants, as well as a sharp decline in the informal apprenticeship system prevalent in the very small workshops typical of the old central industrial wards referred to above.

The most important sub-category of quasi households, however, were company dormitory residents. Given their significant cost and scale, dormitories were more prevalent for factories above a certain threshold, although no hard data is available to quantify their exact relationship with firm size. The company dormitory during the postwar high growth period has only been discussed very little in the English language literature, in particular its effect on cities. In his Miyamoto-cho study, Bestor describes two company dormitories in the neighborhood, "[t]he larger one houses about 175 employees of a larger optical equipment factory located a few blocks from Miyamoto-cho", while the smaller one "houses about a dozen employees of an electrical engineering research facility in an adjacent neighborhood". The neighborhood's residents regard these dwellers as transient who are not expected to involve themselves in local affairs. However, "their patronage is probably important in sustaining some local shops and businesses" (Bestor, 1989, p. 26). This is one of the only mentions of these two company dormitories in one of the most detailed anthropological studies of a Tokyo neighborhood available to the English reader, despite this demographic accounting for just short of 10% of the *chō* population in 1980 (Bestor, 1989, p. 271).

In his doctoral dissertation at the Urban Design Lab of the University of Tokyo, Kobayashi analyzed the role of the company dormitory in the mediation between Japanese city space and the company. One of the most important features of the company dormitory is that it cuts the time spent on public transport: The commuting time of the average corporate dormitory dweller is much smaller than that of the average household member, thus reducing the strain on public infrastructure as well as increasing time and productivity of the workers. Moreover, the subsidized rent offered to company employees was an important part of non-wage compensation. In the cramped housing market of the postwar period, offering affordable accommodation was an important method of attracting and retaining a loyal workforce. With economic conditions improving, so did the designs of company dormitories. Furthermore, increased land prices in the center of the cities later led to an increase in the distance between company dormitories and place of work (Kobayashi, 2004).

The close proximity of live and workspace did not only have positive aspects. Concerned with the welfare of small factory workers and using the language of the times, TMG lamented that by offering homes, “private capital holds the potential of limiting the freedom of the worker” (TMG, 1972b: 59). Small factories, on the other hand, represented a peculiar problem due to the “proximity of the worker with the employer and his family in the home-workshop… This situation carries within itself the possibility, even the danger, of the worker’s freedom being infringed upon and his privacy violated” (TMG, 1972b: 60).

Equal compensation

Earlier above we showed that the difference in remuneration between small and medium sized factories and their larger peers was not as large in Tokyo as it was on the national scale. This is an important factor in explaining why these small and medium sized factories inside the 23 wards were able attract and retain qualified labor. What follows will further substantiate this hypothesis by presenting income data from the 23 wards. It shows that entrepreneurs in the industrial wards were doing relatively better than salary earners, partially explaining why this mode of employment was more widespread here and also why workers were perhaps more incentivized here than in the other wards to start their own small factory. A large caveat of this data is that it does not allow for a more detailed analysis into salaried employment. It would have been interesting to understand the difference between white- and blue-collar worker compensation on a ward level.

[Insert Table 25 here]

The table above shows the average cash earnings of salaried workers and entrepreneurs across the different ward groupings as used elsewhere in this chapter. This data is only available from the year 1965 onwards and does not distinguish between economic sectors. Therefore, a large component of the entrepreneurial income will be formed of small proprietors in the retail or restaurant sector. With that in mind, we note that in 1965, there was an almost equal level of compensation between salary and entrepreneurial income at the total 23-ward level, income from salary was just 1.9% higher than that from entrepreneurial activity. Entrepreneurs in fact took home more money than salaried workers in all wards but the western wards, which were mainly white-collar and had very little manufacturing activity taking place in them. Entrepreneurs had the highest total income in the central business wards (717,429 yen), while they had the highest relative income vis-à-vis salary earners in the old industrial wards. The lowest absolute income for entrepreneurs was recorded in the northern and eastern industrial wards (516,440 yen), the lowest relative income in the western wards.

By 1970, the situation had changed slightly in favor of salary earners, which now, at the total 23-ward level, took home 7.9% more compensation than entrepreneurs. However, entrepreneurs in the central business wards as well as the old industrial wards still earned more compensation than salaried workers. The highest absolute (1,161,966 yen) and relative entrepreneurial income was recorded in the central business wards. The old industrial wards came second in both measures. The northern and eastern industrial wards saw the lowest absolute entrepreneurial income (868,740 yen), while the lowest relative income was recorded once more in the western wards, i.e. the salary income here outstripped entrepreneurial income the most.

We have only two data points for which we can calculate variability figures. The coefficient of variation for salary income across the 23 wards in 1965 stands at 14.1% and decreases to 12.7% in 1970. The variability for entrepreneurial income is lower still. The coefficient of variation decreases from 12.5% in 1965 to 10.6% in 1970. This suggests that the differences in income were low to begin with and further decreased during the late 1960s.

To summarize, small factory owners and operators represented a sizeable proportion of some wards' entrepreneurs, particularly in the old industrial wards. On average, their economic fortunes were better than that of salary earners here. By earning relatively well, they pulled up the average income of these traditionally poorer wards and thus helped prevent them falling behind the more affluent western wards. Therefore, relatively high entrepreneurial income and its relatively even growth across the 23 wards contributed to a lack of socio-economic stratification across the city. It also helped incentivized workers to start their own companies and thus contributed to this segment's competitiveness vis-à-vis the higher wages paid in larger firms.

This section has shown that an analysis of the factor of production labor benefits from bringing in spatial dimensions. We have demonstrated this by looking at the spatial distribution of educational attainment. Not only were workers on average better educated in Tokyo than in the rest of Japan, there was also little spatial stratification by educational attainment across the 23 wards. A comparatively large proportion of Tokyo's manufacturing workers worked from home. This was the case for small factory owners and their family workers (primarily their wives) as well as live-in apprentices. However, a large proportion of home-based work was accounted for by company dormitory residents. These dormitories were an important part of non-wage compensation in medium sized factories. Finally, the spatial distribution of salary or entrepreneurial income has shown that a large proportion of relatively well-earning self-employed workers in the old industrial wards pulled up average incomes here, leading to lower inequalities across the 23 wards.

Finally, how about the third factor of production, capital? In general, large firms had easier access to financing than small factories in Tokyo's 23 ward, because "generally speaking, the banking structure of Japan is geared to supply capital attracted from the masses mainly to the major enterprises." (TMG, 1972b, p. 99). This held especially true for Tokyo due to the large amount of corporate headquarters and the national scale of much of the financing taking place. However, small firms had an increasing demand for capital towards the end of our period of observation due to the growing capital intensity of their operations, growing competition from abroad and a lack of qualified labor. TMG therefore became involved in small enterprise financing (TMG, 1972b, p. 100), a practice continuing to this day. Small and medium sized factories had better access to finance in the 23 wards than their peers in most other locations in Japan due to the dense branch network of commercial banks and government-owned banks with a mandate to lend to small enterprises.

Spatial dimensions of demand

Small and medium sized factories in Tokyo catered to a variety of markets and sold their products within the 23 wards, the metropolitan agglomeration, domestically, and abroad. The next section will analyze some features of these markets that show how small firms in the 23 wards could compete successfully in all of them. Small factories producing final products sold principally inside the metropolitan area, benefiting from the large urban market and its varied demand. They were helped by an exceptionally dense network of wholesalers that also distributed their products further afield, primarily in eastern Japan. Some small firms also exported their final products, at least initially. In terms of intermediary products, small factories in the 23 wards were increasingly integrated in complex production processes via the subcontracting system. Most of their "parent" companies were situated in the adjacent prefectures.

End consumer demand

Small factories producing final consumer products benefited greatly from their access to the vast urban market at their doorstep. This was already the case during the Edo period as well as the early stages of Japan's industrialization (Waley, 2009, p. 15) and primarily a function of the city's large population. Historically, a significant proportion of this population had enough disposable income to purchase the goods produced in small urban workshops, be it a large contingent of feudal retainers and their *samurai* during the Edo period or a growing segment of white-collar middle-class workers employed in government or the service sector in modern-era Tokyo.

[Insert Table 26 here]

The table above shows that Tokyo's workers' households spent significantly more on consumption than in Japan as a whole. Their consumption expenditure was as much as 20% higher than national levels at their peak in 1965. From here on, there was a relative catch-up of other parts of the country so that by 1970, Tokyo's consumption expenditure was only 10.3% higher than the nationwide average. In line with growing incomes, the share of expenditure spent on food declined in both Japan as a whole as well as Tokyo. However, Tokyo's workers' households spent a smaller share of their expenditure on food until 1970, leaving more resources for other items, e.g. housing and consumer goods.

[Insert Table 27 here]

The sheer size of Tokyo's urban market is not captured adequately without looking beyond the administrative boundaries of the Tokyo prefecture. Table 27 shows the sum of households for Tokyo prefecture along with the adjacent prefectures of Saitama, Chiba and Kanagawa. Together, these four prefectures accounted for an ever-growing share of Japan's total number of households. In 1950, 16.4% of total households lived in either of these four prefectures. By 1970, this number had grown to 24.7%, i.e. one in four Japanese households lived in or very near Tokyo. Being able to sell to such a market, at low transportation cost and with very close connections to local consumer preferences, small firms in Tokyo had a clear advantage over their national peers. Their geographical situation was thus "generally more advantageous than in any other part of the country; taken all in all, the enterprises that exist at present are relatively superior to others" (TMG, 1972b, p. 134).

The large size of the urban market theoretically benefits large and small and medium sized factories alike. Which other demand factors made small factories specifically more competitive than their larger peers inside the 23 wards? We have already mentioned that space constraints inside the 23 wards made it increasingly impossible for large factories to be located here. Stricter zoning towards the end of the 1960s made it even more difficult for them. Therefore, due to the relative absence of larger firms, small factories could leverage exceptional end consumer demand compared to less space-scarce places in Japan. In other words, one of their major advantages were their lower space requirements and the higher land intensity under which they were operating. The latter was not just a function of their smaller size, but also of the mixed-use of their production facilities as we have shown above.

The large size of the urban market allowed small firms to specialize in final niche products that were not easily mass-producible, but which faced sufficient demand without transportation cost becoming excessive. This was particularly relevant to a large part of the sundry industries, e.g. handmade pottery, tatami mattresses, customized furniture, etc. Due to their custom-made products, these firms faced limits to scale and hence stayed relatively small in size and, most importantly, were decentralized across the ward area. Small firms producing other final sundry goods (e.g. kitchenware) were also more competitive due to the continued presence of the traditional wholesale-merchant system. As discussed above, this divided the production of final goods into smaller parts shouldered by different companies and coordinated by an agent. Due to the large degree of nearby consumption, "Tokyo's production ratio of expendables is high, and there are innumerable subcontracting enterprises, especially in the manufacture of sundry goods, clothing, and hide and leather products". This was facilitated by the close proximity of these firms, especially in the traditional manufacturing centers, "in pursuance of the merit of concentration" (TMG, 1972b, p. 103).

Other final products also favored small factories in the 23 wards: The printing industry is as a good example. Pre-digital printing was a labor-intensive process, more so in Japan than in the West given the Japanese script's much more extensive requirements in terms of typesetting equipment. Traditionally, publishers have therefore contracted out their printing rather than print in-house owing to the complex requirements in terms of machinery and especially skillset of the printing specialists. Moreover, the Japanese bookbinding sector usually requires short production runs and a high degree of customization, further favoring small firms that are more flexible and willing to take on low-volume business at short notice (United States International Trade Commission, 1983).

Furthermore, small factories also had superior knowledge of urban consumer preferences due to their physical proximity, or embeddedness, in the urban market. Small factory owners, their families and workers were the consumers of their own products. This "product pull" and "market-in" has been an important determinant of Tokyo's innovative model. Moreover, due to short supply lines, small factories engaged in the production of final consumer products could react much faster to changing market requirements and consumer preferences (K. Fujita & Hill, 2005, pp. 19–22).

Immediately after the war, small factories were also competitive in producing relatively advanced products such as radios, at least for several years. The economic difficulties in the late 1940s along with high commodity taxes charged on finished radio sets were difficult for larger manufacturers to weather, resulting in many of them going out of business. In contrast, electronic components manufactured by small factories were not taxed nearly as much. Amateur-made radios built from these components were outselling those manufactured by large companies by factor three to one in 1950 (Takahashi, 1993, p. 41). A large proportion of these radios were assembled in Akihabara, where "a huge underground market for radio parts thrived around the Akihabara station, attracted by an electrical engineering college nearby" (K. Fujita & Hill, 2005, p. 55). The amateur construction method also included television until the market for these electronic appliances market became dominated by large companies in the mid-1950s (Takahashi, 1993, p. 41).

Small and medium sized factories were helped by a disproportionately large number of commercial wholesalers in the ward area. On the one hand, they helped distribute goods from outside of the ward area to the retailers selling them to the final end consumer. On the other hand, they also bought the final and intermediate products of small and medium sized enterprises, primarily in the sundry industries, and distributed them outside of Tokyo, primarily covering the east of Japan, but also abroad. In terms of the purchase of manufactured final consumer products, wholesalers cater to small and medium sized factories disproportionately, as large firms tend to have their own in-house distribution channels.

[Insert Table 28 here]

Table 28 shows the relative importance of the wholesale trade in Tokyo prefecture compared to Japan as a whole. Osaka, Japan's historical center of wholesale trade, is also shown to compare Tokyo with another major urban agglomeration in Japan. Tokyo's wholesale trade caught up with and overtook that of Osaka over the period of observation, exemplifying how small and medium sized factories in Tokyo could rely on an ever more intricate network of wholesalers for the purchase of their goods. We note that in 1952, the density of wholesalers in Tokyo (317 inhabitants per wholesale establishment) was higher than in Japan (607) but lower than in Osaka (239). By 1970, the density of wholesalers had become higher everywhere, and was now almost the same between Tokyo (260) and Osaka (256), which were both considerably higher than the national average (405). Tokyo's wholesalers also became bigger in terms of average sales per establishment. In 1960, the average wholesaler in Tokyo turned over 146 million yen, considerably less than the equivalent establishment in Osaka (197). In 1970, Tokyo (722) had overtaken Osaka (623). Finally, in 1952 Tokyo's wholesalers (7.9) had more employees than the national average (6.0) but fewer than Osaka's (8.5). By 1970, Tokyo wholesalers had on average become bigger (15.4) than their counterparts in Osaka (14.7). Both figures were considerably larger than the national average (11.2).

Tokyo's wholesale market was highly concentrated in the two central wards of Chiyoda and Chūō, although their importance slightly diminished during the period observation. In 1958, both wards together accounted for 49.9% of all workers employed in wholesale and 71.0% of all sales. In 1968, these figures had decreased to 45.7% and 60.9%, respectively. There were also some important exceptions, of importance specifically to small and medium sized factories. Citing data from 1968, the major biggest concentration of mechanical equipment wholesalers was in Minato, the historical home of Tokyo's electronic sector. A total of 17.4% of all wholesalers in the 23 wards in this segment were located here, employing 28.7% of all ward-area mechanical equipment wholesale employees. There were other clusters, e.g. a significant incidence of wholesale furniture equipment dealers in Taito (20.0% of all establishments, 19.0% of all employees) and recycled material wholesalers in Arakawa (23.0%, 19.7%). Therefore, while the wholesale market was generally very concentrated in the central business wards, specialized wholesalers also formed clusters in certain wards in accordance with local market conditions (Commercial Census, 1968).

Finally, some small and medium sized factories located in the ward area sold their final goods abroad. This was more the case in the early part of the period of observation. A good example is SCAP's "Made in Occupied Japan" program, which launched in 1947 in an effort to generate much-needed foreign exchange. It encouraged primarily labor-intensive Japanese firms producing toys, ceramics and other handicraft to export their goods to the U.S. (SCAP, 1947). The program's intellectual foundations had already been articulated in 1945, when an industry analysis of the toy industry commissioned by SCAP concluded that

> [t]oy manufacturing appears to be well adapted to the postwar economy of Japan for the following reasons: The industry is almost entirely unrelated to war industries; it requires very little capital; it provides fairly large quantities of exchange; raw materials and shipping requirements present no problem; the industry is widely dispersed and employs an appreciable number of people throughout the country; a large part of the production processes is carried out in the home and a relatively small amount of capital equipment is required; because of specialization, effective organization, and the availability of cheap home labor in the toy industry, the rate of output is high, and production costs are low." (SCAP, 1945, p. 1)

The toy industry had been among the first industries to directly compete with companies in advanced industrialized markets in the interwar period by exporting to countries like the United States and Britain (Tanimoto, 2013). The roots of its competitiveness lay in the organization of its production process—it was coordinated by the *ton'ya* merchant wholesaler as described above. This entailed the dispersal of the production across a variety of small-scale producers engaged in specific steps in the manufacturing of the final product. These production networks benefited from agglomeration effects as well as institutional support. The importance of toy exports for the "Made in Occupied Japan" program testifies to this model's continued validity in the immediate postwar period.

Underlying the competitiveness of small and medium sized factories' final consumer products, including their exports, was the precise knowledge of customer preferences domestically and abroad. Here, the ward area played out an advantage vis-à-vis other cities in Japan. Tokyo has traditionally been the central nexus where foreign technology is absorbed, converted and adapted (K. Fujita & Hill, 2005, p. 25). As Japan's capital, foreign embassies are located here, as are foreign businesses. The port in Yokohama has historically connected Tokyo with the rest of world. During the early postwar period, Yokohama and the smaller Tokyo Port combined accounted for about half of Japanese imports (Tokyo Customs). Tokyo also remained the center from where to access foreign information, e.g. via foreign magazines and second-hand books in Kanda, which thrived due to the large concentration of institutes of higher education in this area. Later, the physical presence of the Allied occupation forces in the city from 1945-1952 exposed a sizeable part of the population to what were primarily "American" consumer products and habits (Yoshimi, 2008, pp. 83–87). In her study of Japanese consumerism, Francks concludes that

> "[t]he small-scale producers who generated the wide and differentiated range of consumer goods that was being formed in the Tokugawa period continued, with the help of their own borrowings from amongst the technological and marketing possibilities opened up by exposure to the industrial West, to meet a large part of consumer demand through to the post-Second World War period." (Francks, 2009, p. 219)

In the section above, we have shown some characteristics of the urban market that have benefited small and medium sized factories in the production of final consumer goods.

Subcontracting

Why did small factories in the 23 wards also succeed at producing intermediary products competitively? In other words, why did large companies not integrate vertically and instead outsourced significant parts of their production processes via subcontracting? Following a simple economies of scale model, access to larger markets and firm size are usually positively correlated. Thicker markets for capital, labor and materials usually affect firms' factor of productions choices in a way that increases their size (M. Fujita, Krugman, & Venables, 1999). According to this line of reasoning, we would expect large firms in or around Tokyo consolidating production processes under one roof. However, coordination costs can play a bigger role than the size of the market in explaining firm size. If coordination costs between firms are low, firm sizes can be expected to be lower in turn (Becker & Murphy, 1992). Coordination costs between firms, particularly situated in Tokyo's numerous industrial clusters, were on average smaller due to network effects and positive externalities as has been shown above. The most important manifestation of this segmented production was subcontracting.

On numerous occasions, this paper has referred to subcontracting networks as an important organizational principle of the Japanese economy. We have mentioned them in the historical section as well as in the section on agglomeration economies, distinguishing between the traditional subcontracting in the wholesale-merchant system (the *ton'ya* system, often also referred to as the "putting-out" system) and the 20th century version of large enterprises coordinating the subcontracting themselves. Here, we shine a different light on the latter from a demand point of view. We briefly review the history of these relationships and then analyze why they have blossomed particularly in and around the 23-ward area.

The modern subcontracting model emerged in the 1930s (M. Hayashi, 2005). During this period, the structure of the economy changed toward heavy manufacturing processes, not least due to the growing militarization of Japan. Requiring more capital, this change favored larger firms. In the face of higher demand for their products during the economic expansion of the 1930s, however, many of these larger firms started to contract out to smaller suppliers instead of expanding their own facilities commensurately. Recent experience taught these managers to tread conservatively. The post-First World War panic of 1920, the 1923 Great Kanto Earthquake, the financial panic of 1927 and the recession of the early 1930s were still fresh in their mind. The flexibility they gained from subcontracting allowed them to scale down their operations relatively easily in the event of further economic turmoil. Cheap labor in small and medium sized factories as well as relatively expensive capital at this time contributed to making this decision (M. Hayashi, 2005, pp. 40–41).

The escalation of war further increased subcontracting processes in the military industries. While large firms were initially producing most of their products in-house, they could only meet the growing demand for their products by outsourcing part of their production to small and medium sized factories. This practice was not only intended to increase quantity of production but also quality, as it "honed the small firms' technical skills and was an opportunity to raise production standards" (Nakamura, 1995, p. 15). These subcontracting relationships were of decisive importance in shaping the postwar links between small and medium sized factories and their larger peers.

However, it took several years for this system to re-emerge after World War Two. Initially, large enterprises were disproportionately affected by the war: More expansive in scale, their facilities had been disproportionately damaged in the bombing raids. A large part of what did survive was often geared to the war effort and was obsolete now if not requisitioned by the Allies anyway. Eventually, the Korean War from 1950-1953 and the special procurement policies of the Allied forces gave an impetus to the machinery industry and caused a rise in production carried out by larger firms. They fell back to contracting out a significant share of intermediate inputs to small and medium sized factories. The reasons were very similar to those in the prewar period, i.e. large firms intended to exploit the wage differential, increase flexibility and save on capital.

As the Japanese economy transitioned to a higher value-added model of economic growth, producing more sophisticated products toward the late 1950s, it was increasingly labor that became scarce rather than capital. This incentivized large enterprises to contract out labor-intensive processes to small and medium sized factories. Technological progress and diversification of demand, however, meant that the requirements placed on small and medium sized factories grew commensurately, leading "large scale machinery forms [to not require] subcontractors which only offered low wages, but also those which were modernized, mechanized and technologically capable" (M. Hayashi, 2005, p. 52). Meanwhile, subcontracting enabled the parent firm to specialize in fewer operations, allowing it to gain a competitive edge in these (Urata & Kawai, 2001, p. 12). Subcontracting was one of the main reasons why towards the end of the period of observation and for Japan as a whole, total factor productivity (TFP) growth in the advanced segments of the manufacturing sector was recorded at similar levels for small and large firms. In the electric machinery segment, TFP growth of small firms even exceeded that of large firms (Urata & Kawai, 2001).

In Tokyo, an increasing number of subcontracting relationships took place between "parent" companies in the Kawasaki-Yokohama industrial zone and small factories in

Tokyo's 23 wards. Large firms in the periphery of the urban agglomeration relied on small factories in the more central locations for their inherent flexibility as well as skills at producing complex and often labor-intensive components. Often, the large companies would have their roots in the 23-ward area and moved their production facilities out of space-constrained conditions into greenfield locations further afield. A large amount of the technological know-how embedded in the production remained in the ward area. Finally, as the production of all components required higher levels of quality and capital intensity, small factories engaged in subcontracting often moved up the value chain along with the final product (TMG, 1972b, p. 104). A growing number of subcontracting enterprises were therefore "provided with equipment and techniques to match the production techniques of their respective 'parent' enterprises" (TMG, 1972b, p. 105).

A particular Tokyo model emerged (K. Fujita & Hill, 2005). "Mother" plants and their expert suppliers extended westward from Ōta, "along the Tama and Tsutsumi river basins, as far as 50 kilometers from the urban core, into greater Tokyo and the national capital region, to form the nation's premier center of manufacturing innovation in the metal and machinery industries" (K. Fujita & Hill, 2005, p. 19). The "concentric spatial division of labor" entailed the 23 wards as the location for corporate headquarters but also significant production in industrial clusters. Small and medium sized factories in Ōta/Shingawa and Sumida/Kōtō were increasingly involved in prototype design and the production of orders required in small quantities. Despite the loss in overall manufacturing employment after the mid-1960s, Tokyo's central city still had the highest concentration of very small manufacturing firms among all cities in Japan in the 1990s (K. Fujita & Hill, 2005, p. 20).

Small factories depended on the urban agglomeration for the majority of their sales, regardless of whether they sold final products to their end customers and wholesalers here, or intermediary products to their "parent" company located within the urban agglomeration. Towards the end of the period of observation of this dissertation, therefore, "up to 70% of [Tokyo's minor enterprises'] customers…as well as 80% of the principal sources of supply…are concentrated within the Metropolitan area" (TMG, 1972b: 91). This ratio tended to be higher the smaller the scale of the company. Small and medium sized factories in the 23 wards were a competitive force in these markets not only because of the wage differential vis-à-vis larger firms. They sold to the urban end consumer directly because they were flexible and small enough to build "made-to-order" in the case of several sundry industries (e.g. tatami and other furniture). Their goods were also distributed further afield by a large number of wholesalers who catered exclusively to small and medium sized producers. Finally, many of these small and medium sized factories, primarily in industrial clusters such as Ōta, later became "foundation firms" engaged in relatively sophisticated processes outsourced to them from large parent firms. These small factories became an integral part of Tokyo's innovative capacity. In the 23 wards, there were intrinsic links between the urban, domestic and international markets, because in Tokyo, "local demand is the stepping stone to international markets via the city's test markets" (K. Fujita & Hill, 2005, p. 6).

Finally, Tokyo's small and medium sized companies remained competitive also because they became an ever more integral part of the innovation model the city's success was based on. Tokyo's spatial distribution of innovation is different from that in the west, where "manufacturing innovation takes place in the peripheral suburban rings of metropolitan areas, not the urban core" (K. Fujita & Hill, 2005, p. 7). This is mirrored in income polarization and generally uneven development. In Tokyo, on the other hand, “there are no large disparities in income and opportunity between the city’s districts” (K. Fujita & Hill, 2005, p. 7). The demand for the products small and medium sized factories were producing in the 23 wards were therefore an important reason for the relatively egalitarian distribution of socio-economic indicators, as will be shown in the next chapter.

Conclusion

A particular type of labor-intensive industrialization characterized the Japanese capital’s development between 1945 and 1970. Just like the national economy, Tokyo was heavily geared towards manufacturing. Secular trends included a shift away from sundry toward more “advanced” industries—representative of Japan’s ascent up the valued-added ladder of modern industrial development—as well as a reconfiguration of the economic geography within the 23 wards, primarily the growth of electrics, machinery and metals manufacturing in the southern industrial wards. Meanwhile, heavy and chemical industries almost vanished from the territory of the 23 wards, a process that began long before more stringent environmental regulations began to be imposed. Lastly, while clusters did and continued to exist, the spatial distribution of manufacturing activity across the 23 wards stayed relatively even.

Small and medium sized factories managed to narrow the performance and capital intensity gaps between them and their larger peers throughout the period of observation. This was not just the case in the more “advanced” industries, but also in what is often thought of as “backward” segments of the manufacturing sector. Value added per worker grew faster in smaller and particularly medium sized firms, across most industries. Small and medium sized factories in Tokyo turned over their fixed assets faster than their national peers but employed less capital on a per worker basis. Combined with the fact that these factories paid relatively higher wages, we can infer that they were remained relatively labor intensive but also became more skill intensive, an important qualification to the traditional labor-intensive industrialization model that puts cheap labor at the heart of its competitiveness.

Why were small and medium sized factories more successful? We argued that a significant part of this question can be answered by turning to the characteristics of urban "space". In doing so, we (re-)introduced land as a factor of production, as well as analyzed some of labor's spatial features. If treated as a separate factor of production, urban land, or space, became a source of competitiveness for small and medium sized factories because they enjoyed benefits under Tokyo's prevailing zoning regime, benefited from economies of agglomeration and used land more efficiently. A recurring theme was the mixed-use character of much of Tokyo's built environment, i.e. the concurrent use of a dwelling for industrial/commercial and residential purposes. This did not only make for an efficient use of space, it also infused dynamism and flexibility into the production process. It also directly contributed to an urban upgrading as the economic fortunes of small business owners improved. Features of the production factor labor can also be illuminated with spatial features, as the example of home-based work showed. The inter-ward distribution of educational attainment as well as low wage disparities between the wards alluded to an important feature of Tokyo's postwar growth model that will be taken up again in the next chapter: Differences between wards were relatively low to begin with and/or decreased as the city underwent its rapid growth.

Following this focus on production, this chapter concluded by a look at the various markets small and medium sized factories produced for. The large urban market represents a strong continuity stretching back to the Edo period, when a culture of consumption became ingrained, not least because of the *sankin kōtai* system. Small factories could tap into a pool of varied customer preferences with a large degree of niche demand favoring small product runs and fast product cycles. Products from Tokyo maintained a privileged position within Japan due to the city's elevated position as a negotiator and adaptor of foreign ideas and products. Small firms had sophisticated antennas for shaping consumer demands. Some small firms were also competitive when it came to the export to foreign markets. A large part of the competitiveness of small and medium sized factories derived from them being integrated in increasingly complex subcontracting relationships. This allowed them to partake in Japan's industrial upgrading that was based on the production of sophisticated and high value-added products.

3: The egalitarian improvement of private and public space

The inhabitants of the 23 wards had to endure relatively low living standards, in particular regarding their living space. However, as opposed to many other growing cities, this what we call "space poverty" was a widely-shared experience, manifesting itself without a large degree of stratification across the geography of the city. The gradual improvement in living standards during the period of observation was also shared by inhabitants regardless of their location in the city. In fact, the differences between the wards became less pronounced towards the end of the observation period. The Tokyo of this period is usually used to highlight the negative side effects of urbanization: pollution, congestion and the decimation of a once-enviable river network, to name but a few of them. While we do not wish to argue these away, this chapter focuses also on the improvements in urban life. On a per capita basis, there were more schools, parks, library books and other amenities, as well as better and more equal connectivity via roads, sewage, telephone and television. As in chapter two, space becomes an explanatory variable again to account for these "egalitarian" improvements once more. An urban form unique to Tokyo reproduced itself as the city expanded. This is best described as a medium-density, low-rise and mixed-use typology. A number of space-economizing features of the urban space facilitated this (e.g. public baths, shops and restaurants), as did a dense network of construction establishments building primarily wooden homes. Another equally important factor in avoiding spatial stratification was the Tokyo Metropolitan Government (TMG). On the one hand, it was actively redistributing resources from the richer to the poorer wards. On the other hand, it did not get overly involved in urban planning down to the neighborhood level, focusing instead on retrofitting infrastructure.

Measuring living standards and spatial inequalities

Before introducing the data on private and public space in Tokyo between 1945 and 1970, this section first builds some theoretical foundations. To begin with, we survey how living standards are being conceptualized and measured, specifically in an urban setting. We then review the literature on spatial inequalities in cities. This information will allow us to contextualize Tokyo's experience in the postwar period and to later demonstrate in what ways Tokyo was unique in overcoming its space constraints and generating a comparatively equal distribution of living standards.

The Cambridge Dictionary defines living standards as "the degree of comfort that people in a particular social class, country, etc. have, and the number and types of products and services they can buy". As a proxy for living standards, macroeconomists tend to use gross domestic product (GDP) per capita. By converting this figure into US dollars, it can be compared to other nations' values. Microeconomists, on the other hand, use income or expenditure data, which usually allows for better comparability within countries. Both measurements have their limitations, in particular when applied to cities. While GDP data can be calculated on a subnational level, the methodology between countries varies, making comparisons between cities difficult. Moreover, GDP entails a large portion of economic activity that is not directly consumed by households, and therefore has little weight in determining living standards. As an aggregate figure, GDP also ignores distributional issues, both between groups, within groups and across different spatial units. Consumption and expenditure data, meanwhile, suffers from a lack of comparability between nations given the relative nature of a consumption basket and its regional variation (Smeeding & Rainwater, 2002).

Macroeconomists and development practitioners have responded to some of the criticism leveled at narrowly GDP-focused measurements of living standards by broadening their definition. Designed to account for a more multidimensional understanding of development, the Human Development Index (HDI) captures not just income, but also education (illiteracy or school enrolment rates) and longevity (life expectancy). The HDI's shortcomings are well documented: Among others, they include that there is a strong cross-correlation between the components of the index, specifically between income and the other two measures, and that the index does not take into account the quality of education (Bilbao-Ubillos, 2013).

Despite these conceptual shortcomings of the HDI, several authors have attempted to construct longitudinal series. Crafts, for example, has calculated HDIs for Britain during the Industrial Revolution (Crafts, 1997). De la Escosura put forward a historical index of human development for Latin America, with data from 1870 onwards (De La Escosura, 2015). However, building historical HDIs for growing megacities such as Tokyo between 1945 and 1970 is problematic. Tokyo experienced rapid migration from other parts of the country. Therefore, health and educational attainment of many of the city's inhabitants were factors largely determined elsewhere. Moreover, there are difficulties in terms of data availability. Historical HDIs usually depend on GDP estimates, which have only systematically been compiled at a national, not urban level.[15]

[15] In general, the historical measurement of living standards is made difficult by the large number of indicators that can be used to proxy them, their varied availability and their changing relevance over time. For example, historical income figures ignore "radical changes in the range of goods and services that money can buy today – from anesthesia to better lighting, radios, telephones, education and air travel" (Voth, 2004, p. 2). Information on workload in hours per year allows making statements on how much leisure workers had, although conceptually, "leisure" is prone large cultural variations. Consumption baskets, particularly with respect to luxury goods, show to what use incomes could be put. However, the definition of luxury goods also varies strongly over time and space.

The shortcomings of the HDI have resulted in adaptations of the index's methodology, primarily via the gender-adjusted HDI (the Gender Inequality Index, GII) and the inequality-adjusted HDI (IDHI). The GII measures gender inequalities in reproductive health, empowerment (percentage of parliamentary seats held by women and measures of female education) and economic status (labor force participation). The IHDI discounts the three dimensions of the traditional HDI depending on the value of inequality that is observed for each of them. This corrects for the HDI's shortcoming that two countries with very different distributions of human development may still have the same average HDI value (UNDP, 2016). These adaptations of the HDI's methodology suggest that the measurement of human development is not dogmatic and can be amended depending on the focus of one's study. This allows us to draw on a varied selection of indicators from Tokyo between 1945 and 1970.

The measurement of living standards can draw on additional measures of wellbeing. The UN's Population Division's *Charting the Progress of Populations* includes 12 indicators of health, education and access to basic services, including the "availability of affordable and adequate shelter for all" (UN Population Division, 2000, p. 79). This indicator is collected on a city level and is expressed as the floor area per person (median floor area of a housing unit divided by average household size). A low value for this indicator captures signs of overcrowding. Floor area includes all living space, i.e. bathrooms, corridors and closets. Semi-private spaces, e.g. corridors, inner courtyards or verandahs are only included if a household uses these for cooking, eating, sleeping or other domestic functions. This differentiation alludes to the complexity of comparing data on living space across time and space. First of all, data availability is "extremely limited" and "[c]ultural values affect sensitivity to crowding" (UN Population Division, 2000, pp. 82–83). The

UN data shows that floor area per person is usually smaller for lower levels of development. Moreover, cities in Asia and Oceania have lower per capita living space than their peers in Latin America, but more than those in Africa.

One of the major reasons for this discrepancy are slums. Slums are squalid and overpopulated districts inhabited primarily and informally by poor people. UN Habitat defines slum households as not meeting either one or more of five conditions: durable housing of a permanent nature; sufficient living space with no more than three people sharing one room; easy access to water in sufficient amounts at an affordable price; access to adequate sanitation; and security of tenure (UN Habitat, 2006). While no definite figure is provided for per capita living space in this definition, at the very minimum a room is expected to be four square meters large, and hold no more than three people (UN Habitat, 2015, p. 3). This translates to a minimum living space per capita of approximately 1.3 square meters.[16]

The conventional unit for measuring living space in Japan is the traditional tatami mat, of which one converts to about 1.7 square meters. Dwelling rooms are designed to be the size of multiples of tatami mats, e.g. 4, 6, or 9. The measurement of living space in tatami goes back several centuries and persists to this day when calculating individual room sizes. In the postwar period, total apartment sizes, however, have usually not been expressed in tatami mats, but using the "nLDK" metric, with *n* denoting the number of bedrooms, "L" a living and "D" dining room, as well as "K" the kitchen. In international comparison, this is similar to the United Kingdom, where the size of an apartments is also described

[16] Today, Japan's Ministry of Land, Infrastructure, Transport and Tourism (MLIT) recommends the minimum living area to "meet the minimum essentials for a healthy and cultural life" to be 25 square meters per person in a single household, and 15 square meters in a two-people household (MLIT, n.d., p. 2).

by the number of bedrooms rather than an absolute size in square feet or other units. This is usually seen as a way to gloss over relatively poor floor space standards in the United Kingdom (HATC Limited, 2006, p. 35).

There are further particularly urban dimensions of living standards besides housing attributes. A short review of some of the studies in this field reveals the fluidity of the concept of urban living standards. In the development practitioner's world, urban living standards encompass fields such as education, poverty, drinking water and sanitation, basic physical infrastructure, health and wellbeing, safety, and social cohesion (World Bank, 2018, pp. 94–143). In order to allow their inhabitants to lead "fulfilling lives", cities need to be people-centered and livable. This means "making them inclusive, equitable, tolerant and access-oriented; they should have good-quality public open spaces and be affordable, healthy, walkable, and pleasant for different groups of people" (World Bank, 2018, p. 94). The World Bank lists scores of indicators that can be used to assess cities across these varied dimensions of development. Furthermore, Lucci suggests mainstreaming an urban dimension into new development frameworks given the importance of specifically urban problems to the development discourse. This relates in particular to the fact that most of the growth of cities takes place in developing countries and that poverty is gradually urbanizing (Lucci, 2014, p. 10).

UN Habitat holds that a city's prosperity derives from its combined performance across six dimensions. These are productivity (the capacity of a city to generate wealth, and how it is shared); infrastructure development (providing access to clean water, sanitation, good roads and communication technology); quality of life (general wellbeing and life satisfaction); equity and social cohesion (the capacity of a city to distribute the benefits of prosperity, reduce poverty and the incidence of slums, etc.), environmental sustainability (the protection of the city's urban environment as well as being energy-efficient); and urban governance and legislation (the capacity to regulate the urbanization process) (UN Habitat, 2018). UN Habitat had also previously developed a prototype City Development Index (CDI) for the Habitat II conference in Istanbul in 1996. The methodology used to calculate the index is similar to UNDP's HDI, in that separate sub-indices are constructed and combined into one composite index. The sub-indices are infrastructure, waste management, health, education and city product. The authors of the study found that the CDI correlates well with the HDI. As does the HDI, the CDI too correlates strongly with the city product (UN Habitat, 2001, p. 117).[17]

Another avenue for quantifying urban living standards comes with the "quality of urban life" (QOUL) concept, which translates both objective and subjective quality of life factors into an urban setting. QOUL studies usually assume that the quality of the life in a certain geographical or environmental setting "cannot be captured through a single measure; rather, it requires measures of multiple attributes" and caution us that quality of life is a "subjective phenomenon reflecting the life experiences of the occupants of the setting" (Marans, 2012, p. 14). In terms of objective indicators, QUOL can be measured by a composite of scores including the availability of health services, urban green spaces and recreation areas, the quality of the urban environment, employment opportunities, family and marital status, social networks, income and income distribution, unemployment, level of education, leisure resources, crime and social inequalities and exclusion (Psatha, Deffner, & Psycharis, 2011, pp. 12–13). Subjective measures of

[17] We will later refer to the Greater Mumbai Corporation's efforts to calculate a ward-level HDI for the year 2009.

QOUL are usually determined by way of satisfaction surveys and their statistical analysis (Marans, 2012, p. 11).[18]

The above suggests that the measurement of living standards is far from being an exact science across time and space. Economists have tended to equate economic development with the quality of life, which may be an assumption too far for some already. Moreover, a variety of measures is needed to reflect the multidimensional character of development. As such, historical data availability and conceptual difficulties (e.g. the comparability of concepts such as adequate living space across cultures) make longitudinal or geographical comparisons challenging. Compromises such as the UN's HDI have their inherent weaknesses. However, they have been the starting point for many debates on the quality of life.

Moving the discussion of living standards into an urban setting further complicates the picture. Here, the realities of dense co-habitation bring to the fore a host of other quality of life issues that set the urban space apart from the countryside. The provision of clean water and other basic infrastructure is more important here given the absence of natural remedies urban dwellers have access to compared to those living in a rural setting. Besides these basic requirements, housing presents itself as the other major physical feature of urban life: As people move into cities from the countryside without adequate housing being provided, crowded conditions are often the corollary of urban growth, with slums representing the most extreme end of the distribution of living space in cities in the developing world. Important, too, are considerations of equity. Average measurements

[18] The Minobe administration's "civil minimum", discussed in detail in chapter four, represents an early attempt to capture the multidimensional character of quality of life in an urban context and to use it for concrete policy guidance.

often hide distributional issues. Finally, as living standards are also a very subjective measure of wellbeing, the perceived extent of one's own position on the socio-economic ladder may be as important as measured fact.[19] Nowhere is this more pertinent than in cities, where the visible manifestations of inequality are there for everyone to see.

This leads us to a short review of urban inequality. It has been suggested that the analysis of intra-urban inequalities "suffers from the greatest dearth of data, especially in low- and middle-income countries" (Kilroy, 2007, p. 2). The reasons for this are manifold: Data is not regularly compiled, and the quality of data collection is low due to a large degree of informality in labor and housing markets, to name but a few examples. The characteristics of administrative entities for which data is collected may also be extremely varied between cities at one point in time, and within cities across time. Lastly, longitudinal studies are made more difficult by changing standards of data collection as well as the inconsistent collection or changing definition of indicators. All of this is relevant to Tokyo during the period of observation and will be pointed out throughout the remainder of this chapter.

Some aspects relating to intra-urban inequality appear to be valid despite these data issues. Income is the most important determinant of spatial segregation as people often tend to co-locate with those of a similar socio-economic background. At the top end of the income distribution, this may lead to positive externalities, e.g. good schools and other public infrastructure in an area with disproportionately affluent people. At the bottom end of the distribution, this may lead to spatial pockets of poverty and a bad quality of public services. The importance of the automobile for urban development in developed countries

[19] We refer back to the discussion of "relational space" in chapter two.

has led to a clustering of socio-economic groups in different parts of the city, i.e. "the poor tend to be clustered in the central cities, while higher-income residents are dispersed towards the periphery". However, in cities in developing countries, poverty may also be concentrated "in informal settlements at the urban periphery" (Kilroy, 2007, p. 3).

Williamson argued that in line with Kuznets's reasoning on overall income inequalities, his famous inverted-U curve may also be applicable to regional (or more widely interpreted, spatial) inequalities, i.e. they increase during early stages of development, reach a turning point and henceforth decline (Williamson, 1965, p. 10). This divergence-convergence view rests on the idea that areas with low per capita incomes can grow faster than a region with higher incomes (catch-up growth). However, this line of reasoning, especially the underlying perfect factor mobility, has long since come under criticism for lack of institutional and historical considerations (Chakravorty, 2006). In OECD countries, for example, inequality tends to be higher in cities with higher average incomes. Cities with similar income levels can also show varied spatial inequalities, suggesting the presence of non-linear relationships (OECD, 2018, p. 21). Divergence between regions can be expected because of increasing returns in urban economies, which can become self-reinforcing (Chakravorty, 2006, p. 175). If we understand cities as a collection of urban regions, these processes can be thought to exist at some scale also within cities (Kilroy, 2007).

Moreover, spatial poverty traps can perpetuate spatial inequality despite fast economic growth. In his survey of the literature, Kilroy attributes these traps to six forces, i.e. isolation from geographic concentrations of jobs, lack of access to social networks in disadvantaged areas, economic constraints from ethnic segregation, spatial concentrations of crime and violence, diminished cross-income economic exchanges and inaccessibility caused by locational disadvantages of the urban form itself. Inequalities in municipal investment also exacerbate spatial inequalities (Kilroy, 2007, pp. 9–19).

The spatial scale at which inequalities are measured and compared is crucial. Usually, data is collected at the administrative unit level. Low inequality between Tokyo's wards could be offset by high intra-ward inequality, for which only little data exists. There are further theoretical problems in using data at such level, in particular the modifiable area unit problem (MAUP) (Chakravorty, 2006, p. 169). This suggests that administrative boundaries may cut through areas of similar population characteristics and combine those with very unequal features. Redrawing these boundaries can result in very different inequality measures between them. A popular example of MAUP is gerrymandering, in which electoral districts are redrawn to skew voting results in favor of a certain party. Most of Mumbai's wards, for example, contain slums and upscale residential districts. A redrawing of the administrative map consolidating adjacent slums in neighboring wards would change the measure of inequality significantly. Moreover, the "checkerboard problem" refers to the situation in which residential segregation by income in one side of the city covering several wards (e.g. all western wards) can yield the same measure inter-ward inequality than if high and low-income wards are adjacent and "checkered" throughout the city. Finally, there has been discussion as to the perfect number of administrative subdivisions for spatial inequality analysis, and the "literature appears to indicate that anything fewer than 15 may be too few, and any number greater than 50 may be too many" (Chakravorty, 2006, p. 170).

For this thesis, intra-urban inequalities are measured as the inequalities between the 23 wards. To avoid some disadvantages of our respective calculation methods, i.e. coefficient of variation (CoV) and Theil index, we often use both. We also perform a spot check with regards to intra-ward inequalities, and do not find substantially different results from our inter-ward analysis. For an overview of the statistical method that we employ, as well as respective advantages and disadvantages of the indices chosen, please consult the annex.

[Insert Table 29 here]

To sum up, the table above lists the indicators we analyze in this chapter along with the broad category of living standards they belong in. We do not follow the methodologies of any of the studies cited above but remain close to most of them in spirit: We also understand human development as a multifaceted phenomenon that cannot only be captured by income. We agree that there are specifically urban dimensions to the quality of life that need to be expressed by other indicators. We distinguish between private and public space. Private space is primarily defined by the living space per capita, which is influenced, among other factors, by the degree by homeownership rates in the 23 wards. The proportion of the population living in extremely crowded conditions is also an important indicator denoting the quality of private living space. The quality of public space is determined by how healthy a city is and how it provides for the education of its population. Culture and safety are two further important facets of (urban) living standards.

The quality of private and public space was low by national and by international standards, at least initially. However, this relative "urban space poverty" across Tokyo's 23 wards was shared, as we can demonstrate by showing the spatial distribution of these indicators.

Living standards improved across the ward area, and the inequality in their spatial distribution became smaller in most of the examples provided. The first part of this chapter will outline these changes in more detail. The second part of the chapter offers an explanation as to why this was the case, drawing on spatial attributes of Tokyo's urban form. Chapter four will deepen this discussion by considering the institutional context of the period of observation.

The improvement in private living space

The following section will first show how private living space as measured in tatami per capita improved across the 23 wards. The biggest improvements were recorded for households living in owned accommodation, while for residents in rental accommodation, they were somewhat smaller. This explains why comparatively high homeownership rates in the old and dense industrial wards helped overall living space keep pace with the peripheral wards, which had a higher proportion of renting households. Overall, the variability of living space as measured in size available for each person decreased between the wards. Other indicators of private living standards improved, too. The provision of sanitary infrastructure became more widespread, and the proportion of the population living in very crowded conditions decreased markedly.

Historically, Tokyo had less living space per capita than the Japanese average, primarily because of urban land scarcity. In 1948, the first postwar year for which figures are available, Tokyoites lived on an average of 2.8 tatami per person, whereas the average Japanese had 3.5 mats of living space. As the national housing shortage slowly abated from the early 1960s onwards and living space per capita increased, the difference between Tokyo and Japan became bigger, too, and reached one whole tatami mat by 1963

(3.9 vs. 4.9). Living space increased at about the same pace from here so that the difference between Tokyo and Japan as a whole was maintained over the next decade. In 1973, the average person in Tokyo lived on 5.5 tatami compared to a national average of 6.6.

[Insert Table 30 here]

The table above shows how the gradual improvement in living space manifested itself across the territory of the 23 wards. We use the same ward groupings than in the previous chapter. The old industrial central wards had the lowest per capita living space in 1950 at 2.4 tatami mats per person, while the western wards had the highest (3.1). The wards with the least living space were Kōtō and Kita (2.1 mats), those with the largest space were Suginami (3.4) and Setagaya (3.3). Living space increased gradually from here, with the biggest shifts taking place in the 1960s: The first five years of the decade saw an increase in the average of 0.7 mats, the latter five years by a full mat. In 1970, therefore, the average resident in the 23 wards had 5 tatami mats of living space. The central wards had the highest average at 5.8 mats, the northern and eastern industrial wards the lowest at 4.4 mats. The wards with the lowest living space per capita were Arakawa, Adachi and Edogawa (4.3 mats), while those with the largest space were Minato (6.1) and Chiyoda and Suginami (5.9).

Throughout the period of observation, we note a decreasing variability in living space between the 23 wards. The coefficient of variation decreases from 15.1% in 1950 to 11.8% in 1970. The Theil Index shows a short-lasting polarization from 1950 to 1955 (i.e. the differences between the 23 wards in terms of living space per capita increase in population-weighted terms), from where an equalizing trend can be observed until the index reaches a low of 0.0066 in 1970. This suggests that despite 15 years of rapid growth from 1955 until 1970, differences in living space across the 23 wards in fact decreased. In other words, wards with lower per capita space at the outset in 1950 increased their average living space faster than the wards with more abundant living space at that time. All throughout the observation period, no single ward had a higher living space average than what was observed at the national level at the same time. Small living space was a shared phenomenon across Tokyo's 23 wards.

Before we continue with a more detailed split into owned and rented accommodation, it is worthwhile questioning whether declining inter-ward variabilities paint a one-sided picture. We refer back to the literature review, in which we discuss the two problems inherent in spatial inequality analysis, i.e. the checkerboard problem and modifiable areal unit problem (MAUP). Both suggest that if the boundaries between analyzed entities were drawn differently, or if smaller spatial units analyzed, altogether different variables could be observed.

[Insert Table 31 here]

Drawing on 1970 census data, which is available at the neighborhood (*chō)* level, we calculate the variability in living space within the four sample wards (Nakano, Arakawa, Bunkyō and Ōta). While we must apply caution in comparing the coefficients of variation from this dataset with the one in Table 30, we can deduct unambiguously that Nakano and Arakawa are more "egalitarian" than Bunkyō and especially Ōta as they have both lower CoVs and Theil index values. Ōta appears to be the least equal ward in terms of living space per capita. Its CoV (21.4%) and Theil index value (0.183) are significantly above those of the other three wards shown here.

The wards' varying characters can be drawn on as a preliminary explanation: Nakano is a western, primarily white-collar ward with little spatial variation, while Arakawa, a northern primarily working-class ward, too, is rather uniform in character. Bunkyō and Ōta, meanwhile, comprise areas with very different socio-economic profiles. Bunkyō has historically been a relatively stratified part of the city, in which topographical features such as ridges and valleys determined the location of wealthy inhabitants and commoner districts, respectively (Jinnai, 1995). As regards Ōta, the difference in neighborhood character between Den-en-chōfu and Kamata could not be starker: While the former is a leafy suburb inhabited by wealthy commuters, Kamata is at the heart of Ōta's urban manufacturing sector, described in more detail in the previous chapter.

[Insert Table 32 here]

We now turn to a more detailed breakdown of living space per capita across the 23 wards from 1950 to 1970. Table 32 lists the average living space per capita for households living in owned accommodation. These households tend to have more living space per capita than the average. As of 1950, people living in owned accommodation inside the 23 wards had on average 3.1 tatami mats of living space compared to 2.8 mats for all residents of the 23 wards as seen in Table 30. The central business wards and the western wards had the highest per capita living space at 3.5 mats. The old industrial wards had the lowest space with 2.6 mats. The wards with the highest living space per capita in owned accommodation were Chūō (4.3 mats), Suginami and Setagaya (4.0). The wards with the lowest per capita space were Arakawa (2.3) and Kōtō (2.2).

There is hardly any change per capita space between 1950 and 1955 and further little change until 1960. During the 1960s, however, residents living in owned accommodation enjoyed substantial increases in their average living space: They added a total of 2.4 mats between 1960 and 1970, eventually reaching 6.2 mats per capita in 1970. The western wards stayed on top with 6.9 mats per capita in owned accommodation. The northern and eastern industrial wards' average was considerably lower at 5.3 mats. The wards with the highest living space per capita in owned accommodation were Suginami (7.5 mats) and Setagaya (7.4 mats). The wards with the lowest space were Arakawa and Adachi (5.1 mats). Mirroring the aggregate data cited above, the variability of living space per capita in owned accommodation decreases markedly between 1950 and 1970. The coefficient of variation decreases from 17.5% in 1950 to 12.7% in 1970, while the Theil index, too, declines from 0.0145 in 1950 to 0.0086 in 1970. The improvement in living space in owned accommodation therefore occurred faster in wards with less per capita space at the outset, leading to lower inter-ward variability by the end of the observation period.

[Insert Table 33 here]

Table 33 shows the equivalent data as in the preceding section, but for households living in rented accommodation. Intuitively, living space per capita here is lower than the average. In 1950, households living in rented accommodation had on average only 2.5 tatami mats per capita compared to 2.8 mats for all residents of the 23 wards. With 2.7 mats per capita, the central business wards and the western wards had the highest per capita living space in rented accommodation. Renting households had the least space per capita in the northern and eastern industrial wards at just 2.1 mats. The ward with the highest per capita living space at this point in time was Suginami (2.9 mats). With 1.9 mats, Arakawa was the ward with the least space per capita in rented accommodation.

The situation for the renting population did not improve throughout the 1950s; the average had even decreased by 1955, only to increase slightly to 2.6 mats in 1960.

In line with owned accommodation, the 1960s saw a faster improvement in living space, so that by 1970, an average of 3.8 mats was reached. At 5.1 mats, the central business wards had the largest per capita living space, while the northern and eastern industrial wards remained at the bottom with 3.3 mats. In terms of specific wards, those with the highest per capita living space in rented accommodation were Minato (5.5 mats) and Shibuya (4.6 mats). The lowest average space was recorded in Arakawa and Adachi (3.2 mats). The variability of living space per capita for rented accommodation presents a somewhat different picture than that for owned accommodation. While it can be described as low, it increased towards the end of the observation period. The coefficient of variation ticks up from 12.7% in 1950 to 15.6% in 1970. The weighted Theil index, meanwhile, shows little movement from 0.0079 in 1950 to 0.0084 in 1970. This suggests that stratification of living space per capita in rented accommodation between 1950 and 1970 was negligible. The differences between the 23 wards in terms of their per capita living space in rented accommodation remained relatively small.

[Insert Table 34 here]

Table 34 above computes the ratio of average per capita living space in rented vs. that in owned accommodation. We note that in the beginning of the period of observation, there was less difference between these two types of accommodation: If a resident lived in rented accommodation in 1950, they would live on 80.2% of the living space than the average resident living in owned accommodation. The old industrial wards had the highest rental / owned space share (89.0%), while the lowest was recorded in the central business wards (76.4%). In terms of specific wards, the share was as high as 96.4% in Shinjuku and 93.3% in Bunkyō. On the other end of the scale stood Setagaya, where a renting resident only lived on 70.0% of the space of the average resident living in owned accommodation.

The ratio for the 23 wards would fall over consecutive census reports, before reaching a mere 61.2% in 1970. This was already observable in Tables 32 and 33 above, where the increases in living space in rented accommodation were not as pronounced as those in owned accommodation. In 1970, the highest share was still observed in the central business wards (75.9%), while southern industrial wards had the lowest rental to owned ratio (58.7%). In terms of specific wards, the highest ratios were observed in Minato (77.5%) and Chiyoda (76.9%), while the lowest were in Suginami (56.0%) and Ōta (56.5%). In other words, in these two wards, a person living in a rented home lived on a little more than half of the space of a person living in owned accommodation. In terms of variability, there is a marked decrease in observed variability from 10.8% to 6.1% between 1950 and 1955, from where the variability is increasing slightly, towards 8.8% in 1970.

From the tables above, we note that the increase in living standards as measured by living space per capita was more pronounced for the population living in owned accommodation. In contrast, the renting population did not increase its living space at the same pace, leading to a more bifurcated situation by the end of the period of observation as seen in Table 34. Much of the 23 wards' population growth in the 1950s and 1960s resulted from "social increase", i.e. net in-migration from outside the ward territory. A large part of these migrants came from other prefectures and settled primarily in the growing peripheral wards, where they were primarily renting, often in minimal conditions. As was shown already in the previous chapter, a significant proportion of the young male migrants also moved into company dormitories.

[Insert Table 35 here]

As can be seen from the discussion above, homeownership is an important variable in explaining the differences in living space across the 23 wards, i.e. residents living in homeowner households had on average more per capita living space than their renting counterparts. Homeownership is normally calculated as the ratio of owner-occupied housing to the entire housing stock. We use a different metric in order to account for varying household size and simply divide the household members living in owner-occupied dwellings by total household members (for a discussion of homeownership rates and their calculation in the Japanese context, see Ito, 1994, pp. 219–220).

In the 23 wards, our aggregate homeownership ratio stood at 51.6% in 1950 and increased markedly to 60.0% five years later in 1955. From here, the figure steadily decreased, to 48.9% by 1970. The highest homeownership rates in 1950 were observed in the old industrial wards (58.7%), the lowest in the northern / eastern industrial wards (45.9%). The single wards with the highest homeownership rates were Taitō (62.1%) and Kōtō (59.0%), the lowest Katsushika (41.9%) and Itabashi (41.7%), two of the newly-urbanizing outer wards. While experiencing the same long-term decline than the 23 wards as a whole, the old industrial wards maintained higher than average homeownership rates by 1970 (54.5%), although the central business wards had overtaken them in the top position by that time (56.1%). All three wards (Chiyoda, Chūō and Minato) experienced population losses during the preceding years. Chūō is the only ward whose homeownership increases from the ward-wide peak in 1955 to 1970 (from 59.5% to 59.6%).

The ward groupings with the lowest homeownership rates in 1970 were the southern industrial wards, the northern and eastern industrial wards as well as the western wards (all 47.7%). The individual wards with the highest homeownership were Chiyoda (65.4%) and Taitō (62.4%), the ones with the lowest Toshima (43.9%) and Kita (43.6%). We therefore observe significant variations in homeownership rates across the 23 wards. Given the larger per capita living space in this type of accommodation, differences between wards and changes over time are important. First of all, the variability in homeownership across the 23 wards increases marginally over the period of observation, although much depends on the method of measurement. While the coefficient of variation increases from a low of 6.3% in 1955 to a high of 12.2% in 1970, the Theil index in 1970 (0.0040) is lower than the one in 1950 (0.0053).

The comparatively high degree homeownership in the old industrial wards is noteworthy. These wards experienced an overall population decline in the 1960s, and their population densities fell (see below). It is intuitive that for the most part, it was renting households that were moving out from here given their higher mobility and flexibility. As a result, homeownership in the central business wards and old industrial wards remained at higher levels than elsewhere in the 23 wards. As discussed above, owner-operated workshops (tool houses) and small factories with attached owner's accommodation made up a significant proportion of the housing stock here.

[Insert Table 36 here]

The tables and their discussion have so far shown that the improvement in per capita living space was not only a shared experience across the 23 wards but was experienced disproportionately in wards that had less than average living space in 1950. We showed that a large part of this "catch-up" was due to improvements for owning households rather than the rental population. Table 36 above provides another look at living standards in terms of dwellings' sanitary standards and the share of the population living in crowded living conditions. Detailed and comparable data for making these calculations was only made available in the housing surveys of 1963 and 1968. By 1963, most dwellings in the 23 wards had their own sink (88.8%) and running water (85.5%). 72.1% of dwellings had exclusive toilets. The variability in the provision of these services was also relatively low, with coefficients of variation of 4.6%, 5.5% and 11.6%, respectively. However, only 34.4% households had flush toilets, and 33.8% their own bath. The variability of these last two indicators was also relatively high across the 23 wards, with coefficients of variation of 78.3% and 31.2%, respectively in 1963. By way of illustration of these discrepancies, 97.9% of households had a flush toilet in Chūō, compared to just 4.6% in Edogawa.

Looking at these two indicators, i.e. flush toilets and bath availability, in more detail, we find that the central business wards had the best sanitary infrastructure in both 1963 and 1968. Here, 94.2% of dwellings had a flush toilet in 1963 compared to 98.2% in 1968. 45.8% of dwellings had a private bath in 1963 compared to 53.3% five years later in 1968. The southern industrial wards had the smallest proportion of dwellings with its own flush toilet in 1963 (14.9%) and 1968 (27.8%). In 1963, the lowest share of households with their own baths was recorded in the northern and eastern industrial wards (24.8%). By 1968, the old industrial wards had the lowest share (32.8%). In terms of single wards, in

1963, Chiyoda had the highest availability of flush toilets (97.9%). In 1968, Bunkyo had overtaken all other wards (98.9%). In 1963, 51.9% of all households had their own bath in Chiyoda, while in 1968, the highest share was in Minato (58.8%). In 1963 and 1968, the lowest spread of flush toilets was recorded in Edogawa (4.6% and 11.5% respectively). The lowest share of households with their own bath was recorded in Arakawa in both 1963 (18.5%) and 1968 (22.8%).

The variability in sanitary conditions decreased considerably over the relatively short period of just five years. The CoV for the spread of flush toilets decreased from 78.3% in 1963 to 54.5% in 1968. This suggests that less developed wards caught up with the central wards that had already been connected to the urban sewage system for much longer. In fact, as will be shown later, the mid to late 1960s saw heavy investments in the sewerage system as part of the Olympic "upgrading" of the city's infrastructure, which disproportionately benefited the hitherto unconnected wards. Private bath availability does not depend on the dwelling's connection to the sewerage system and therefore develops independently. We can state that the spread of private baths remained relatively low, but that the variability across the wards decreased: The CoV for own bath availability declined from 31.2% in 1963 to 24.7% in 1968. The low availability of bathrooms suggests the demand for public baths, *sentō,* remained strong, as will be shown later.

Moving on to crowded housing conditions, we compute the share of households whose members each lived on less than 3 tatami mats by 1963 and 1968. To recall, 3 mats were a little more than average (2.8) for all 23 ward residents in 1950, when the rental population lived on even less (2.5). However, by 1965, the average had already increased to 4.0 mats (owned: 4.9, rented: 3.0). As aggregate figures as used throughout this chapter, we have so far not been able to say much about the distribution of per capita living space, especially at the lower end of the spectrum where space poverty is concentrated. Three tatami mats are a little less than 5 square meters and denote very crowded living conditions. As of 1963, 31.2% of households in the 23 wards lived in such conditions, i.e. each member of these households lived on less than 3 mats. The wards with the highest proportion were Adachi (45.6%) and Arakawa (43.8%). The wards with the lowest share of households whose members lived on less than 3 mats were Chiyoda (7.9%) and Minato (19.0%). By 1968, the 23 ward-wide figure had dropped to less than a quarter (23.1%). The wards with the highest proportion were Arakawa (33.9%) and Kōtō (31.5%), those with the lowest Minato (13.8%) and Chiyoda (16.2%). The variability of the proportion of households whose members lived on less than 3 mats across the 23 wards, as measured by the coefficient of variation, decreased from 31.2% in 1963 to 22.0% in 1968. This suggests that extremely low per capita living space became not only less common but also more equally distributed across the 23 wards. To put these numbers into perspective, today less than one percent of households live in such crowded conditions (MLIT, 2015).

[Insert Table 37 here]

To conclude this section on private living standards, the table above illustrates the spread of some selected household consumption items. This paper has so far avoided analyzing living standards in the traditional way, i.e. by income and/or expenditure data. We make an exception for two of the "three sacred treasures" (*sanshu no jingi)* and the telephone, primarily for us to comment on the variability of their distribution across the ward area.

The three sacred treasures were a popular reference to the three imperial regalia, which according to legend, were granted to the Japanese emperor in ancient times. There were three sets of the three postwar sacred treasures at different points in time; the three S' of the late 1950s and early 1960s (*senpūki, sentaku, suihanki;* electric fan, washing machine, electric rice cooker), the three C's of the mid-1960s (*kaa, kura, kara terebi;* car, air conditioner, color television) and the three J's of the early 1970s (*jueru, jetto, jūtaku;* jewels, overseas vacation, house). The changing composition of the three sacred treasures reflected the growing affluence of the postwar period (Kelly, 1993, p. 195). Table 37 above shows the spread of TVs, telephones and cars among the ward population. It takes a different approach to the data tables above in that here, information is only provided for 20 wards, i.e. it excludes the three central business wards of Chiyoda, Chūō and Minato. The numerous offices and embassies in these three wards skew the data for all three indicators: They inflate the total number of TVs, telephones and cars. Therefore, calculating variabilities for the 20 remaining wards gives a better indication of the differences in the lived experience for Tokyo's inhabitants.

The three selected indicators were chosen primarily due to data availability. The spread of TVs in the 20 wards increased from 42.4% in 1960 to 71.1% in 1970, i.e. there were 71.1 TVs per 100 inhabitants in 1970. The variability in the spread of TVs in the 20 wards as measured by the coefficient of variation decreased from 10.2% in 1960 to 8.2% in 1970. The amount of telephone connections also increased. In 1962, there were 9.8 connections per 100 inhabitants, while in 1970, the number had grown to 24.0. The variability, too, decreased markedly, from 31.1% in 1962 to 20.0% in 1970. Finally, the spread of consumer cars (sedans) also increased. There were only 1.2 per 100 inhabitants in 1960. This figure increased by more than factor 6 by 1970, when there were 7.8 sedans per 100 inhabitants. As with the other items, the variability in the spread of sedans across the 20 wards decreased, from a 1960 coefficient of variation of 38.0% to 19.9% in 1970. Taken together, the increase in the provision of these three household consumption items across the 20 wards was significant during the 1960s. Most importantly, however, the variability in their provision decreased markedly, too, so that the enjoyment of improved living standards and the participation in the Japanese economic miracle became a more shared experience across the 23 wards.[20]

The section above has shown the how the gradual improvement in living standards was a shared phenomenon across the ward area. This was especially true for those living in owned accommodation. Therefore, it did not matter so much where one lived but whether one was a homeowner or not. The improvement in private living standards as measured by other indicators suggests that things were getting better for the population in all wards, albeit slowly and from a low base. The period from 1945 to 1970 did not coincide with spatial stratification as could be expected during such episodes of megacity growth.

The upgrading of public space

After having discussed the improvements of living standards related to the private space of the inhabitants of the 23 wards, the following section will discuss how the provision and quality of public space, too, improved over the period of observation. What do we mean by "public space"? In short, using the data that is available at ward level, we want to describe the quality of life that Tokyo's residents experienced outside of their homes. Ideally, their urban environment should have no harmful effect on their health, provide well accessible spaces for education, expose them to culture and provide spaces for leisure, as well as make them feel safe from harm. To test Tokyo for these qualities, we have

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[20] It is important to mention that the increasing diffusion of automobiles was one of the main reasons for the increasing pollution and congestion on Tokyo's streets.

collected basic data on (infant) health, childcare and primary education, park space and municipal library books as well as crime. The indicators chosen may not have an immediate space-related dimension. However, the four categories they represent—i.e. health, education, culture and crime—illuminate the public aspects of living standards in Tokyo from 1952 to 1970, and thereby at least indirectly describe its public space(s).

[Insert Table 38 here]

The table above presents health data in terms of the still birth rate and the infant mortality rate (the number of deaths per 1,000 live births of children under one year of age). In contrast to other health data (e.g. life expectancy), this information has consistently been collected at ward level and allows evaluating the quality and access to maternal and postnatal healthcare. We suggest that it may allow making better inferences about health and healthcare in Tokyo's 23 wards than life expectancy figures, the preferred measure for composite quality of life indices such as the HDI. Given rapid population growth due to migration as well as inter-ward migration, we cannot link life expectancy at birth with the quality of life in a small geographic entity such as a special ward. Turning to the data, the still birth rate includes figures on "artificial stillbirth", i.e. abortions. These become listed as a separate category only from 1970 only. Furthermore, Japanese vital statistics measure stillbirths differently by going back further in gestation than the global standard of 28 weeks (Ministry of Health, n.d.). Therefore, we must apply caution in comparing the stillbirth numbers to those in today's developing countries. In contrast, the infant mortality rate is comparable to global standard figures. At any rate, the primary interest of this section is to detect trends in absolute figures in the different ward groupings as well as the variability of infant health data across the 23 wards.

In 1952, the stillbirth rate stood at 92.0 still births per 1,000 live births. The wards with the highest stillbirth rate were the western wards (103.5 stillbirths per 1,000 live births), those with the lowest rate the old industrial wards (82.7). In terms of single wards, the maximum rate was in Toshima (122.0), the minimum in Kōtō (73.0). The 23 ward-wide stillbirth rate increased to 116.5 in 1960 – a level about six times as high as today's figure (21.6). The wards with the highest rate were the northern and eastern industrial wards with 121.0 stillbirths per 1,000 live births, those with the lowest rate were the southern industrial wards (106.0). Toshima still topped the list with 169.5 stillbirths per 1,000 live births, while Setagaya had the fewest (91.5). From here, the stillbirth rate decreased steadily, halving within the decade to 66.9. The wards with the highest stillbirth rate were the northern and eastern industrial wards (72.2), those with the lowest the southern industrial wards (57.2). Toshima retains the highest rate (98.3) and Setagaya the lowest (48.6). In terms of inter-ward variability, the coefficient of variation increases from 14.3% in 1952 to 17.6% in 1970, pointing to a stratification of stillbirth rates across the 23 wards. The Theil index confirms this reading. However, both measures show 1965 as the maximum point of inequality, suggesting some equalizing trends took hold towards the late 1960s.

The other health indicator shown here, infant mortality rate (IMR), improves steadily throughout the period of observation, from 33.4 deaths per 1,000 live births in 1952 to 11.8 in 1970. The wards with the highest IMR were the northern and eastern industrial wards (39.9), while the lowest IMR was recorded in the western wards (28.7). The ward with the highest IMR was Adachi (44.5), the one with the lowest Bunkyō (23.9). By 1970, the wards with the highest IMR were the central business wards and the old industrial wards (13.4), the ones with the lowest were the northern and eastern industrial wards and the western wards (11.5). The ward with the highest IMR was Taitō (16.3), the one with the lowest Arakawa (9.7). The variability of IMR between the 23 wards decreases throughout the period of observation. The coefficient of variation stood at 25.3% in 1955 and decreased to 12.9% by 1970. This trend is confirmed by the Theil index. The improvement and lower variability may have to do with better postnatal medical support throughout the territory of the 23 wards. We can therefore conclude that the slow improvement in living standards was mirrored in improving neonatal healthcare standards as measured by IMR. However, maternal health as represented by the stillbirth rate stratified until 1965, challenging this narrative slightly.

[Insert Table 39 here]

Turning to education, we have calculated the density of kindergartens and elementary schools and the variability of this density across the 23 wards. These indicators are important features of urban space and the city's social infrastructure. They allow making inferences about how far the inhabitants of a certain area have to walk to reach this infrastructure and whether the city is investing in its provision commensurately with population growth. Schoppa has argued that the walkability of Japanese neighborhoods is one of the defining features explaining their social cohesion. According to him, low residential mobility increases civic activism because inhabitants face very high exit costs, i.e. they cannot simply move elsewhere to access better educational facilities for their children (Schoppa, 2013). For this argument to work, each of the Tokyo wards needs a certain number and relatively equal distribution of primary schools (and to a lesser extent of kindergartens).

In 1952, there were 10.8 elementary schools per 100,000 inhabitants, a number that decreased slightly throughout the period of observation, reaching 9.3 by 1970. The wards with the highest density of elementary schools in 1952 were the central business wards with 12.6 schools per 100,000 inhabitants. The lowest level was recorded in the old industrial central wards with 10.3 schools per 100,000 inhabitants. The single ward with the highest density was Chiyoda (15.4), the one with the lowest Meguro (9.0). By 1970, the central business wards remained at the top with 14.9 elementary schools per 100,000 inhabitants, while the southern industrial wards had the least (8.3). The single ward with the highest density was again Chiyoda (18.9), the ones with the lowest Meguro, Nakano and Suginami (7.4).

Kindergartens slightly increased in density from 1960 to 1970, the period for which information at ward level is readily available: While there were 8.9 kindergartens per 100,000 inhabitants in 1960, this figure had increased to 10.3 in 1970. The wards with the highest density were the central business wards with 14.3 kindergartens per 100,000 inhabitants in 1960. The lowest density was recorded in the northern and eastern industrial wards (6.2). The single ward with the highest density was Chiyoda (17.1), the one with the lowest Kōtō. Here, there were only 2.6 kindergartens per 100,000 inhabitants, a much more pronounced difference to say Chiyoda. In other words, childcare was practically unavailable in Kōtō. By 1970, the wards with the highest kindergarten density were still the central business wards (22.4), while the northern and eastern industrial wards came in last again with 8.3 kindergartens per 100,000 inhabitants. The single ward with the highest density was again Chiyoda (27.0), the one with the lowest was now Arakawa (6.1). Kōtō had a density of 7.3 kindergartens, representing a remarkable catch-up in kindergarten infrastructure during the 1960s.

We now calculate the variability of elementary school and kindergarten densities for the 23 wards. While kindergartens become more equally distributed across the 23 wards, primary schools show some stratification in the 1950s, ending on a higher variability in 1970. The variability figures are comparatively high because of a statistical anomaly that is already evident from the previous paragraphs: Despite their declining populations in the 1960s, Chiyoda, Chūō and Minato wards did not see their social infrastructure decrease proportionately. In other words, elementary schools and kindergartens were not closed commensurately, leading to high densities of kindergartens and elementary schools. When we calculate the variability of kindergartens and elementary schools without these three wards, we see a slightly different, more egalitarian picture emerge.

[Insert Table 40 here]

We have selected park space per capita as well as municipal library books per 1,000 inhabitants as indicators for the third category of urban space, i.e. leisure and culture. Park space in Japanese cities has historically been low by international standards (Japan for Sustainability, 2014). Due to the same space constraints described frequently in other sections of this dissertation, park space has been even scarcer in Tokyo than at the national level. In 1952, it stood at just 0.6 m^2 per capita, and even decreased from here due to rapid population growth and lack of commensurate investment in public parks. Nonetheless, there were significant improvements in the 1960s so that by 1970, park space per capita had more than doubled to 0.9 m^2 per capita. The central wards, in particular Chiyoda, with relatively few inhabitants and more generous parks, are the wards with the highest per capita park space at 3.3 m^2 in 1952. The lowest allotment of parks per capita was in the southern industrial wards and the western wards (0.2 m^2 per capita). The single ward with the highest per capita park space was Chiyoda, at 7.7 m^2, while the lowest per capita park space was in Adachi and Meguro (0.1 m^2).

By 1970, the wards with the most park space were the central business districts (2.4m^2), while the least park space was available in the southern industrial wards (0.5m^2). The ward with the largest relative park space was Chūō (3.7m^2), the one with the lowest was Toshima (0.2m^2). We calculate the variability figures without the central ward Chiyoda, whose Imperial Palace (some parts of it are classified as public parks) and Hibiya Park otherwise distort the sample. The variability of park space provision decreases from 1952 to 1970: The coefficient of variation drops from 116.3% to 82.0%, although there was some stratification evident in the middle of the period. The long-term trend, however, suggests that while relatively high, the differences in park space per capita between the 23 wards decreased over time.[21]

The indicator chosen for culture, municipal library books per 1,000 inhabitants, also shows improvements for the period for which data is available, the 1960s. In 1962, there were 96 books per 1,000 inhabitants, by 1970 that figure had more than doubled to 212. By 1970, the largest relative number of books for wards except Chiyoda and Chūō was available to the residents of Taitō (323), the fewest to those of Itabashi (64). Chiyoda and Chūō are excluded due to the large number of municipal libraries here owing to their central location and national importance. The variability between the 21 wards declined from a coefficient of variation of 61.3% in 1962 to 45.9% in 1970. Not only were there

[21] Some authors have noted that the relative lack of park space in the peripheral wards was partly compensated by the availability of open, green space there (Hebbert, 1986).

more books available per capita in Tokyo, municipal ward libraries also became more evenly equipped with books across the 23 wards.

[Insert Table 41 here]

The fourth and final set of indicators chosen to illustrate the quality of public space in Tokyo's 23 wards from 1952 to 1970 relates to safety. We have collected data on aggregate criminal offences and the number of fires per 1,000 inhabitants. Criminal offences include so-called felonious, larcenous, moral, intellectual and violent offences. The largest component of crime statistics throughout the various years' reports is larceny, i.e. theft. Crime is highest in the central business wards, presumably due to the low proportion of nighttime to daytime population. In other words, crimes were committed by the daytime population, while the denominator (not just) for crime statistics is the nighttime population. Another reason for the higher incidence of crime in the central business wards might be the large amount of retail and recreational establishments.

In 1955, there were on average 28.4 crimes registered per 1,000 inhabitants across the 23 wards. In the central business districts, this figure was as high as 71.5, in the northern and eastern industrial wards there were only 19.4 crimes per 1,000 inhabitants. The ward with the highest crime rate in 1955 was Chiyoda (121.5), while the one with the lowest was Nerima (12.6). By 1970, the relative number of crimes had decreased to 21.0 per 1,000 inhabitants across the 23 wards. The central business wards were still those with the highest crime rate (54.4), while the northern and eastern industrial wards reported the lowest rate (15.8). The ward with the highest crime rate in 1970 was still Chiyoda (97.7), while the one with the lowest rate was Setagaya (13.0). In terms of variability, we observe a relatively stable coefficient of variation throughout the period of observation, reducing slightly from 80.3% in 1955 to 75.8% in 1970. To account for the outlying character of Chiyoda and Chūō wards, with their low nighttime population and relatively high incidence of crime, the weighted Theil index allows a more conclusive statement on inter-ward variability: It decreases from 0.1878 in 1955 to 0.1220 in 1970, denoting a more equal distribution of crimes across the 23 wards. Despite rapid growth both in terms of incomes and population during this period, crime did not only reduce in relative terms, it also became more evenly distributed across the city.

The other indicator details the incidence of fire per 1,000 inhabitants. It describes an important feature of safety which is particularly relevant to Tokyo. The city has traditionally battled with fire, owing to high population density and a residential construction tradition using primarily wood (see below). Neighborhood fire stations, both professional and volunteer-based, are an important social institution (Bestor, 1985). The incidence of fire increased somewhat during the period of observation. There were 0.5 fires per 1,000 inhabitants across the 23 wards in 1952. Most fires on a relative basis were recorded in the central business districts (1.1), the fewest in the western wards (0.4). The ward with the highest relative incidence of fire was Chiyoda (1.6), the one with the lowest Meguro (0.3).

By 1970, there were 0.9 fires reported per 1,000 inhabitants. The highest incidence was reported in the central business wards (2.1), while the fewest fires took place in the southern industrial wards and the western wards (0.8). Chiyoda still topped the list with 3.0 fires per 1,000 inhabitants. The fewest fires were reported in Meguro, Setagaya, Nakano, Suginami, Kita and Nerima (0.7). The variability in the incidence of fires between 1952 and 1970 stayed stable as measured by the coefficient of variation. The same logic as above applies: In order to account for the outlying character of the central business wards and their low nighttime population, the weighted Theil index returns a less ambiguous statement on the variability of fires. The index decreases from 0.0737 in 1952 to 0.0458 in 1970. While fires became somewhat more frequent, their distribution across the 23 wards became more equal. Relative safety in terms of crime and fire incidence was therefore becoming much more of a shared property of urban life in the 23 wards.

The data we presented above shows that Tokyo became healthier; that there were growing pains in the equal provision of education, which were successfully resolved toward the late 1960s; that it became more "pleasant" to live and more cultured regardless of one's location in Tokyo; and that it stayed relatively safe throughout the 23 wards. These figures and the conclusions we draw from them may run counter to the public image of Tokyo during the 1960s that saw the city as hopelessly crowded and polluted. This is certainly an important aspect of Tokyo's history that we do not wish to argue away. Once more, an important if not the most important fact we wish to stress is that public spaces improved slowly, but for most parts of the ward population equally, as shown by decreasing variabilities for most of these indicators. This is an important takeaway for developing megacities, where absolute living standards are low, and their distribution is highly unequal. We also point to evidence provided in the previous chapter once more, which had stated that residents in wards with a high share of small factories complained less about nuisance than their peers in the leafier suburbs to the west. This suggests to us that the public perception of Tokyo's chaos was also a byproduct of the population's growing affluence.

Towards a postwar model of shared space poverty and space egalitarianism

How did the relatively egalitarian improvement in private as well as public living standards come about? The next section will discuss several factors that collectively help explain this phenomenon in Tokyo's 23 wards from ca. 1950 to 1970. The first part will describe "ad-hoc", or "organic", factors. These can perhaps be thought of as some of the traditional features of Tokyo's urban form, unfolding without intervention by the authorities, and contributing to a relatively equal distribution of socio-economic indicators across the 23 wards. In terms of physical features, they include an increasingly uniform medium-density and low-rise typology that reproduced itself with the expanding city. Roads in these new or expanding neighborhoods were built haphazardly, i.e. most of them were narrow and many remained unimproved by the end of the observation period. In terms of other features, the growing city reproduced a commercial infrastructure that allowed households to economize on space: Crucially, there was a remarkably equal distribution of bathhouses (*sentō)*. Moreover, the density of restaurants, food retail outlets and construction establishments was extremely high and in some cases even increased during the period of observation. The steady reproduction of these neighborhood features across the territory of the 23 wards both was both symptom and cause of the lack of stratification in living standards. It was a symptom because populations with relatively homogenous socio-economic features with similar features tend to use *sentō* similarly frequently and have similar shopping habits. These neighborhood features also prevented stratification in that allowed poorer households to stay here thanks to the availability of space-saving private commercial infrastructure. While not covered in detail in this dissertation, the prevalence of small and medium sized enterprises and their exceptionally high density also provided an ample source of entrepreneurial employment, itself an important factor in the egalitarian distribution of living standards. We avoid speaking of "generic neighborhoods" or "default neighborhoods", primarily because there were important distinctions in character between, for example, the traditional typology of the old industrial wards vis-à-vis new neighborhoods in the peripheral wards. However, there were also important commonalities in terms of population density, road network and distribution of private commercial infrastructure.

Uniform medium density

[Insert Table 42 here]

The table above provides information on population density in the 23 wards. The 1940 figures represent the status quo before and the 1945 figures the status quo after the end of World War II, when much of inner-city Tokyo was destroyed and depopulated. In 1940, population density across Tokyo's 23 wards was highly uneven. The old industrial central wards had the highest population density, with 25,881 people per km^2. The most densely populated ward was Taitō, with 46,025 inhabitants per km^2. The lowest population density was recorded in the northern and eastern industrial wards, with 6,186 people per km^2. The ward with the lowest population density was in 1940 was Edogawa with 3,935 people per km^2. The damage due to the 1945 Allied Firebombing was most acutely felt in the most densely populated wards of the city, i.e. the old industrial central wards. They dropped in population density to just over 4,000 inhabitants per square kilometer, now almost in line with the 23-ward wide average of 4,431. The ward suffering from the most extreme devastation was Kōtō: Its pre-bombing population, according to a February 1944 survey, stood at just under 400,000 people. In November 1945, only 25,208 people were left in the ward, with 81% of the ward's area devastated by firebombs (TMG, 1956). This represented a density of under 1,000 inhabitants per km^2, the lowest in the first postwar population survey. The ward with the highest density at that time was Taitō, with 8,457 people per km^2.[22]

From here on, the recovery in population meant a rapid pickup in density, most pronounced in the old industrial central wards. This suggests that the inhabitants who had fled the city during the war returned in great numbers to their prior residences, and in many cases, rebuilt them from scratch. The density of the old industrial central wards correspondingly increased to 17,627 people per km^2 in 1955. The northern and eastern industrial wards were the least dense category of wards, with 9,216 people per km^2. The ward with the highest density was once more Taitō (31,006), the lowest again Edogawa (4,635). The 1960s saw some "de-densification" take place in the most densely populated central wards, as inhabitants here moved out to the other wards, the Tama area, or adjacent prefectures. By 1970, the old industrial central wards recorded a lower population density than at the peak (17,340) and were now less densely populated than the southern industrial wards (18,873). The lowest population density was recorded in the central business wards (9,793). Their nighttime populations had consistently decreased during the 1960s. The ward with the highest density was Toshima (27,243) and the one with the lowest was now Chiyoda (6,440). Most importantly, the variability in density across the 23 wards decreased markedly from 1950 onwards. The coefficient of variation declined from 46.6% in 1950 to 33.5% in 1970. The weighted Theil index declined throughout the whole postwar period from 1945 to 1970, from 0.2444 to 0.1316. The average 23 ward density

[22] More details on the difference between prewar and postwar population distribution can be found in the historical supplement to chapter one.

of 14,107 people per km^2 was therefore much closer to the realities on the ground in most of the wards, rather than just being an aggregate figure.[23]

Tokyo's uniform medium density went hand in hand with a low-rise building typology. In 1963, 35.9% of the city's dwelling stock (i.e. buildings with at least part-residential purpose) had just one floor, and less than one percent more than two floors. 59.6% of all dwelling were detached houses. The situation changed considerably over the course of the next five years. By the time of the next Housing Survey in 1968, only 23.6% of the dwelling stock were one-storied. The share of dwellings with more than two floors had increased to 8.4% and now only 41.5% of all dwellings were detached houses. The relaxation of building height restrictions in the late 1960s had little to do with this as it only concerned buildings higher than approximately 30 meters. The medium to high-rise *manshon* apartment buildings would only become a common sight from the 1970s onwards. The most important reason for the increase in average height during the 1960s was that a large proportion of one-story houses were rebuilt during this period, getting replaced by two-story houses.

[23] Tokyo and other Japanese cities represent a global anomaly in terms of their population densities, as shown by Uchiyama and Okabe (2012). The authors use the Global Human Settlement framework, whose data stems from the European Copernicus space program and was released in 2016. It shows the "observable human presence of built-up structures or buildings" (European Commission, n.d., p. 24). As these comprise the physical part of human presence on the planet, they allow making inferences on population density. This satellite data is available in four layers, 1975, 1990, 2000 and 2015, therefore beginning somewhat after this research's period of observation. Nonetheless, the density patterns shown for 1975 Tokyo had gradually evolved as shown in the data above. We observe a medium-density pattern that stretches out in all directions from the center. Incidentally, this is the same pattern for Osaka. The typical pattern for megacities outside of Japan is to combine both high-density and lower-density areas in their territories. One interpretation is that lower population densities exist in areas of relative affluence and/or increasing distance from the center. High densities may be observed in the city center or in areas of relative poverty, e.g. slums. These patterns can be observed in particular in South Asian cities, e.g. Mumbai, Delhi or Dhaka. Beijing and Shanghai also have a much more diverse distribution of population densities. Lastly, all cities under review in this paper have higher peak densities than Tokyo, with the exception of Osaka.

Neighborhoods conditioned by roads

We argue in this section that during Tokyo's rapid megacity growth, certain features of the city reproduced themselves in the form of primarily low-rise neighborhoods dissected by a set of unplanned (and often basic and unimproved) narrow roads. We have already commented on road width in chapter two, where we noticed that Tokyo's postwar street grid appears to have exhibited considerable continuities vis-à-vis the prewar period: The majority of buildings continued to be built alongside very narrow roads. The data presented there was not split by ward, however, so did not allow us to comment on unique trends across the geography of the 23 wards.

The following tables, drawn from TMG's Yearbook, provide this data, but have some consistency issues. Until 1961, they omit a significant number of improved roads below 4.5 meters and very narrow unimproved roads, which, in TMG's classification, may not have even registered as roads until then given that the planning law foresaw roads to be wider than 4 meters in order to provide for firebreaks (TMG, 1996). Whatever the reason for their omission, a significantly broader representation of roads is included from 1961 onwards. This makes the two datasets incomparable. Nonetheless, important trends can be detected by looking at both individually: The road network became more equal on a per capita basis. Urban growth in the periphery caused a rise in unimproved roads. The share of narrow roads was high but peaked in the 1960s.

[Insert Table 43 here]

The first table shows that during the 1950s, investment in roads did not keep pace with population growth, as evident from falling road length per capita. There were 0.6 meters of road per capita in 1952. The ward groupings show relatively little difference due to aggregation: 0.7 meters of road per capita were recorded in the western wards and the northern and eastern industrial wards, while 0.5 meters were available in the old industrial central wards as well as the southern industrial wards. The ward with the highest per capita road availability was Nerima (1.5 meters), the one with the least road length per capita Ōta (0.2). By 1960, the overall situation across the 23 wards had deteriorated: There were only 0.4 meters of road available per capita now, reflecting little investment in new roads as well as strong population growth. The wards with the highest per capita road length were the central business wards (0.6) and the northern and eastern industrial wards. All other ward groupings had 0.4 meters per capita. The single ward with the highest per capita road length was Chiyoda (0.8). Shinjuku, Bunkyō, Taitō, Shinagawa, Nakano, Toshima, Kita and Arakawa all had only 0.3 meters of road per capita. The variability in per capita road provision decreased over these eight years. The 1952 coefficient of variation of 52.3% declined to 39.7% in 1960.

Despite the lack of investment in new roads, there was a noticeable focus on road improvement, e.g. paving. The share of unimproved roads as of total roads decreased from 37.1% in 1952 to 25.3% in 1960. The wards with the lowest share of unimproved roads in 1952 were the central business wards (1.8%), those with the highest share the northern and eastern industrial wards (39.3%). In terms of single wards, the ward with the lowest unimproved road share was Chūō (0.3%), the one with the highest was Nerima (65.6%). In 1960, the northern and eastern industrial wards still had the highest share (39.3%), the central business wards the lowest (1.8%). The single ward with the highest unimproved road share was Adachi (55.5%), Chūō by now had no unimproved roads. The share of unimproved roads became more variable across the wards during the 1950s, evident from a rising coefficient of observation (1952: 62.5%, 1960: 78.4%).

The growth in the 1950s road network disproportionately took place via the new construction of narrow roads as defined above. As demonstrated, though, it could not keep pace with the growing population. In 1952, only 23.8% of the roads in the 23 wards were narrow according to the criteria used in this dataset. By the end of the decade in 1960, 33.1% of all roads were narrow. In 1952, the wards with the highest share of narrow roads were the northern and eastern industrial wards (35.3%), the wards with the lowest share were the central business wards (3.4%). The single ward with the highest share of narrow roads was Nerima (56.0%), the one with the lowest share was Chūō (0.2%). By 1960, the wards with the highest share were again the northern and eastern industrial wards (43.2%), while the lowest share was once more in the three central business wards (6.1%). The single ward with the highest share was now Adachi (57.8%), the one with the lowest share was Chūō (0.1%). The variability in the narrow road share decreased. The 1952 coefficient of variation stood at 72.8%. In 1960, it had declined to 54.3%.

[Insert Table 44 here]

The second road table presents data for 1961 and 1970. Now, a significantly wider definition of roads underlies the data collection, and narrower improved roads below 4.5 meters are included, as are very narrow unimproved roads. Their inclusion leads to significantly higher per capita road lengths: In 1961, there were 1.2 meters of road for every resident in the 23 wards. The figure had not increased by 1970, suggesting that investments in new roads merely kept pace with population growth. Incidentally, road length per capita today is 1.3 meters. This has to be seen against a significantly larger amount of the population living in multi-story, multi-family buildings, reducing the requirement for per capita road length significantly.

The wards with the highest per capita road length in 1961 were the northern and eastern industrial wards (1.4 meters), those with the lowest the old industrial wards (0.8 meters). The single ward with the highest per capita road share was Nerima (2.5 meters), the one with the lowest Arakawa (0.7 meters). These figures suggest that the peri-urban Nerima ward had a comparatively lengthy road network due to the scattered distribution of the its population. This had not shown in the previous dataset for 1960 due to these roads not being classified as such according to TMG's methodology. In 1970, the situation had changed significantly. Now the wards with the highest road share per capita were the central business wards (1.6 meters), which saw both a rise in the total length of roads and a decrease in nighttime population in this period. The wards with the least amount of per capita road length were the old industrial wards once more, now with 0.9 meters per capita. There was hardly any increase in the length of roads in these wards, coupled with a decrease in overall population. The ward with the highest per capita road length in 1970 was Chiyoda (2.5 meters), the one with the lowest Kōtō (0.7 meters). The variability in the road length per capita decreased like it had done in the 1950s. The coefficient of variation decreased from 40.0% in 1961 to 33.7% in 1970.

The investment in the road network also led to a gradual improvement in the quality of the roads. In 1961, the unimproved road share, according to this dataset's methodology, was 46.3%. In 1970, it had reduced to 30.4%. The wards with the highest share of unimproved roads in 1961 were the northern and eastern industrial wards (55.3%). The central business wards had the lowest share (19.0%). The single ward with the highest share was Adachi (73.5%), the one with the lowest Chūō (8.3%). In 1970, the wards with the highest share of unimproved roads were the western wards (41.3%), while those with the lowest share were once more the central business wards (3.8%). Chūō and Chiyoda had no more unimproved roads in 1970, while Toshima was now the ward with the highest share of unimproved roads (56.5%). The variability in the unimproved road share increased significantly, as evident from a coefficient of variation of 38.5% in 1961 compared to 77.6% in 1970.

Finally, the narrow road share decreased over the 1960s, from 62.5% in 1961 to 53.9% in 1970. However, this decrease was not universal across the 23 wards. In 1961, the wards with the highest share of narrow roads were the western wards (71.9%), while only 25.3% of the central business wards were narrow. 82.5% of all roads in Nerima were classified as narrow. 9.9% of roads were narrow in Chūō. In 1970, the western wards still had the highest narrow road share at 70.2%, while the central business wards now had 28.0% narrow roads, primarily because of an increase of their kind in Minato.[24] The ward with the highest share of narrow roads was Nerima (90.5%), the one with the lowest share was Chiyoda (16.7%). The variability in the narrow road share increased during this period. The coefficient of variation in 1961 stood at 36.8% while it had increased to 41.8% as of 1970.

Why are narrow roads important? First of all, they are a major reason why Tokyo's neighborhoods are traditionally very walkable. This is because reduced lane width decreases the average speed of motor vehicles, making it safer for pedestrians to walk.[25]

[24] We need to question the coherence of the data in this respect given that there was relatively little urban expansion taking place in this already urbanized ward. Another source of caution arrives from the growing share of narrow roads in Chiyoda between 1961 and 1970. We suspect that the classification criteria changed once more during this period. We contend that the overall message of the data remains intact.

[25] A growing interest in walkability is evident across various academic disciplines. Health practitioners associate perceived walkability with an improvement in physical well-being due to physical exercise (Hanibuchi, Nakaya, Yonejima, & Honjo, 2015). They have defined certain environmental attributes that define walkability, including population density, intersection density, access to local destinations (food outlets, grocery stores, parks, schools, libraries, retail, etc.), sidewalk availability and access to public transportation (Koohsari et al., 2018). The important link between neighborhood walkability and public transportation in Tokyo has been highlighted by others (Williams, 2017).

Moreover, as the road network in the peripheral wards expanded rapidly during the period of observation, many of these new roads were built cheaply and without concrete paving, i.e. remained "unimproved". Both categories, i.e. narrow roads and unimproved roads, were thus particularly high in the wards experiencing the fastest growth during that period: The northern and eastern industrial wards expanded most rapidly around 1960, while the periphery of the western wards grew fastest during the latter part of the 1960s with the onset of strong suburban growth.

Private commercial infrastructure

The next section will demonstrate how, as Tokyo's population between 1945 and 1970 grew, a specific type of commercial infrastructure reproduced itself across the 23 wards. This infrastructure allowed residents to economize on living space by outsourcing hygiene functions of the house to public baths (*sentō*); kitchen and storage functions to restaurants and mom-and-pop or convenience stores. Numerous construction establishments renewed the neighborhoods' building stock and were the agents of the city's famous "scrap-and-build", i.e. the frequent demolition and rebuilding of residential homes. These homes were predominantly made of wood, the "egalitarian" construction material of the postwar period.

[Insert Table 45 here]

The table above shows the density of public baths (*sentō*) in Tokyo's 23 wards. We define relative density as the inhabitants there were per *sentō,* i.e. the smaller the number, the denser its distribution. We note that for the period between 1952 and 1970, there is a slightly increasing density across the 23 wards, from 3,537 to 3,030 inhabitants. In 1952, the wards with the highest density of *sentō* were the old industrial wards. There was, on average, one *sentō* for every 2,870 inhabitants here. The wards with the lowest density were the western wards (4,093). The single ward with the highest density was Taitō, with an average of 2,641 inhabitants sharing one *sentō*. The ward with the lowest density was Nerima. Here, there were 7,607 inhabitants per *sentō*.

By 1970, the wards with the highest density remained the old industrial wards (2,131), those with the lowest density were again the western wards (3,654). The single ward with the highest density was again Taitō (1,186 inhabitants), the lowest density was also once more recorded in Nerima (5,279). The variability of the *sentō* distribution first decreased until 1960 (irrespective of whether we look at the coefficient of variation or the Theil index), from where it increased until 1970. Although variabilities increased, all wards had a denser network of *sentō* by the end of the observation period. The increase in variability was therefore related to the uneven increase in *sentō* density across the 23 wards, not their decline in parts of the ward area.

Public baths remained a necessity in postwar Japan as populations grew and not all residences had the luxury of a private bath, as was shown in the first section of this paper. A news report quotes a survey from the time of the 1964 Olympics, in which 39.6% of households said that they used a *sentō* regularly. This was also around the time when with 22,000, the largest ever number of *sentō* was being recorded nationwide (Crowe, 2017), from where it decreased steadily until today. Despite a stagnation in the 23-ward population between 1965 and 1970, the number of *sentō* grew by 250 during this period, taking their total number to almost 3,000. Municipal public housing (*tōei ken'ei jūtaku*) within 300 yards of a *sentō* often did not have bathrooms included in their units. Private bathing facilities were essential in new *danchi* units as most of them were at a "considerable distance from the preexisting residential districts of cities and the public baths that had naturally congregated there" (Waswo, 2002, p. 74). *Sentō* have therefore played an important role in the provision of infrastructure and were designated as public facilities, making them eligible for local government subsidies (Machida, 2017). Waswo's choice of words, i.e. "natural congregation" suggests the spontaneous character with which *sentō* popped up in Tokyo's neighborhoods and provided an important service to their residents.

[Insert Table 46 here]

The table above shows the density of several other types of commercial establishments in the 23 wards. Along with *sentō*, they were ubiquitous features of Tokyo's residential neighborhoods and grew almost proportionately in number with the expanding city population. The central business wards (Chiyoda, Chūō and Minato) have the highest density of all commercial establishments given their function of commercial centers. In line with the presentation above, we show the inhabitants per establishment in order to making inferences regarding their spatial distribution in the ward groupings. The types include food and drink retailers (the majority of them small mom and pop shops), furniture makers (including tatami makers), construction establishments (including carpenters). We comment on restaurants and construction establishments in more detail below.

Food and drink retailers were the most common commercial establishments in Tokyo in 1958: There was one of these for every 166 inhabitants. The wards with the highest density of food and drink retailers were the central business wards (138 inhabitants), the western wards had the lowest density with 177 inhabitants per retailer. The single ward with the highest density was Chūō (124 inhabitants), the one with the lowest Nerima (225). By 1968, the overall density of food and drink retailers had marginally declined to 168 inhabitants per establishment. The central business wards still had the most stores proportionately (112 inhabitants per store), the western wards again the fewest (194). The single ward with the highest density was now Chiyoda (111), the one with the lowest density again Nerima (216). Variability in density was at a low coefficient of variation of 13.3% in 1958. It marginally increased to 18.1% in 1968. Only four wards had density levels of more than 200 inhabitants per store (Setagaya, Suginami, Nerima and Edogawa). The Theil index calculation confirms this reading of low, but slightly increasing disparities in density (from 0.0063 in 1958 to 0.0131 in 1968).

Furniture makers, including tatami makers, too, were ubiquitous features of Tokyo's expanding neighborhoods. In 1958, there were 869 inhabitants per each of these shops. The wards with the highest density were the central business wards (535 inhabitants), proportionately the fewest were in the western wards (902). The single ward with the highest furniture maker density was Chiyoda (435), the one with the lowest was Nerima (1,149). The density of furniture makers across the 23 wards had increased by 1968. Now there were 803 inhabitants per shop. The wards with the highest density were still the central business wards (427), while the western wards again had the least amount of furniture makers proportionate to their population (935). The single ward with the highest density was Chiyoda once more (243), while Setagaya was now the ward with the lowest density of furniture makers (1,188). The variability in furniture maker density also increased in line with the food retail outlets: While the coefficient of variation was 21.5% in 1958, it had increased to 26.2% ten years later. The Theil index increased correspondingly, from 0.0232 in 1958 to 0.0389 in 1968. However, only four wards had a furniture maker density of more than 1,000 inhabitants per shop (Setagaya, Suginami, Nerima and Edogawa). In other words, these shops were extremely numerous across the 23 wards, and fulfilled an important function in the maintenance and improvement of Tokyo's dwellings.

[Insert Table 47 here]

The density of restaurants in the 23 wards was traditionally high, and became higher during the period of observation, as evident from Table 47. There were 247 inhabitants per restaurant in the 23 wards in 1960, a figure that decreased to 152 in 1970, representing a significant increase in density. The wards with the highest density of restaurants in both years were the central business wards (86 and 53, respectively), while the northern and eastern industrial wards had the lowest density (378 and 196, respectively). The single ward with the highest density in both years was Chūō (56 and 25, respectively), the one with the lowest in 1960 Nerima (690) and in 1970 Adachi (320). To put these numbers into context, Tokyo prefecture's restaurant density in 2014 stood at 149 inhabitants per restaurant, putting it at the top of a list of 30 cities worldwide (World Cities Culture Forum, 2018).

Even the wards with lower restaurant densities in 1970 reach the aggregate levels of cities in the West today (e.g. Berlin in 2014 with 389 inhabitants per restaurant and London with 430 inhabitants). In the same survey, the second and third highest restaurant densities were also recorded in East Asia, i.e. in Seoul and Shenzhen. A combination of small living and especially kitchen space, historical traditions of eating out as well as culinary traditions favoring food preparation in restaurants could explain this shared phenomenon.

In Tokyo's case, high restaurant densities, particularly surrounding train stations, took off considerable pressure from the problem otherwise posed by low living space per capita.

[Insert Graph 1 here]

We complement Table 47 above by showing aggregate commercial establishment densities for Tokyo prefecture covering a longer time range (1954-1972) in Graph 1, for which data is readily available in the Statistical Yearbook. Food and beverage retail establishments become slightly less densely distributed during the period of observation: In 1954, there were 136 inhabitants per food retailer, while by 1972, this number had grown to 167 inhabitants. In 2014, there were 431 inhabitants for each of these shops, including today's ubiquitous convenience stores. They only arrived in Japan in 1969 as an import from the United States (Koki, 2001). Restaurants, meanwhile, grew disproportionately faster than the overall population: In 1954, there were 279 inhabitants per restaurant. By 1972, there was one restaurant for every 147 inhabitants. At the peak in 1981, this had decreased further, to 104 inhabitants, while by 2014, it was almost back to 1970 density levels, i.e. 149 inhabitants per restaurant. Most retail establishments described above had less than 10 employees. The share of these shops as a proportion of all retail establishments barely moved from 1954 (91.6%) to 1972 (88.0%). This is further proof of the equal distribution of small and medium enterprises beyond the manufacturing sector, an important factor explaining the egalitarian nature of the ward area during the period of observation.

Metabolic neighborhoods: wood-based construction

Another important feature of Tokyo's expanding neighborhoods were small construction firms. These companies provided a mix of services from turnkey construction of residential homes to being subcontractors for larger construction firms. Their numbers also included repair professionals (e.g. carpenters, plumbers, etc.) and equipment contractors. We argue that their relative numbers and equal density across Tokyo's 23 wards provided a cost-effective way for these neighborhoods to grow and upgrade themselves. It also kept carpentry a viable trade, with a large degree of small enterprises spread evenly across the ward area.

We refer back to Table 46. In 1958, there were 599 inhabitants for every construction establishment. The wards with the highest density in construction establishments were the central business wards. Here, there was one of these businesses for every 256 inhabitants. The lowest density was recorded in the northern and eastern industrial wards (826 inhabitants). The single ward with the highest density in construction establishments was Chiyoda (212), the one with the lowest Itabashi (1,394). By 1968, the density of construction establishments had increased significantly. There were now 360 inhabitants for every one of these businesses. The central business wards still had the highest density (118 inhabitants), while the western wards had the lowest density (526). The single ward with the highest density was once more Chiyoda (93), while the one with the lowest density was Nerima (1,086). There was not a single ward with a lower density of construction establishments in 1968 compared to 1958. However, some wards experienced much faster, therefore more disproportionate, growth in density, accounting for the increase in overall variability: In 1958, the coefficient of variation stood at 49.7%, while by 1968, it had increased to 59.5%.

[Insert Table 48 here]

The 23-ward area remained predominantly wooden-built, although the wooden share decreased somewhat toward the end of the period of observation. The table above shows the degree of wooden construction in new building starts across the 23 wards in 1960 and 1970. In 1960, 89.8% of all new buildings were made of wood, while just 57.1% of all new building floor area was wood-made. This is due to the fact that building materials other than wood (e.g. ferro-concrete, reinforced concrete, steel frame and block-concrete) were used for larger buildings, while wood was (and remains) the material of choice for residential and primarily detached housing. The central business wards had the lowest number of new wooden buildings and correspondingly also the lowest new wood floor area (67.7% and 15.5%, respectively). Chūō was the ward with the lowest wooden building ratio and floor area, i.e. 47.0% and 7.5%. In other words, while almost half of new buildings in Chūō were made of wood, only 7.5% of the newly-built floor area was in these buildings. Large office and apartment buildings explain the discrepancy. The wards with the highest wooden building and floor area ratios were the western wards (93.2% and 75.0%). Virtually all new buildings in Nerima were wooden (96.8%), representing 86.2% of all new floor space in 1960. By 1970, the situation had changed significantly. Now, only 70.7% of all new buildings were made of wood, representing just 23.0% of new floor area. The central business wards were again those with the lowest share of wooden buildings (15.5%) and the least new wooden floor space (2.4%). Just 11.2% of new buildings in Chūō were wooden, and they represented 0.9% of all new floor space. Wooden buildings represented the bulk of new buildings in the norther and industrial wards (77.7%), although here, too, they only represented 37.1% of all new floor space. The ward with the highest wooden building share and proportion of floor space was still Nerima (83.9%, 51.3%).

The variability of these two indicators – wooden building share and share of total new floor area – increases significantly across the 23 wards. Detached houses remain the major residential form in the outlying wards, while commercial construction as well as large apartment buildings become more prevalent in the central wards inside the *yamanote* line ring.[26] The 23 ward-wide coefficient of variation increases from 12.7% in 1960 for the wooden building ratio to 34.2% in 1970. The effect is somewhat smaller once we remove Chiyoda and Chūō, the two wards in which virtually all new construction is non-wooden. The 21 ward-wide coefficient of variation increases from a very low 5.3% in 1960 to 19.7% in 1970. The proportion of new wooden floor area is more variable and stratifies further during the 1960s. In 1960, the 23 ward-wide coefficient of variation is 34.2%, in 1960 it has increased to 60.9%. Taking out Chiyoda and Chūō once more, the coefficient of variation for the remaining 21 wards increases from 21.0% in 1960 to 50.0% in 1970. We can conclude that in the immediate postwar period until about 1960, the share of new wooden buildings was extremely high in overall number terms, while somewhat lower in terms of floor area. There was virtually no difference in the wooden share across the more residential wards, although this too stratified somewhat in the 1960s. Another important finding in the table above is the extremely low variability of per square meter cost for new wooden construction. In 1960, building a wooden house cost 10,700 yen per square meter. By 1970, this figure had inflated to 32,400 yen. The coefficient of variation stayed low, increasing from 5.7% in 1960 to 7.0% in 1970. In other words, it did not matter so much where one built a wooden home within the 23 wards. Relative construction costs were almost identical.

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[26] An important reason for the proliferation of non-wooden residential dwelling space toward the end of the period of observation is the so-called *manshon boom*, referred to in the planning section of chapter four.

Throughout Japan’s history, the major building material, in particular for residential construction, has been wood. Despite representing a permanent fire hazard, there are several reasons for this. In the absence of expensive and technologically advanced appliances, moisture and ventilation control in Japanese climatic conditions is best achieved by using wood. Timber structures can more easily be raised above ground, and walls can be left open, letting air flow freely. There is also a strong tradition of frequent rebuilding that favors wood. While cultural issues play a strong but diffuse role, there are also more practical considerations of frequent rebuilding, such as getting rid of mold and insect infestations.

A large part of the timber is usually reused in new construction, otherwise recycled, or burnt in a nearby *sentō*. Furthermore, metal construction materials have less durability in Japan’s climatic conditions, in particular joints and fasteners, which rust faster, while wood naturally hardens for many decades after being cut. Frequent typhoons and earthquakes have historically also favored wood as a construction method. Timber is open to visual inspection so that leaky roofs can easily be detected in the case of torrential rainfalls. It is earthquake resistant: Flexible timber joints absorb the lateral energy of seismic shocks. Finally, wood is historically abundant in Japan, including cryptomeria and cypress, which mature relatively quickly within 40-60 years and are naturally insect and mold resistant (Kohtz, 2016).

Due to its ample availability, relatively cheap price as well as the presence of thousands of construction firms with carpentry skills, timber proved to be the egalitarian construction material of the postwar period. In this, Tokyo’s ward area could rely on a long tradition of wood-based construction in Japan in general and in Edo in particular.

Virtually identical construction cost on a per square meter basis for wooden buildings suggests that the standards in detached residential home construction were very similar across the 23 wards and therefore a factor contributing to relatively equal living standards. The pattern of the expanding city included the typical typology of neighborhoods made up of single or two-story wooden homes. This pattern becomes less common towards the end of the observation period. However, we must apply caution as the data above includes only new building starts. When looking at the building stock, wood retained its predominant share. According to the 1963 Housing Survey, 91.4% of dwellings in the 23 wards were wooden. More than three quarters of them had been built after 1945 (77.5%) and was thus less than 20 years old by the time of the survey. By 1968, the proportion of wooden buildings had gone down slightly to 88.1%. The proportion of postwar dwellings as of total dwelling stock had increased to 84.8%.

Conclusion

In a special issue of the magazine *Sekai* in 1959, the economist Ōuchi Hyoē gave a dire assessment of life in the capital at the end of the 1950s. He suggested Tokyo had only recovered 50 percent of its prewar living standards. There was a shortage of 400,000 housing units. 42 percent of the population lived on less than 2.5 tatami per person. Finally, only 20 percent of apartments were connected to the sewerage system (L. Hein, 2004, p. 185). Ten years later, the assessment of the political leadership of Tokyo had not improved significantly, and the perception of the city continued to be framed as part of the "Tokyo problem" and "Tokyo reform" debates. As a fast-growing Asian city that situated itself within the ranks of developed cities primarily in the West, Tokyo in some sense still had to deal with “both the problems of Calcutta and the problems of New York”, as governor Minobe’s secretary quipped in the late 1960s (as cited in Hein, 2004, p. 197).

This frame of reference is important. Tokyo’s megacity growth was considerably different from the experience of western cities and therefore its performance should be analyzed according to different criteria. As we established in chapter two, Tokyo relied on the large presence of labor-intensive, small and medium sized factories. Average firm size was smaller in Tokyo than elsewhere in Japan. This path emphasized employment rather than per capita income. Tokyo’s growth was the result of a combination of competitive skilled labor, the adequate use of (scarce) capital for infrastructure and the intensive use of scarce land. The prevalence of small firms was not limited to the manufacturing sector. Other establishments, e.g. retailers, restaurants and other services, had comparatively few workers, too, and were often run by their owners. This had a profound impact on the economic geography of the city, and contributed to relatively equal conditions across the 23 wards due to extensive employment opportunities.

This chapter then provided evidence of rising living standards in Tokyo’s postwar period. A relatively broad definition of living standards has been employed to capture the multidimensional nature of welfare, especially in cities, which we described first theoretically. In the presentation of our primary data, we distinguished between private and public space. In terms of the former, we looked at how housing attributes, in particular living space per capita, improved in an egalitarian manner between 1950 and 1970. This means that differences in living space across the 23 wards became smaller over time. This was valid particularly for households living in owned accommodation, explaining why traditionally the less affluent old industrial wards with comparatively high homeownership rates could account for disproportionate increases in living space. The sizeable number of migrants moving to Tokyo settled disproportionately in the peripheral wards and, at least initially, rented their accommodation rather than buying it in the increasingly expensive real estate market.

We also noted an improvement in other aspects of private living space, in particular better, albeit still low, sanitary standards toward the end of the observation period. Water and sewerage remained problem areas in the provision of public infrastructure well beyond 1970. Moreover, the proportion of the population living in extremely crowded conditions decreased significantly, as measured as the share of residents living in households with less than three tatami per person. Furthermore, the typical consumer goods of the high growth era were also become more common, and more equally distributed, across the 23 wards. Altogether, private living standards lagged behind those elsewhere in Japan and other developed countries at the time. However, they improved gradually and, more importantly, equally.

We then showed how, in parallel to gradually better private living standards, the quality of public space also improved. The measurement of public space is complex, and we utilized proxies allowing us to make statements on the health, education, culture and safety the city was able to provide its citizens. Crucially, and in line with the observations on private living standards, the differences between the wards became, on balance, smaller over time.

We subsequently tried to understand which spatial factors may have supported this model of improving living standards occurring along with spatial homogenization. We first noted the existence of a certain urban typology in Japan in general and Tokyo in particular, a typology with a uniform medium population density regardless of distance from the center. This typology also included a dominance of wooden residential neighborhoods intersected by what were mostly narrow roads. As the city expanded, a certain mix of private commercial infrastructure proliferated. This infrastructure helped households economize on scarce living space by providing functions that are usually integrated inside dwellings. These included the ubiquitous Japanese bathhouse, the *sentō,* a dense network of (food) retailers, as well furniture makers and restaurants. Lastly, construction establishments became more densely distributed during the period observation and helped upgrade the city's neighborhoods, house by house.

We have called these factors "ad-hoc" factors, owing to the fact that there was very little coordination intrinsic in their proliferation. The reproduction of certain types of neighborhood features was principally a result of Tokyo's tradition of small enterprises as well as cultural proclivities, e.g. toward shared bathing. While important, these "default" factors cannot fully account for the egalitarian nature of Tokyo's growth in the period of observation alone. We will argue in the following chapter that specific institutional factors were also important reasons. TMG, the most important, intermediate, layer of governance redistributed resources between the wards to ensure an adequate and equal level of expenditure, particularly in education. However, TMG was also conspicuously absent from intrusive urban planning, leaving the city to grow by its well-honed own devices, in part introduced in this chapter.

4: The Tokyo Metropolitan Government

The following chapter will show how institutional factors contributed to the improvement of living standards in the 23 wards, as well as their increasingly egalitarian distribution. It is therefore the companion to the preceding chapter three. We will contend that the Tokyo Metropolitan Government (TMG) was a powerful intermediary layer of government wielding a large degree of control over the special wards. TMG used this control to undertake fiscal redistribution from richer to poorer wards, which contributed to more egalitarian outcomes in socioeconomic conditions across the 23 wards. At the same time, financial resources and administrative capacity were too limited to engage in large-scale urban planning, letting the upgrading of neighborhoods proceed in an ad hoc, even organic fashion. Finally, a so-called civil minimum became official policy under the Minobe administration after 1967, enshrining some minimum standards for an urban life.

This chapter is structured as follows: We first review, briefly, the history of urban governance in Tokyo from 1868 to the late 1960s, commenting in particular on the changing relationships between the various layers of urban government. We subsequently demonstrate how fiscal redistribution between the 23 wards equalized financial conditions during the period of observation, but also how TMG directed its social spending differently across the city. The second part of the chapter then moves on to discuss how, in spite of the existence of large-scale plans, the actual expansion of the city proceeded largely without major urban planning. Instead, more pragmatic initiatives such as land readjustment were more important, albeit in selective places only. For the most part, there was a distinct lack of urban planning, which may have been fortuitous in hindsight because resources were saved, mistakes avoided, and important neighborhoods features to replicate by themselves. In terms of methodology, the first section on fiscal redistribution is primarily quantitative in nature and analyzes variabilities across the wards. The second half differs in that it is mainly a historical narrative of postwar planning drawing primarily on secondary sources.

Background on urban governance in Tokyo

The former Edo was renamed Tokyo in 1868 and became a prefecture in its own right. With the enacting of the Meiji Constitution in 1889, Tokyo City (*Tōkyō shi*) and its 15 wards were promulgated as part of the prefecture (*fu*) that also included various cities and villages in the Tama region west of the city. Tokyo prefecture's urban core—the city—therefore had its own government subordinate to, but separate from, the prefectural administration. This was part of a national drive towards municipal self-governance, which, during the 1920s and 1930s, expanded in scope and size (Ohsugi, 2011). Accounting for the growth beyond the traditional city limits, 20 new wards were added to the original 15 in 1932 via the annexation of 82 adjacent localities. Amid increasing centralization of power in the central government in the decade before and during the Second World War, the Code for the Tokyo Metropolis was promulgated in 1943. It dissolved the city and consolidated all communities within the Tokyo prefecture into the newly created Tokyo Metropolis (*Tōkyō-to*). After the war, the Allied Occupation was "publicly committed to the establishment of local autonomy" (Steiner, 1965, p. 71) as one of the main pillars of its promotion of democracy. The Local Autonomy Act of 1947 officially disbanded the Home Ministry, banned neighborhood associations and mandated the election of municipal heads as opposed to their appointment by government bodies. Tokyo's urban governance remained unique. The 35 wards were consolidated into 22 and later 23 special wards, with no institutional equivalent elsewhere in Japan. There was a "broad grant of functions to the wards", elevating them to city status (Steiner, 1965, p. 195). The structure of the Tokyo Metropolis was kept intact.

The division of responsibilities between the metropolitan government and the individual wards was highly political and not a total SCAP imposition. In line with the spirit of "home rule", decentralization and democratization, the wards strived for more financial independence and saw themselves encouraged by the Shoup Report's recommendations (TMG, 1972a, p. 94). The Columbia University professor had come to Japan in 1949 and recommended that local governments be allowed to levy taxes and have more spending discretion (Sorensen, 2002, p. 157). A less arbitrary allocation of Treasury subsidies as well as the right to issue local municipal bonds were also high on the agenda of ward officials.

In a petition by the Ōta Ward Assembly to SCAP from 1950, ward officials argued that merely 15% of the taxes raised in their ward were spent at the local level. However, local government staff had much better knowledge in terms of "engineering, education, taxation, public welfare, public health, etc. but have no practical authority to execute or (...) modify administration [sic]" (Ōta Ward Assembly, 1950, p. 32). The wards voiced familiar arguments in favour of decentralization, i.e. the ability to improve the quality of spending by letting decisions on it being made closer to the point of implementation. TMG instead argued that it should be allowed to siphon off excess taxes from richer wards in order to "correct the financial inequality of the wards" (TMG, 1972, p. 102).[27]

[27] The literature on decentralization and inequality is sizeable. Some authors find that decentralization of government expenditure can help achieve a more equal distribution of income if the government sector is sufficiently large and if decentralization also affects the revenue, i.e. taxation, side (Goerl & Seiferling,

With prime minister Yoshida Shigeru's return to power in 1948, however, a number of laws were passed that would gradually restore a "substantial degree of centralized administrative control over the municipalities" (Takemae, 2002, p. 303). For Tokyo in particular, and "considering the needs of a modern city—in planning, transportation, water supply, sewage, etc.", an indiscriminate devolution of authority towards the wards "was bound to create problems" (Steiner, 1965, p. 195) and could have inhibited some of the successes highlighted in this research, particularly the egalitarian increase in living standards that necessitated taking from richer wards and giving to poorer wards. TMG amended its tax ordinance in 1950, which prohibited wards from charging surtaxes (TMG, 1972, p. 94). The amendment of the Local Autonomy Act in 1952 devolved a limited but specific set of functions to the wards. These included the establishment and management of primary education, parks, playgrounds, recreational areas, libraries, public halls and some roads. The amendment "emphasized the subordination of the wards to the metropolitan government" (Steiner, 1965, p. 196). Other changes included the indirect election of the ward chief as opposed to a direct popular vote, his/her approval by TMG, as well as TMG's assignment of officers to handle administrative affairs in the wards. In short, "the special wards were no longer basic local authorities" (Ohsugi, 2011, p. 9).

2014). A recent OECD study comes to a similar conclusion (Bartolini, Stossberg, & Blöchliger, 2016). However, others find that low and medium income countries experience worsening regional disparities in the event of fiscal decentralization as they tend to have much worse territorial disparities to begin with (Rodriguez-Pose & Ezcurra, 2010). "Hence, under a more decentralized regime, it is often assumed that the playing field is not level, and that the poorer and less well-endowed regions face significant constraints that would prevent them from delivering and innovating in the same way as their richer counterparts, thereby perpetuating pre-existing patterns of disparities in the provision of goods and services and in wealth" (Rodriguez-Pose & Ezcurra, 2010, p. 623). This argument may apply more readily to the Tokyo between 1945 and 1970 given Japan's status as a middle-income country back then as well as the rapid growth it would embark on during the postwar period.

In day-to-day practice, TMG exercised control over the wards in terms of finances: The wards had no independent taxing power (Steiner, 1965, p. 195) and were subject to financial adjustments by the metropolitan government, "[s]ince the wards differ both in needs and resources" (Steiner, 1965, p. 196). The wards' financial requirements and tax income were considered together and "whenever the taxes exceeded the needs, the difference was delivered to the Tokyo Metropolitan Government" (TMG, 1972, p. 101). This centralization of power is an important prerequisite of fiscal redistribution and hence TMG's ability to effect a more egalitarian distribution of living standards across the 23 wards. As more tasks were delegated to the ward level, the financial situation of the ward governments deteriorated. This was made worse by growing educational expenses related to the new 6-3 compulsory system (TMG, 1972, p. 102). Therefore, the amount of receiving wards increased from 6 in 1951 to 12 in 1955, while the number of net donor wards decreased from 17 in 1951 to 11 in 1955 (TMG, 1972, p. 101).

Despite their resistance (as exemplified by the Ota protest letter cited above), the wards were not able to garner the necessary strength to revert this concentration of power within TMG, specifically in the crucial years between 1947 and 1952. Although the Allied Forces were pushing for decentralization, it may in fact be argued that the opposite took place (Omori, 2010). Besides the general trend toward central rule in Japan during this time, one important explanation for this must be sought in the lack of strong political ward identities, specifically in the beginning of the period of observation. Many of these administrative entities had been created by fiat after 1932, and were further merged in 1947, a year after the first redistribution system was introduced. They were therefore inadequate arenas of political mobilization. Perhaps as an indication of a prevailing sense of indifference of the electorate, a news article from 1952 reported that Tokyo housewives were fed up with *both* TMG and the wards for their perceived wrangling over autonomy (Asahi Shinbun, 25 April 1952, p. 2).

The growing pains of Tokyo in the early 1960s increased the demands on and criticism of public administration and revealed TMG's institutional shortcomings. Pollution, congestion and slow progress in public infrastructure provision were seen as the symptoms of a city without an effective government, leading prime minister Ikeda to even proclaim that "*Tōkyō-to* has no government" (Ohsugi, 2011, p. 9). The 1964 Revision of the Local Autonomy Law was a direct response to this. The most important feature of the revision was a significant devolution of authorities to the special wards, in particular those related to citizen welfare. Moreover, the special wards were now organized in a council and also had some more leeway in the levying of taxes. However, the authority of the wards was basically "still as restricted as before", resembling in character "an internal organization of the *To"* (Ohsugi, 2011, p. 9).

The relationship between TMG and the special wards in the late 1960s is outlined in a consultancy report written for TMG by Professor Robson of the London School of Economics.[28] He called the position of the wards "unsatisfactory" (TMG, 1967, p. 14), and "just as the TMG has been engaged in a long struggle with the central government for a greater measure of autonomy, so the Special Wards feel they have been and are still engaged in a similar struggle with TMG" (TMG, 1967, p. 15). He called for a clarification of functions between TMG and the wards, in particular regarding planning, which was impossible in such a vast metropolitan city "to be efficiently carried out by a single

[28] William Alexander Robson (1895-1980) was a Professor of Public Administration at LSE and founder of the Greater London Group, which conducted policy research about the British capital.

centralized body” (TMG, 1967, p. 17). He also suggested the delegation of significant planning control to the wards, while TMG should maintain supervisory functions. In line with this was his suggested change in personnel policy. At the time of the report, the “staffs of the Special Wards consist mostly of officials of TMG” (TMG, 1967, p. 19), which greatly reduced their autonomy and strengthened TMG control over them.

Ironically, TMG officials engaged in city planning also remained “legally required to act as an agent of the national government” (Sorensen, 2002, p. 157). Zoning plans or other important decisions therefore required approval by higher authorities and often remained under central ministry control. National authorities also reserved the right to dismiss local executive officers particularly in the early postwar period. This further weakened the autonomy of local governments (Takemae, 2002, p. 303). Although the Shoup Report had recommended to devolve urban planning to the more local level as early as 1949, the central government remained the paramount actor in urban planning, even if it meant the further proliferation of unrealistic plans as well as inadequate supervision of existing planning controls as will be shown further below. Politicians in higher echelons seemingly did not trust their local counterparts with decisions as important as city planning (Sorensen, 2002, p. 158).

Foreigners had their own radical ideas as to how to reconfigure the ward-TMG relations. During the Occupation, GHQ thought that the solution to this wrangling over decision making authority would “not be found in simply strengthening the existing 23 wards”. Instead, the solution lay in further administrative reform, eventually “abolishing the numerous special wards and substituting them with about five units of government similar to the boroughs in Greater New York” (SCAP, as cited in Ōta Ward Assembly, 1950, p.

17). Later, Robson called for the complete redrawing of the administrative map of Tokyo, including the harmonization of wards' populations as well as the expansion of the ward area to parts of the Tama region and adjacent prefectures (TMG, 1967, p. 15). Needless to say, these suggestions went unheeded and Tokyo's governance structure today resembles in large parts the system Robson described. A slow but steady devolution of authority to the ward level took place within the existing structures instead (Ohsugi, 2011).

The section above has highlighted some important features of Tokyo's urban governance, and in particular how the concentration of decision-making power within TMG and the national government was contested but maintained. This allowed this intermediary layer of government to redistribute resources between the wards, i.e. taking away from richer wards and giving to poorer wards. The concentration of urban planning decision making power in TMG may have had several effects. One hypothesis is that the scale of the undertaking and the lack of resources paralyzed concerted efforts at urban planning. The inability of ward governments to fill that void may have left the 23 wards a relatively planning-free zone, in which mixed use and *in situ* upgrading were the norm. We do not judge the merits or demerits of centralization. In Tokyo's case, there may have been a fortuitous combination of a strong intermediary when it came to fiscal redistribution as well as a lack of institutional capacity and resources when it came to urban planning. Both led to a more egalitarian distribution of improving living standards across the territory of the 23 wards. The following sections will attempt to substantiate these two claims. We begin by providing evidence of the extent and effect of fiscal redistribution.

Fiscal redistribution

The public sector in the territory of the 23 wards operated in three layers, i.e. the national government, the metropolitan government as well as the ward governments. The rules governing their fiscal relationships were complex in terms of both revenue (taxation) as well as spending, and they were changing over time. They were also distinct from the national system, primarily due to Tokyo's importance as the nation's capital as well as the size of the administrative entity (Ohsugi, 2011). This section focuses on the relationship between TMG and the ward governments. As discussed above, wards were subordinated to TMG in governance terms, a fact that was reflected in the fiscal system. The relationship between TMG and the central government is not discussed in this paper. Its strenuous nature can be gleaned from reports published by TMG toward the late 1960s (TMG, 1969b, pp. 24-38).

TMG's budget is split into three accounts: general, special and public utilities. The general account is the central account, which finances the majority of activities and projects carried out by TMG (e.g. roads, schools, housing, livelihood aid, hygiene and sanitation, unemployment relief, police and firefighting). The general account is also the largest account. In 1969, it stood at 755.9 billion yen and accounted for 64.1% of total TMG expenditure in that year. We choose this year for illustration purposes primarily because TMG published a brochure entitled "Budget for Tokyo Fiscal 1969: The First Step towards 'Civil Minimum'", in which budget items are itemized and discussed separately. The largest single item on the expenditure side for the fiscal 1969 budget was education (primary and junior high schools) at 15.1% of total general account expenditure, followed by public works at 13.4% (TMG, 1969c, p. 9). Public housing saw the highest year-on-year increase from a year before (+34.3%), reflecting the growing importance of this part of public expenditure in this period. It represented 8.0% of total general account expenditure in 1969. The 1969 general account was financed largely by metropolitan taxes (59.5%), followed by national subsidies (13.4%). Metropolitan taxes included corporation, residents and property taxes, which combined accounted for 76.6% of metropolitan tax revenue (TMG, 1969c, p. 5).

The ward governments had a much smaller combined budget of 197.7 billion yen, or about one quarter of TMG's general account. In terms of duties, TMG handled some affairs which, elsewhere in Japan, were usually performed by city governments. The division of responsibilities underwent several changes throughout the period of observation. As was discussed above, the major event was the 1964 reform which saw considerable functions relating to health and welfare services as well as land-use planning to the wards. Ward governments spent 32.6% of their combined budgets on education, followed by 22.3% on public welfare and 20.7% on public works (TMG Statistical Yearbook, 1969, p. 384). The scope of ward level responsibilities towards the end of observation period was broader than ever before, but still relatively concentrated on education and social welfare coupled with the maintenance of neighborhood-scale infrastructure. To finance their expenditure, ward governments levied the residents' tax, retained a special ward portion, and relayed the remainder to TMG. Wards also earned revenue from the local tobacco tax as well as local consumption tax.

Where this revenue was insufficient to fund expenditure, Article 282 of the Local Autonomy Act applied. It states that in order to "divide sources of revenues equitably between the *To* and the special wards, and between special wards, and to assure the autonomous and well-planned operation of the special wards, the *To* shall (…) grant subsidies to the special wards for financial equity" (Nippon Foundation Library, n.d.). This system of redistribution is unique to Tokyo. TMG assessed the amount of financial revenues and the financial demands in each of the wards. Where the revenues exceeded the amount of demands, the surplus was delivered to the Metropolitan Government. Where there was a deficit, the Metropolitan Government would cover it in the form of grants-in-aid. This process thereby "[affected] financial adjustment between the Metropolis and its special wards and among the special wards themselves" (TMG, 1969c, p. 10*)*.

As a result of this legal foundation, fiscal redistribution as it took place in Tokyo was non-discretionary. It was not subject to the whims of the administration's stance on local-level welfare. This is important because we normally associate the egalitarian aspects of such fiscal interventions more readily with the administration of governor Minobe, specifically as part of his "civil minimum" policy which will be introduced in more detail below. What we will show in the subsequent pages is that fiscal redistribution took place discernibly much earlier already.

This section proceeds as follows. We will first show that the per capita tax base differed significantly within the ward area, i.e. some wards raised significantly more tax per capita than others, primarily due to differences in corporate tax revenue, which were much higher in the central business wards. Taxes were raised primarily at the metropolitan level, and so was expenditure highly centralized as will be shown thereafter. However, there was some fiscal decentralization taking place throughout the period of observation, primarily in the wake of the 1964 Revision of the Local Autonomy Law as stated above.

Ward governments took over more responsibilities, particularly in social welfare and education. The wards that were able to raise less tax on their own received higher transfers from the metropolitan government, reducing inequalities in total ward income. After that, we will show that wards receiving relatively high transfers spent more on education in per capita terms. Finally, TMG did not only redistribute resources between the different wards via fiscal redistribution, but also via other expenditure, in particular metropolitan social welfare.

[Insert Table 49 here]

The table above illustrates the discrepancy in municipal tax raised per capita. It is clear from the data that the central business wards generated a large proportion of total municipal tax revenue. Recall that municipal taxes included enterprise and corporation tax as well as fixed asset tax. Revenues from these are bound to be higher in wards with a large contingent of corporate headquarters. At the beginning of the series, in 1952, the average metropolitan tax raised per capita across the 23 wards was 3,201 yen. The central business wards had the highest per capita metropolitan tax revenue with 14,874 yen. The lowest tax revenue per capita was recorded in the northern and eastern industrial wards (1,399 yen). The single ward with the highest tax revenue on a per capita basis was Chūō (24,450 yen), the one with the lowest Nerima (1,110 yen).

By 1970, the differences between the 23 wards were even more pronounced. While the ward-wide tax revenue per capita stood at 60,617 yen, the central business wards recorded more than ten times that value (644,452 yen). The northern and eastern industrial wards still had the lowest per capita metropolitan tax revenue at 19,882 yen. The single ward with the highest revenue was now Chiyoda (1,346,458 yen). The ward with the lowest revenue per capita was once more Nerima (16,023 yen). The increasing differences in municipal tax take per capita are reflected in growing coefficients of variation (1952: 61.3%, 1970: 105.4%) and Theil indices (1952: 0.4927, 1970: 1.0329). This suggests that the municipal tax base in the wards continued to stratify as time went by. In other words, there was an extremely uneven distribution of tax sources between the 23 wards. Economic growth translated into growing corporate profits and hence municipal tax revenue in the wards where these companies were incorporated, i.e. primarily Chiyoda, Chūō and Minato.

[Insert Table 50 here]

Table 50 above shows the corresponding inequality in ward taxes raised per capita. As ward taxes predominantly comprise inhabitant taxes, they tend to be less unequal across the 23 wards due to the relatively equal distribution of personal income. Nonetheless, important differences exist. In 1952, the wards with the highest per capita ward tax take were the central business wards with 761 yen. The lowest per capita ward tax take was registered in the northern and eastern industrial wards (224 yen). The single ward with the highest take was Chiyoda (948 yen), the one with the lowest was Edogawa (185 yen).

By 1970, the wards with the highest per capita ward tax take remained the central business wards with 29,549 yen. The northern and eastern industrial wards were still at the bottom of the list with 7,662 yen. The single ward with the highest per capita ward tax take was once more Chiyoda (42,124 yen), the one with the lowest take was Adachi (6,740 yen). Aside from the anomalous year of 1954, the variability of per capita ward tax take is relatively stable over the period of observation, from a coefficient of variation of 54.5% in 1949 to 60.1% in 1970. The Theil index shows that the inequality in per capita ward tax take is somewhat less in 1970 (0.074) than in 1949 (0.100). We can highlight that there were important differences in per capita ward tax take, but these differences did not spatially stratify over time. This stands in contrast to the per capita metropolitan taxes raised, whose variability increases significantly over the 21-year period as shown above.

The two tables above have highlighted the varied geography across the 23 wards as far as public revenue is concerned. The differences were most acute in terms of metropolitan tax revenue, primarily a result of the strong proportion of business taxes. However, important variations also existed in the ward-level taxes, which were raised commensurately with personal income. It was because of TMG's centralized fiscal system that these differences did not translate into a varying provision of public services at the local level. Transfers were made to wards with a low tax raising ability, which led to more a more equal provision of services, as measured by ward total expenditure and expenditure on education, as we will show next.

[Insert Table 51]

In Table 51, we provide evidence that Tokyo was fiscally centralized, i.e. that TMG accounted for the majority of public expenditure as well as tax revenue. The combined expenditure of the 23 wards as a share of the TMG general account represented 15.6% of TMG's general account in 1949. This figure increased to 24.3% in 1970. The increase demonstrates a notable, albeit slow, trend towards fiscal decentralization on the expenditure side over this 21-year period. Several responsibilities were devolved to the wards in the mid-1960s. These new responsibilities included a growing share of public works and other social expenditure, on top of the traditionally ward-administered primary (and part-secondary) education as discussed above. Today, the split between ward and TMG expenditure is about 50/50.

In terms of revenue, we observe a similarly small ratio of ward taxes to metropolitan taxes. In 1949, the wards only raised 11.5% of the taxes that were raised at the metropolitan level. By 1970, this figure had increased to some 21.3%, denoting the same slow trend towards fiscal decentralization on the revenue side than that observed in terms of expenditure. However, just four years earlier, in 1966, ward taxes were relatively higher, at 27.5% of metropolitan taxes. These fluctuating ratios are evidence of the generally higher volatility of metropolitan taxes. As they comprise a large proportion of business tax, they rise and fall significantly in response to the business cycle (TMG, 1970: 5). Finally, we can observe that both wards and TMG were able to cover about half of their expenditure through taxation, although these values, too, fluctuated significantly between the years. There is little merit in analyzing the ups and downs from one year to the other for the purposes of this paper. The key takeaway from the table above is that Tokyo was highly centralized in fiscal terms, with some decentralization occurring towards the end of the observation period.

[Insert Table 52 here]

Table 52 above provides evidence of fiscal redistribution. Ward income did not only comprise tax revenue but also other sources (e.g. income from local municipally-owned companies). We provide this total ward income per capita in each of the left columns. The right columns show how much the wards received in transfers on a per capita basis. A high capacity of a ward to raise its own taxes and generate income from other sources would suggest fewer needs to receive transfer payments. Indeed, we see that this is generally the case. In 1949, the central business wards had the highest ward income on a per capita basis drawing on their economic strength and relatively high tax-raising capacity. They generated 958 yen in own income per capita (tax and other income) but received only 230 yen in transfer payments per capita. The northern and eastern industrial wards saw the reverse situation apply: On a per capita basis, they generated only 297 yen in own income compared to receiving 592 yen in transfers. The single ward with the largest ward income raised per capita was Chiyoda (1,156 yen), the one with the lowest was Edogawa (247 yen), denoting a ratio of richest/poorest ward of about 5:1. In terms of transfers, the ward receiving the highest transfer payments per capita was Edogawa (1,303 yen), the one receiving the least was Meguro (231 yen).

By 1970, the difference between these two values—ward income vs. transfers received—was much greater. The central business wards now generated 34,806 yen of own income per capita and received only 3,228 yen in transfers. The northern and eastern industrial wards still had the lowest income raising capacity per capita with 9,952 yen but received the largest per capita transfers or 15,704 yen. The ward with the largest ward income raised per capita was once more Chiyoda (52,031 yen), the one with the lowest Adachi (7,949 yen), now a ratio of about 7:1. The ward receiving the largest per capita transfers was Arakawa (20,212 yen) compared to Shibuya, which only received 2,927 yen in transfers per capita. While the inter-ward variability of ward income per capita stayed about the same between 1949 and 1970 (as seen by relatively stable coefficients of variation and Theil index figures), the variability of transfer payments on a per capita basis increased during this period. Its coefficient of variation in 1949 stood at 29.4%, while in 1970 it had reached 58.6%. In weighted terms, the message is the same: The Theil index increases from 0.051 in 1949 to 0.177 in 1970. This is evidence of an increasing magnitude of fiscal redistribution between the rich and the poor wards during the period of observation.

[Insert Graph 2 here]

The graph above complements the data from Table 52 with a graphical representation of the changing Gini coefficients in per capita ward revenue before and after transfers. The pre-redistribution inequality in ward income (i.e. without transfers) is a lot more pronounced than the post-redistribution inequality, which does include transfers. Both measures of inequality are rising until the mid-1960s, when the post-transfer Gini reaches its peak at just below 0.1, from where it decreases slightly towards 1970 (0.09).

[Insert Table 53 here]

The table above provides details on ward-level expenditure, i.e. public spending carried out by the ward governments. The left column shows the total ward-level expenditure per capita. The column on the right represents education spending per capita. We note that ward-level spending is a lot more equal across the different wards than is the ward revenue before transfers. The central business wards have the highest per capita spending due to their central position in Tokyo both geographically and politically and later their decreasing nighttime populations. In 1949, the 23 ward-wide average total ward-level expenditure is 901 yen per capita, and 412 yen for education. The wards with the highest per capita total expenditure were the central business wards (1,188 yen). The highest education expenditure per capita was recorded in the southern industrial wards (451 yen). The wards with the lowest total ward-level expenditure and education expenditure were the old industrial wards (801 and 334 yen, respectively). By 1970, the central business wards had the highest total ward-level expenditure and education expenditure per capita

(38,199 and 10,872 yen, respectively). The wards with lowest total ward-level expenditure and education expenditure were the western wards (20,561 and 6,089 yen, respectively).

This data shows that wards receiving more transfers per capita had comparatively high spending per capita, especially in the field of education. The variability in ward-level spending increased slightly: Its 1949 coefficient of variation stood at 13.6%, while by 1970, it had reached 15.9%. The Theil index confirms this reading. The variability of ward-level spending on education reduces slightly, from a 1949 coefficient of variation of 23.2% to 20.4% in 1970.

[Insert Graph 3]

This chart shows the correlation of ward income per capita with total expenditure and education expenditure per capita. We see that the correlation of the wards' own financial means (as expressed by their ability to raise higher taxes per capita) and their spending behavior decreases over time. This means that poorer wards begin to spend more on a per capita basis after 1954. The correlation between the ward's economic strength and education spending per capita goes below zero as early as 1959. This suggests that poorer wards (i.e. those with a lower per capita ward tax and income base) spent proportionately more on education per capita. Note that in this graph, we exclude the three central business wards of Chiyoda, Chūō and Minato in order to avoid skewing the results. As highlighted above, although they experience a nighttime population loss during the period of observation, their public expenditure in particular for education remains broadly stable as schools are not closed commensurately.

[Insert Table 54 here]

Fiscal redistribution did not only occur via transfers to and from the ward government budgets but also by actively redistributive spending by TMG. The emphasis here is on "active". Passive redistribution, e.g. via progressive taxation, will have an equalizing effect if income inequalities are spatially manifested, e.g. if low-income or high-income households disproportionately live in one ward over another. Active redistribution by TMG can take many forms: It can be disproportionate spending on a per capita basis in terms of education, culture or social security.

The table above shows the total number of households receiving municipal aid as a proportion of the total number of households. Aid-receiving households include those on livelihood aid, housing aid, educational aid, medical aid, maternity aid, occupational aid and funeral aid. Altogether, we find that a relatively small number of households in the ward area received financial aid from the metropolitan government. In 1952, 3.7% of all households received aid. The wards with the highest share were the northern and eastern industrial wards with 5.2% of their households receiving financial aid from TMG. Only 2.3% of the central wards' households received aid that year. The ward with the highest share of aid-receiving households was Itabashi (8.6%), the ward with the lowest share Chūō (2.2%). By 1969, the share of aid-receiving households as of total number of households had declined to 1.8% across the 23 wards. The northern and eastern industrial wards still had the highest proportion of aid-receiving households (2.7%), while the central business wards again had the lowest share with 1.0%. The single ward with the highest share was Taitō (5.0%), the one with the lowest share Chiyoda (0.8%).

Although decreasing in absolute terms, the variability in aid-receiving households as a proportion of total households across the 23 wards increased throughout the period of observation. The CoV and Theil index stood at 40.3% and 0.0624, respectively, in 1952. Both increased to 58.7% and 0.1234 in 1970. One interpretation of this is that pre-redistribution socio-economic differences were becoming more significant over the period of observation, causing increasingly uneven welfare payments across the 23 wards.

[Insert Table 55]

The table above confirms the observation from Table 54. We present figures for the share of households living in public housing provided by TMG. In contrast to the primarily middle class housing provided by the Japan Housing Corporation in the Tama region, TMG oversaw its own considerably larger low-income social housing program across the 23 wards. Social housing existed in all wards. In 1962, 2.3% of all households lived in these publicly subsidized dwellings. The wards with the highest share were the northern and eastern industrial wards. Here, 3.8% of all households lived in TMG provided housing. The lowest share was recorded in the southern industrial wards (0.6%). The single ward with the highest public housing share was Adachi (5.9%), the ward with the lowest share was Shinagawa (0.2%).

By 1970, the ward-wide share of households living in TMG provided housing had increased to 3.9%. The northern and eastern industrial wards still had the highest share at 7.2%, the southern industrial wards still had the lowest share at 1.1%. Remarkably, the share of households in TMG provided public housing in the old industrial central wards increased from 1.7% in 1965 to 5.2% in 1970. This increase was almost entirely due to Kōtō, which saw a major expansion of its municipal housing program during the period. In 1965, only 4.2% of households here lived in TMG provided housing. By 1970, this figure had increased to 12.7%, making Kōtō also the ward with the highest share among the 23 wards. The ward with the lowest share was Taitō (0.6%).

The variability in the share of households living in public housing across the 23 wards increased considerably over the eight years shown above. In 1962, CoV and Theil index stood at 78.6% and 0.2661, respectively. By 1970, they had increased to 95.9% and 0.3523. The provision of subsidized public housing by TMG therefore became more spatially stratified over the short period for which data is available at this level. Other considerations than just the low income of the ward population may have influenced this, primarily the availability of publicly owned land or existing real estate that could easily be converted into public housing. The above suggests that through its social spending, TMG also effected redistributive spending policies across the geography of the 23 wards from its own account, rather than relying only on fiscal redistribution to alleviate disparities between wards.

This section has demonstrated that TMG actively redistributed resources from richer to poorer wards, with the aim to maintain a broadly equal (egalitarian) provision of social services. Transfers became larger as time went by. This suggests that the relatively equal distribution of Tokyo's socio-economic indicators was not only achieved by default, but also by design, thanks to a powerful intermediary layer of government in the form of TMG. It ensured that the financial situation of the special wards post-transfer did not reflect the ward's underlying economic strength. And while ward budgets were small compared to the metropolitan budget, spending at ward level contained primary education and a growing share social welfare towards the mid-1960s. Lastly, TMG did not only redistribute via coordinating grants to ward budgets but also by spending disproportionately on social welfare in some wards compared to others. All this contributed to a more egalitarian distribution of living standards across the 23 wards.

These findings are relevant for contemporary megacities. Spatial inequalities are often exacerbated by municipal investments or taxation policies, which are often set at a national level and do not account the specific conditions of individual cities (Martínez-Martín, 2005, p. 99), especially megacities with their unique properties in terms of complexity and spatial inequalities. Moreover, metropolitan regions often have administrative units which resist fiscal transfers (Kilroy, 2007, p. 18). In Tokyo, successful fiscal redistribution took place in Tokyo during a phase of rapid economic and demographic change under a specific governance configuration that defies the linear relationships of a traditionally dichotomous decentralization-centralization debate.

Ambitions meet reality: the role of urban planning

In the following section, we will analyze urban planning policies affecting Tokyo during the period of observation. A variety of plans for Tokyo's development existed during this time. Common to most of them was a much stricter separation of land uses. These plans proved to be too ambitious and echoed previous attempts at top-down urban restructuring. Instead, resources for urban improvement were scarce and spending on growth-enabling infrastructure prioritized. The ward population grew rapidly until about 1960, rendering plans to control urban growth obsolete. Prewar zoning ordinances remained largely unchanged until 1968. They were accommodating various uses and can help account for city's enduring tolerance towards mixed-use dwellings as well as light manufacturing activity taking place within the 23 wards. Land readjustment became an important tool for urban regeneration and upgrading. In a city with complicated and fragmented ownership patterns, it was the pragmatic and cost-saving way to do so. Taken together, urban planning was comparatively hands-off and allowed neighborhoods in the 23 wards to grow and upgrade themselves alongside a more or less organic, "Tokyo default" pathway. The proliferation of generic neighborhoods features—in part explained in chapter three—helped to prevent a spatial stratification in living standards.

This peculiar model has to date received relatively little attention from urban scholars. A major reason for this is TMG's admission of its failure to implement its own plans, e.g. to effect more wide-reaching urban planning. Paradoxically, however, the success of the city is explained at least in part by this very failure and the default hands-off approach that was taken instead. We must of course apply caution in making categorical statements about failure and success. This is not only because of the complexity of urban development, but also because of the relatively long time span under review here. However, as has been evident throughout this dissertation, there were undeniable improvements in the ward area during the high-speed growth era. One continuity is the existence of a relatively strong intermediate layer of governance in the form of TMG: Strong enough to effect fiscal redistribution but without the wherewithal to undertake and oversee transformative urban planning.

This section is organized as follows: We will first briefly review the prewar history of urban planning in Tokyo before introducing the major plans of the postwar period. We then discuss land readjustment as the major urban planning tool employed in Tokyo during the period of observation before we discuss urban sprawl and unplanned urban growth.

Historical precedents

The 1888 Tokyo City Improvement Ordinance (*Tōkyō shiku kaisei jōrei*) is considered to be Japan's first city planning law. It applied only to the capital and thus "established an often repeated pattern of dealing with Tokyo's problems first and extending the planning approaches developed there to other areas later" (Sorensen, 2002, pp. 63–64). The law was watered down from earlier versions—more in line with grand urban redesigns in the fashion of Haussmann's Paris—to a much more pragmatic plan (C. Hein, 2010, p. 454), and was further scaled back due to a lack of funds (Sorensen, 2002, p. 71). The ordinance was in effect for 30 years and is usually described as having three stages. The first one, from 1888-99, prioritized the construction of water supply infrastructure. The second stage, from 1900-10 focused on tram line and road development. The third and final stage, from 1911-18, saw heavy investments in the city's sewerage system (Ishida, 2004, p. 64). Other important results of the ordinance included the establishment of Hibiya Park and Ueno Park, the widening of several important roads, including the thoroughfare running alongside the Imperial Palace (TMG, 1999), as well as the sale of parade grounds east of the Imperial Palace, which would later become the Marunouchi business district. The Meiji era established the national government as the central actor in urban planning for Tokyo. This central control led to "urban planning repeatedly [getting] caught up in inter-ministry conflicts over jurisdiction and financial control" (Sorensen, 2002, p. 82). Further, "the weak financial base of urban planning in Japan thus first emerged as a result of conflicts between the Home and Finance Ministries during the Meiji period, and has been an enduring feature of Japanese planning" (Sorensen, 2002, p. 83). Lastly, housing construction and secondary infrastructure development remained largely unregulated (Shibata, 2008, p. 14).

In 1919, the Tokyo City Improvement Ordinance was replaced by the City Planning Act, which would be in place until 1968 and thus cover most of the period of observation of this paper. It was passed in reaction to "physical and social problems caused by the rapid urban growth" (Shibata, 2008, p. 20). The most important elements of the Act were a systemic approach to the popular planning method of land readjustment (C. Hein, 2010, p. 456) as well as the first zoning regulations (Shibata, 2008, p. 22). Land readjustment refers to the pooling of ownership within a project area and the subsequent construction of infrastructure or other urban facilities (Sorensen, 2002, p. 122). Tokyo planners preferred this system over expropriation as it left land ownership in principle unchanged. They thus chose a "pragmatic small-scale approach to functional changes" (C. Hein, 2010, p. 480). In terms of zoning, the 1919 Act established only three zoning areas, i.e. residential, commercial and industrial zones. The character of the regime was permissive: Small factories with less than 15 workers or machinery with less than two horsepower were allowed to operate in residential areas. Factories with less than 50 workers or machinery with 10 horsepower were allowed in commercial areas (Ishida, 2004, p. 107). Moreover, a large unspecified area remained. This "blank zoning area" (*shiraji chiiki)* comprised as much as 40.7% of Tokyo's city planning area (Shibata, 2008, p. 22). The 1919 Act also further strengthened central government control over planning issues. For example, the Home Minister had to approve all plans, and city planning budgets had to be authorized by the ministry (Sorensen, 2002, p. 111).

The Great Kanto Earthquake of 1923 destroyed large parts of the city. As many as 73.8% of all households were affected (Ishida, 1988, p. 19). Modernist city planners saw in the destruction a "golden opportunity" to promote the rebuilding of Tokyo alongside what were considered more rational rules. One of the leading voices of urban planning, Abe

Isoo, lamented Tokyo's mixed character, i.e. the co-existence in close proximity of residential, commercial, industrial and administrative buildings. He suggested assigning different zones for each of these uses, and creating separate cities connected by high-speed transportation (Schencking, 2013, p. 172). Goto Shinpei, former mayor of Tokyo and Home Minister at the time of the earthquake, also advocated large-scale reconstruction including a "replotting" of the city (C. Hein, 2010, p. 474). His plans did not garner enough support as they became "embroiled in political strife" (Ishida, 1988, p. 20), resulting in the reconstruction budget being cut to less than half its initial estimates. However, the next seven years did see major changes to Tokyo's cityscape, primarily a result of land readjustment, the preferred method of reconstruction work. The December 1923 promulgation of the Special Urban Planning Law specified the land readjustment method for Tokyo, allowing the government to expropriate 10 percent of landowners' property without compensation. Fifty of the 65 land readjustment districts were administered by the City of Tokyo, the remaining 15 by the Home Ministry (TMG, 1999b). Roads totaling 253 kilometers and 55 parks were built. Ishida suggests that "the post-earthquake reconstruction projects were extremely significant …because they created the urban infrastructures to support the development of Tokyo's city center up to the 1960s" (Ishida, 1988, p. 20). In total, about 5% of today's ward area was affected by land readjustment projects following the Great Kanto Earthquake. The disaster also precipitated the founding of Japan's first public housing corporation, *dōjunkai.* It was set up in response to a severe housing shortage after the quake as well as in order to introduce the benefits of modern construction techniques. However, only fifteen apartment complexes comprising 5,653 dwelling units were built in the 23 wards (Ishida, 1988, p. 21).

This brief review of the prewar period has established several important features of urban planning in Tokyo that will surface again in the postwar era. Ambitious plans to redesign the city according to Western ideals of modernity existed but failed due to a shortage of funds. These were diverted to other, national uses, e.g. the military. The central government maintained tight control over planning issues, and inter-ministerial wrangling over authority was a recurring feature. Pragmatic methods such as land readjustment proved to be more suited to Tokyo's context of complicated landholding patterns and limited financial resources.

Postwar plans

The destruction caused by Allied bombing campaigns in 1945 was even larger than that of the Great Kanto Earthquake in 1923. The major source of destruction proved to be fire again, fueled by strong winds during the time of the bombardments. Almost 40 percent of the city were destroyed, equivalent to an area of 16,000 hectares. 770,000 homes were lost, many of them built of wood (Ichikawa, 2003, p. 50). Tokyo thus resembled a *tabula rasa* situation, and similar to the 1923 Great Kanto Earthquake, this tempted Tokyo's planners to pursue extremely ambitious plans for reconstruction. The most important of these, the 1946 War Damage Rehabilitation Plan by Ishikawa Eiyo, foresaw the radical restructuring of Tokyo and the creation of several sub-cities with 200,000 to 300,000 inhabitants each (Sorensen, 2002, p. 163), connected by a network of radial and ring roads including seven 100-meter wide streets (Ishida, 1988, p. 26). The overall population of the city was to be limited to about 3.5 million people. The plan also intended a strict separation of land uses accomplished by a stricter zoning regime (C. Hein, 2003, p. 10).

Ishikawa's plan was not implemented for several reasons, above all the shortage of funds following the fiscal retrenchment of 1949 (Dodge Line) and the prioritization of the reconstruction of smaller cities (Ishida, 1988, p. 27). Tokyo's size and complicated land ownership had delayed reconstruction efforts so that "in the meantime, the funds went elsewhere" and "the vast majority of Tokyo was rebuilt in an ad hoc fashion along the former pattern" (Sorensen, 2002, p. 165). The plan was unrealistic from the start. The *tabula rasa* situation proved to be very temporary as "property ownership patterns could not be erased by a few bombs" (Sorensen, 2002, p. 167) and inhabitants returned to the ward area to reclaim their land, often building temporary housing for themselves. Although SCAP had issued orders to the Japanese government to restrict population movements from rural to urban areas in May 1946 in order to avoid housing and food shortages (SCAP, 1946), Tokyo counted 5.0 million inhabitants in 1947 already, with 4.2 million of these striking out a living in the 23 wards. Moreover, large-scale urban transformation would have required the expropriation of thousands of landowners. The Japanese government was in no position to provide the required funds for their compensation, and GHQ was opposed to uncompensated expropriation.

Unlike after the Great Kanto Earthquake, land readjustment was not widely employed either. Besides several projects surrounding train stations on the circular *yamanote* line, only a fraction of the initially planned reconstruction related land readjustment projects were carried out. In total, 1,274 hectares worth of projects, or just 6.3% of the plan, had been implemented in the 23 wards by 1983, the end of the plan period (Yanase, 2018, p. 69). The initially targeted 20,130 hectares would have represented a replotting of a third of the ward area, six times the area restructured after the Great Kanto Earthquake. The immediate postwar period went on without the implementation of a major, coordinated reconstruction plan. When the economy began its rapid growth with the Korean War in June 1950, Tokyo experienced a largely unregulated "building boom". The growth in construction was also fueled by the increasing availability of credit due to the establishment of the Housing Loan Corporation in 1949. These developments, among others, caused land prices to soar, further complicating urban planning initiatives requiring compensated expropriation (Ishida, 1988, p. 27), and pushing urban expansion to the periphery of the ward area and beyond, where land prices were lower. Here, land readjustment partly facilitated urban restructuring as will be shown further below.

The National Capital Region Development Act of 1956 represented the next milestone in terms of large-scale urban planning attempts. It was aimed at developing a regional perspective to Tokyo's urban planning, primarily because growth increasingly took place outside of the 23 wards in the Tama region and the adjacent prefectures. The Act led to the design of the first National Capital Region Development Plan in 1956, with its adaptation by TMG finalized two years later in 1958. The Plan intended to reduce the concentration of both population and industries in Tokyo and targeted areas in a 100-kilometer radius of central Tokyo. It was modeled on the prewar Greater London Plan and echoed the Ishikawa plan (Sorensen, 2002, p. 188). It foresaw the creation of a large greenbelt around the center of the city as well as the development of satellite cities (TMG, 1999c: 14).

Just like the Ishikawa plan, however, it proved to be too unrealistic for it to be implemented. Landholders in the designated greenbelt area preferred their land to be earmarked for conversion to residential use, as this was the by far more profitable option. Affected local governments were also pursuing pro-growth policies and thus opposed the plan in spirit. It therefore “failed to realize its initial objective of limiting the growth of existing urbanized areas” (TMG, 1994, p. 56). Among the few achievements of the plan was the limitation on new universities and the growth of very large-scale factories in the ward area (TMG, 1969, p. 10). However, as regards the latter, these restrictions applied only to firms with more than 1,000 square meters of production facilities and “applied only to factories established before the enactment of the law” (TMG, 1977, p. 27).[29]

Several other large-scale urban plans saw the light of day in the late 1950s. Increasingly, architects became involved in the discourse and theorized about radical solutions to the urban problems presented by Tokyo’s rapid growth (Pernice, 2006). The most important of these plans was Tange Kenzo’s 1960 “Plan for Tokyo”. It foresaw the development of the Tokyo Bay as a response to the congestion of the city. Tange’s and others’ plans took on a more and more utopian imagery, just as the problems of the megacity seemed to veer out of control, in particular the growing congestion and pollution. These visions influenced a generation of architects and urban planners-in-making, inspired popular culture and fueled a national and international conversation (Koolhaas & Obrist, 2011).

[29] Later initiatives included the relocation of factories to outlying areas as part of the “Industrial Relocation Promotion Law” of 1959. However, the overall effectiveness and impact on Tokyo’s industrial landscape during the period of observation is ambiguous. The contention made here is that the system remained permissive in the beginning and gradually became more restrictive in line with tightening environmental standards enacted in the late 1960s. By that time, however, secular trends had already done much of the work of driving heavy industries out of the ward area. Moreover, the authorities recognized other sources of pollution as much more serious, particularly automobiles and untreated sewage (TMG, 1977). Two indications support this reasoning: First, TMG started a program to purchase vacated factory land in 1964. By 1968, a mere 62 factories had sold their land that way. This is testament to the high land prices as well as TMG’s limited budget in this period (TMG, 1971, p. 39). Second, between 1975 and 1986, a total of 330 factories with a production site area of more than 1,000 square meters were relocated from nine of Tokyo’s low-lying wards in the center, north and east. This figure represents a marked increase compared to the 1960s but remains comparatively small (representing less than 10% of factories with more than 20 workers in these wards as of 1970). Almost half of them settled in one of the adjacent prefectures, with the rest distributed across Tokyo prefecture, the wider Kanto region as well as other locations in Japan. In this, they were supported by a set of administrative measures, e.g. interest rate deductions and other subsidies (Endoh, 2007, p. 606).

They found partial realization in the *shuto* expressways (see below) and several thousand hectares of reclaimed land in the Tokyo Bay. However, they failed to make an impact on the day-to-day lives of ordinary ward inhabitants as their realization would have been far too costly.

The 1964 Olympics represent the next most important milestone in terms of Tokyo's large-scale urban planning. Tokyo was awarded the Games in 1959, which accelerated, and, most importantly, secured funding for, several major plans besides the construction of the actual sporting facilities. These included plans for parks and green spaces (1957), expressways (1959) and high-speed railways (1962) (TMG, 1991). More than 30 kilometers of elevated expressways were completed in time for the Games and the high-speed *shinkansen* rail connection between Tokyo and Osaka also made its debut in 1964. The monorail between Haneda Airport and Hamamatsuchō Station on the *yamanote* line was the longest in the world at that point in time. The major impetus for these investments was increasing traffic congestion on Tokyo's roads, "one of the most serious problems now facing the Tokyo Metropolitan Government" (TMG, 1961, p. 27), primarily due to the growth in the number of private automobiles, "increasing with a formidable rate of 7,000 per month" (TMG, 1961, p. 28). Several new subway lines opened around the time of the Olympic Games, including the Asakusa and Hibiya lines, allowing for the gradual retirement of overground streetcar lines.

The construction of expressways, tunnels, bridges and other infrastructure was no doubt significant for the future development of Tokyo (Sorensen, 2002, pp. 191–193). However, the investments primarily affected the central wards of the city or the vicinity of sporting facilities and left most of the other wards unaffected. While the improvement of the public water and sewerage system was accelerated due to the Olympic Games, the goal to increase the coverage of the sewage system from 20% of the ward population in 1960 to 40% by the time of the Olympic Games (TMG, 1961, p. 30) proved to be too optimistic: Only 27.4% of the ward population ended up being connected by 1965 (TMG Statistical Yearbook, 1965, p. 194) and it would take until 1969 for the goal to be reached (TMG Statistical Yearbook, 1969, p. 148). Water and sewage systems remained the "most backward of the services provided by TMG" (TMG, 1967, p. 52). The spread of flush toilets was slow, also because their installation required both the consent as well as expenditure of the owner, therefore slowing the provision of modern amenities for the rental population in the 23 wards (TMG, 1967, p. 53).

Why was the sewerage network so comparatively backward? Japan's quick rise from "underdevelopment" in the early 20th century has often been given as one explanation (TMG, 1963). This would continue in the postwar period, when "the capital has been growing too fast to keep pace with its modernization plans" (TMG, 1963, p. 2). Importantly, however, the lack of sewerage was historically compensated through night soil collection. Human excreta were used as fertilizer on suburban farms. With the advent of chemical fertilizer in the postwar period, there was no more inherent value in night soil. Therefore, homes without flush toilets would require the service of "vacuum cars", and barges would take the collected human excreta out in the ocean to dispose of it there. The combination of a growing population and increasing congestion made the logistical challenge of night soil collection ever greater.

The 1960s saw a series of further important changes to Tokyo's urban planning regime. These included the specified block system in 1961 and the floor area district system in

1963, paving the way for building height restrictions to be lifted in the same year's revision of the Building Standards Law. The previous height limit of 31 meters (or 100 *shaku*), which dated back to 1919, was now scrapped in exchange for a maximum building floor area ratio (FAR). The first skyscraper to feature in Tokyo's skyline was the Kasumigaseki Building (April 1968), setting the new height record at 156 meters. From then on, tall buildings would become increasingly common in the central business wards, as well as Shinjuku, slowly changing Tokyo's low-rise typology that characterized it during most of the period of observation. The *manshon boom* of the late 1960s and early 1970s contributed to that trend. While these relatively upscale apartment complexes were initially built in the central wards, the "trend toward more intensified land use soon spread from the urban core to the suburbs" (TMG, 1994, p. 76). Such high-rise residential buildings were often built in low-rise neighborhoods and made use of new legislation by adding significant setbacks (Imai, 2018).

Public housing became more important as time went by. However, it never reached the same proportions as it did in Western Europe (Neitzel, 2016). By 1970, just 6.7% of all dwellings in the 23 wards were public and for rent (TMG Statistical Yearbook, 1970, p. 368)[30], compared to about 30% in the United Kingdom as a whole at that time (UK Department for Communities and Government, 2015, p. 18). The number of publicly managed dwellings had increased by nearly half in the five years. Many of the new public housing estates (*danchi)* of the national Japan Housing Corporation were located in the Tama region, where affordable land was more readily available. Another initiative were

[30] Note that this figure is different to the data provided in Table 7 above. The reason is that this figure includes national public housing (e.g. by the Japan Housing Corporation, JHC) as well as ward-provided public housing, and is therefore larger.

the "new towns" built in the periphery of Tokyo and designed to alleviate congestion in the city. In 1965, Tama New Town, the largest of these developments, began to house what would ultimately be 200,000 residents. These projects would exert an increasing strain on the metropolitan transport network as they were designed as bedroom communities for white-collar commuters. Professor Robson, in his 1969 report on TMG introduced above, criticized the project's reliance on public transport and called it "fundamentally misconceived". Further he lamented that "its location is not far enough from the central area for a satellite and is not near enough to achieve a reasonably short journey to work" (TMG, 1969, p. 35). Lastly, these large-scale housing developments were built primarily for salaried workers, not for low income groups, "whose housing needs are greatest" and for who TMG had to provide housing primarily in the ward area, where land was much more expensive (TMG, 1969, p. 82).

The City Planning Law of 1968 represents the final milestone in Tokyo's urban planning history during the period of observation. It rectified some of the shortcomings of the by now outdated 1919 Law it replaced. The major purpose of the law was to limit urban sprawl, which "had been identified as the key urban problem during the 1960s" (Sorensen, 2002, p. 213). The primary mechanism with which to control this phenomenon of unorderly urbanization was to regulate the conversion from agricultural to residential land more stringently and to ensure that public infrastructure, including roads and sewerage as well as parks and schools, were provisioned for before or during the development of new urban settlement. There were five main elements to the new legislation. They were the delegation of planning authority to lower levels of governance; the designation of "urbanization promotion areas" and "urbanization control areas"; a new development permission system; public participation in decision-making; and a new and revised zoning system (Sorensen, 2002, p. 214).

We have shown above that urban planning in Tokyo during the postwar period repeatedly fell short of its ambitions. Large-scale reconstruction plans after the war had to be shelved due to a lack of funds and the swift repopulation of Tokyo. Rapid economic growth kicked in soon after and confronted the planning profession with ever-changing conditions in the fast-urbanizing area of the wards and increasingly beyond, making realistic planning ever more difficult. The Olympic Games, while improving Tokyo's transport infrastructure, did not affect the majority of the wards' residential districts. Here, infrastructure continued to be improved in piecemeal fashion. Public housing remained comparatively marginal and did, at least in the 23 wards, not have the same transformative effect on the cityscape as it did in other, primarily European, nations. The 1960s, however, laid the foundations for change that would take more and more effect by the 1970s. Among these were the lifting of building height restrictions and more nuanced zoning definitions.

To sum up, the existence of plans and rules is one thing, their implementation another. Commenting on the role of urban planning in Japan, Professor Robson's assessment was bleak: "The central government and the Diet have not formulated a national urban policy for Japan." Instead, he observed that "an attitude of laissez-faire has prevailed so far as far as urbanization is concerned" (TMG, 1969, p. 10). His assessment of TMG was harsher still: "Planning by the TMG and the Capital Region Development Commission is little more than an exercise on paper" (TMG, 1967, p. 23). According to Robson, there was no control of land use and developments, primarily because "TMG has no staff and no money allocated specifically to planning control" (TMG, 1967, p. 24). Hebbert suggested that “the failure of successive metropolitan plans to curb the unruly, vigorous urban dynamism of Tokyo is only the most visible instance of a more general mismatch between planning intentions and outcomes” (Hebbert, 1986, p. 150).

Instead of large-scale planning: land readjustment

A common urban planning tool in Tokyo’s ward area was land readjustment. It was used to widen some arterial roads and reorganize the vicinity of railway stations. It was also employed in parts of the peripheral ward area, primarily in the north and east. The following section will show how this method represented a pragmatic, if limited, approach to organizing urbanization.

As discussed above, land readjustment refers to public-private partnership instrument, in which governments and landowners “bear the urban development costs in places where existing land use patterns are inadequate and inefficient” (DeSouza, 2018, p. 27). The primary mechanism of this method is the so-called “replotting”, i.e. the change of shape and area of plots in order to achieve a more rational division of land. Various parties can initiate land readjustment plans: individuals, private and public associations, public bodies (e.g. TMG), administrative agencies, or public corporations (e.g. JHC). They seek consensus among the landowners for the overall plan as well as for the individual reductions in plot sizes needed to accommodate public infrastructure such as roads and parks as well as the creation of reserve land, the sale of which contributes to the project cost.

Land readjustment in Japan has traditionally fallen into five categories (DeSouza, 2018, p. 29): control of urban sprawl in suburban or peripheral areas; the development of new towns in suburban or peripheral areas; urban rehabilitation; the development of infrastructure with greater complexity; and disaster reconstruction. All of these played a role in Tokyo between 1945 and 1970 to varying degrees, although land readjustment for new towns applied primarily to the Tama region. Land readjustment became the most important urban planning device of the high-growth era, especially after the passing of the 1954 Land Readjustment Act. One of the innovations of the 1954 Act vis-à-vis the 1919 regulations it replaced allowed the central government to subsidize local government projects, particularly for arterial roads that benefited people living outside the project area (Sorensen, 2002, p. 183). Land readjustment was therefore not only a tool for the upgrading of residential neighborhoods and train station vicinities, but also allowed for the widening of roads, which was important for modernizing Tokyo's old and inadequate street grid with a growing number of trunk roads.

Land readjustment as a planning tool has several advantages vis-à-vis the more intrusive alternative of expropriation, which refers to the forcible removal of ownership rights by the authorities in order to build public infrastructure. First of all, social, cultural and economic networks closely tied to a physical location can be maintained, therefore preserving the original communities. This "posture is quite opposite to the 20th century urban reformers' way of thinking; the one that too often proposed 'erasure'… as the most efficient means of dealing with urban problems" (DeSouza, 2018, p. 19). De Souza quotes Sorensen that "by engaging the existing community in a process of redevelopment, creation of new public spaces and infrastructures, and keeping them in that transformed place during and after the project, it is possible for the land readjustment processes to actually enhance and enrich places based on social networks instead of obliterating them" (Sorensen, as cited in DeSouza, 2018, p. 19).

The second advantage refers to the equitable distribution of cost and benefits among the property owners as they all contribute a share of their property towards public facilities as well as land for sale in order to finance the project. At the same time, they equally benefit from an appreciation in the land value based on the new amenities installed there. Land readjustment represented a method of urban improvements that “let people stay on the sites they had formerly occupied and introduced only minor changes to the site layout for the construction of streets without the reorganization of the bordering zone” (C. Hein, 2010, p. 456). Instead of large scale remodeling and urban design, land readjustment represented a solution that “responded to practical needs and local interests” (C. Hein, 2010, p. 461).

Land readjustment projects were on the whole self-financing. Besides some local and central government subsidies, income was primarily derived from the sale of so-called “reserve land” to third parties. The limited financial exposure of the central government allowed it to focus its resources on projects providing basic infrastructure (e.g. ports, water supply, hydroelectric power and serviced industrial land) instead of social infrastructure (e.g. sewerage, local roads and parks) (Sorensen, 2000, p. 229). Local governments were curtailed in their ability to raise taxes by the central government and were thus not able to stem large investments into public services on their own. To add to the difficulty of providing urban infrastructure, the inflation in land prices had made public investments prohibitively expensive: “About 80% of the cost of new [urban] highways is absorbed in the purchase of land” (TMG, 1967, p. 32). The self-financing character of land readjustment was thus a necessity of fiscal realities during this time. Sorensen cites Nagamine that “Japan has been able to afford only such a living environment as LR could afford. Indeed, LR has been the most vital tool for Japan to muddle through…, particularly during the high economic growth period" (Nagamine, as cited in Sorensen, 2002, p. 184).

Beyond the financial benefits of land readjustment, several other reasons can account for its success as a planning tool in Japan. Weak development control regulations, fragmented landownership patterns, illiquid land markets and limited amount of land in public ownership were making it difficult for the government to build adequate urban infrastructure in the traditional fashion pursued in other countries, e.g. the US. We may add to this certain roadblocks to expropriation in the 1947 Constitution, which were inserted against the guidance of SCAP. The eventual Article 29 strengthened landowners' rights and defined public interest much more weakly than the original draft approved by MacArthur (Sorensen, 2002, p. 156). And although the Japanese government clarified under which conditions expropriation may take place in 1951, in reality the state rarely invoked evident domain (Lum, 2007, p. 464). Another reason for the success of land readjustment were restrictions on development placed on landowners should they not participate in land readjustment projects. This coercive approach sparked select protests against land readjustment policies, requiring government planning officers to spend a lot of time and energy on overcoming opposition movements (Sorensen, 2007, pp. 108–111).

Other authors have attributed the success of land readjustment to cultural factors such as the Japanese tradition of participation and consensus (for a review, see DeSouza, 2018, pp. 53–56). In his JICA-funded study, De Souza contributes two further reasons. The first one is described as a Japanese pragmatic planning culture combined with a technical project-driven system. "Japan could not find a better answer to return the collection of betterment to its mobilized society in the form of basic infrastructure – leaving important resources to other major goals of the State—other than land readjustment”. The second reason is that land readjustment in Japan is not based on project contracts but on an administrative measure. This makes it possible for land readjustment associations to overrule holdouts as long as a certain overall percentage of landowners agree (DeSouza, 2018, p. 56), underlining the coercive nature of the method.

[Insert Table 56 here]

TMG published its first handwritten report with detailed land readjustment statistics in 1977, a summary of which is shown in Table 56. Although this year is rather distant from our period of observation, many of the projects listed as “in process” had in fact been initiated in the decade before, alluding to the long average project lifespan (TMG, 1977: 8-9). By 1977, a total of 100 land readjustment projects were either ongoing or had been completed in the 23 wards since 1945, covering an area of about 4,913 hectares, about 50 km^2 and thus representing about 8% of the total ward area. Of these, 1,075 hectares were related to postwar reconstruction projects. For reference, we have added the land readjustment carried out after the Great Kanto Earthquake in 1923 for comparison, adding another 3,116 hectares to the total, and taking the total area of the 23 wards ever affected by land readjustment as of 1977 to about 13%. Land readjustment kept being the tool of choice for urban planning in the ward area. By 2013, the area already reorganized or in the process of being reorganized had increased to 22.6% of the ward area (TMG, 2013, p. 155).

A significant proportion of the land readjustment during the period of observation was initiated by associations of landowners. The four wards of Itabashi, Adachi, Katsushika and Edogawa accounted for almost all these projects as of 1977, i.e. 2,636 hectares, or about 15% of combined area of the four wards (Yamazaki, 1981, p. 248). These wards were at the frontier of urban expansion during the 1960s and had until then been dominated by rice paddies. It can therefore be said that land readjustment during the period of observation had the most important impact along the *yamanote* ring as well as in the four peripheral wards in the north and east. These projects represented a more pragmatic urban restructuring and upgrading than the unrealistic plans that had repeatedly been drawn up.

However, despite the successes listed above, the role of land readjustment in transforming the 23 wards should also not be overestimated. First off, the results represented a significant underachievement compared to the ambitions that existed in the late 1950s. A map of land readjustment was published in 1961 and can be seen in the appendix (see Map 1). Land readjustment and farmland readjustment areas constitute a significant proportion of the peripheral wards in the east, north and west. The map also shows where farmland readjustment had taken place during the Meiji period under the Arable Land Readjustment Act from 1899, affecting primarily the area in the south of what would eventually become the 23 ward area, e.g. the former Ebara county (*gun)*. The map, too, highlights the area readjusted in the wake of the 1923 Great Kanto Earthquake and after World War Two as part of the reconstruction related land readjustments. Finally, the map shows the proposed network of trunk roads which were to be expanded in width using land readjustment as the planning method.

To show how far ambition and achievement were apart, it is worth looking at a specific ward example. Following TMG's strategy, Nerima began to designate land readjustment zones in 1964 and, by 1969, had done so for 44% of its land area. However, only a very small proportion of that land has actually been developed using land readjustment (Nerima Ward Office, 2009). Sorensen also suggests that land readjustment may represent urban planning at the local level, but may still mean “unplanned, uncontrolled development at the metropolitan scale”, leading to higher costs for sewer and road connections (Sorensen, 2000, p. 235). Yamazaki has shown with his case study of Horie in Edogawa that land readjustment projects in the ward area during the postwar era were far from perfect. In his example, real estate agents and corporations were land-banking and speculated on higher land values in the anticipation of public infrastructure investments. Roads took up the largest share of public facilities post-adjustment. This led to a very dense parceling for what turned out to be small houses. Industrial waste contaminated parts of the former marsh area and led to temporary fall in land prices (Yamazaki, 1981, pp. 264–265).

Instead of planning and land readjustment: haphazard growth and retrofitting

In the absence of large urban planning initiatives as well as considering that land readjustment affected a relatively small proportion of the urban growth area in the 23 wards, a large part of Tokyo’s expansion took place in an unplanned, incremental and haphazard fashion. In the periphery of the ward area, for example, a large part of this expansion occurred in the form of urban sprawl. Urban sprawl is defined as the transitory zone between the urban and the rural. It displays a variety of uses and various building types, dotted with agricultural and idle land. Usually this expansion is driven by landowners and developers. They rely on motorized or public transport connectivity and convert low-value farmland into high-value residential land. This initially scattered development is filled in over the years and provided with urban services (Hebbert, 1986).

There is a large body of literature on urban sprawl in Japan. The two authors mainly cited here, Hebbert and Sorensen, have written about places outside of the ward area as well as covered the time beyond this paper's period of observation. However, their basic observations and the dynamics they present are valid for the peripheral ward area primarily in the 1960s, too.

Sorensen lists several factors that contributed to urban sprawl in Japan: In the wake of the severe postwar housing crisis, authorities deliberately kept development standards low, thereby encouraging private developers to create housing at affordable prices. Legal mechanisms to force developers to provide public goods or connect new housing to the existing road network were limited. In fact, a new, laxer system governing new road installations was set up in 1950. Its rules were limited to setting a minimum road width of four meters. Finally, due to fragmented land ownership, development often took place in small increments, with new blocks of less than 10 houses or wooden rental units (Sorensen, 2002, pp. 196–197). Resulting from this was the "incremental building of extensive new urban areas, confusing and substandard local road networks with the bare minimum of road space, no sidewalks and no parks". Japan's typical pattern of urban development therefore also manifested itself in the periphery of the ward area, i.e. "large areas of unplanned development interspersed with pockets of planned development structured by the transportation network" (Sorensen, 2002, p. 197).

[Insert Table 57 here]

We have already discussed roads in the 1950s and 1960s in the neighborhood section in chapter three. We showed how roads narrower than 5.5 meters (improved) or 4.5 meters (unimproved) represented the most important share of roads in new residential neighborhoods in the periphery of the ward area in 1960s. The western wards had a share of narrow roads of total roads of 70.2% in 1970. Nerima was the ward with the highest share (90.5%). In the table above, we now present the share of narrow *and* improved roads as of total roads. This category's growing importance suggests that TMG, as well as ward authorities, gradually improved the improvised narrow roads that had sprung up organically in new and unplanned neighborhoods—a good example of retrofitting—or that new narrow roads were built to higher standards.

Why are narrow and improved roads important for our analysis? First of all, they represent the acquiescence to this road typology by the authorities. Work improving these narrow roads allows for the simultaneous retrofitting with other public infrastructure, e.g. gas, water and sewage. Narrow improved roads also allow small and medium sized enterprises to access these roads using small but heavier trucks. Finally, they are walkable and conducive to positive neighborhood characteristics as described elsewhere in this chapter.

Across the 23 wards, the share of narrow improved roads to total narrow roads stood at 26.6% in 1961 and increased to 52.5% in 1970. The increase was the most marked in the central business wards, where in 1961, the improved narrow roads share was 24.8%. In 1970 this share stood at 88.1%. In Chiyoda and Chūō, all narrow roads were now improved in 1970, compared to just 26.0% and 16.2% in 1961, respectively. Most ward groupings saw significant improvements of their narrow road network, too. The old industrial wards had only 17.7% of narrow improved roads as of total narrow roads in 1961, but by 1970, this figure had increased to 78.3%. Comparatively little investment into the improvement of narrow roads was registered in the southern industrial wards, where the share in 1961 (39.8%) only increased marginally by 1970 (42.2%). The variability of narrow improved roads stayed stable across the 1960s. This is remarkable, given that narrow roads sprung up in considerable numbers in the ward periphery. The narrow road network here was improved at the same speed than that of the other wards with a more permanent street grid.

The urban expansion of Tokyo's periphery varied from ward to ward. Toward the end of the period of observation, Setagaya showed a large degree of individual real estate transactions over 100 square meters. This suggests that the typology of the relatively spacious, detached house remained dominant in this western ward. A TMG report from 1974 also suggests that major trading companies entered the ward in considerable numbers in order buy up plots for the construction of larger apartment buildings (TMG, 1974, p. 53). In Adachi ward, on the other hand, small scale individual transactions dominated and were rapidly increasing. This meant here the large-scale conversion of farmland into housing lots.

How can we link the expansion of Tokyo's periphery in the 23 wards to a more egalitarian distribution of living standards? First of all, for all their shortcomings, most of the new residential developments in the ward area sprawl had a higher allocation of living space per capita than more central and/or older areas in the same or in the traditionally denser central wards.

The manner in which the urban fringe expanded was also not at odds with the business practices of Tokyo's more traditional neighborhoods, i.e. "the predominant form of housing is pocket-handkerchief development executed by self-employed local builders, who constitute…over 99 percent of construction enterprises" (Hebbert, 1986, p. 152). These new developments were no isolated islands in a suburban wasteland, but part of suburban Tokyo's "open, urban texture which is accentuated by the small scale of most of the building" and "little constrained by boundaries laid down by any planning system" (Hebbert, 1986, pp. 148–149). The growth in the ward population during the period of observation was therefore not only outwards towards the periphery, but also encompassed a densification of existing neighborhoods through the development of idle or remaining agricultural plots that had previously been surrounded by residential plots.

This peculiarly Japanese type of suburban sprawl and densification may have contributed indirectly to a more egalitarian improvement in living standards. The severe shortage of public facilities was not found in the areas that urbanized in the postwar period, but rather "in the old high density cores, where the crucial problem of urban policy is to tackle the historic backlog of provision of sewerage, educational facilities, libraries and parks within severe fiscal constraints" (Hebbert, 1986, pp. 155–156). The lower per-unit price for development in the suburban periphery due to lower land prices attracted residents who were willing to trade off long commutes for their own house. Low planning standards as described above therefore allowed authorities to focus their resources on the traditionally lower-quality areas, often even in the same wards. Therefore, a stricter planning regime, which would have required higher standards of services provided in the sprawling developments, may have placed additional burden on local governments, "at the expense of commitments within the existing built-up area" (Hebbert, 1986, p. 156). The gradual retrofitting of infrastructure, here shown by the increasing share of narrow improved roads, was the more pragmatic and cost-saving way of providing these neighborhoods with public services.

In the absence of large-scale planning and urban renewal works, and in the absence of wide-reaching land readjustment in the 23 wards, most of Tokyo's residential neighborhoods developed incrementally. Existing road networks were not radically altered and new roads sprung up without an overarching plan. The upgrading of infrastructure had to occur *in situ,* i.e. without changing the basic organization of the neighborhood. This is equally valid for neighborhoods which de-densified, e.g. those in the central business wards or in the old central industrial wards, as well as those that densified, e.g. by the filling of empty plots or the construction of taller apartment buildings towards the end of the period of observation.

One way to show this is to analyze maps and aerial images from different points in time. This works best for area case studies. Hattori studied the evolution of Shimokitazawa, an area in Setagaya ward (Hattori, 2012). He refers to the organic street grid and in how far it dates back to the times when the area was occupied by a farming village. Jinnai's work about discovering Tokyo on foot is another attempt to show the continuity of Tokyo's road network from the Edo period until the present (Jinnai, 1995). The architectural historian looks in detail at the varied topography of the *yamanote* and *shitamachi* areas, and in how far natural features such as ridges and valleys in the west as well as rivers and canals in the east have shaped the configuration of neighborhoods specifically through their road network over the centuries.

It is more challenging to quantify the continuity of the street grid of a certain neighborhood, let alone for a large area the size of Tokyo's 23 wards. Advances in geographic information systems (GIS) and the emergence of space syntax as a descriptive technique of spatial analysis in the 1980s have, however, made it possible to compare various maps from different points in time more systematically. Employing this approach, Mizuba and Sasaki calculated the transition of the street grid in Sangenjaya and Shimokitazawa, two neighborhoods in Setagaya ward (Mizuba & Sazaki, 2009). They find that there is a remarkable continuity in the street grid of both neighborhoods from 1935 to 2006.

Tokyo as a whole was analyzed by Nishimura, Takamatsu and Oguchi. The authors designed a mesh system with which changes to the street grid can be compared from 1840 to 2000 (Nishimura, Takamatsu, & Oguchi, 2012, pp. 413–414). This map shows the complex situation of changing streetscapes across the ward area and in how far historical events have played an important role in driving these changes. The map displaying the changes from 1930 to 2000 is the most important one for the purposes of this paper. In it, the very far periphery in the east, north and west of the ward area shows the largest degree of change to its streetscape, primarily due to the relatively recent urbanization taking place here when roads were created from scratch and did not follow an existing footprint. This is perhaps the most quantitative evidence of urban sprawl occurring in the peripheral ward area. In contrast, continuity can be observed in the areas that have been urbanized the longest, i.e. the center as well as a north-south corridor reaching from today's Bunkyō ward down to Shinagawa as well as the *shitamachi* area. As regards the latter, the map shows the change from 1930 onwards, so it takes the footprint after the Great Kanto Earthquake reconstruction as the basis from which little change occurred thereafter. This holds true even considering for the 1945 Firebombing, upon which the city was rebuilt following the prewar street grid. Unsurprisingly, the map plotting the change from 1900 to 1930 shows the *shitamachi* as the area with the most changed street layout. It was here that a large-scale reorganization of the street grid took place in the wake of land readjustment projects. Lastly, little pockets of continuity in the periphery from 1930 to 2000 may denote former farming villages converted to urban land alongside the old street layout, as in the examples from Setagaya cited above.

This section has shown that in the absence of large-scale planning and land readjustment, much of the growth of Tokyo's ward area from 1945 to 1970 occurred in an ad-hoc, unplanned and incremental fashion. We gave the example of a road network whose growth occurred mainly via the construction of unimproved narrow roads. Increasingly, however, the authorities managed to retrofit neighborhoods, which we demonstrated by showing the growing share of narrow and improved roads. Moreover, if the road network does not change its form too much, urban upgrading by definition has to occur via retrofitting.[31] This allowed for the gradual improvement in living standards and did not require large-scale reconstruction. We also suggested that the initially low provision of public services in the more outlying areas of the urban fringe saved scarce resources that were spent on improving conditions in the built-up parts. All this contributed to a more egalitarian distribution of living standards across the 23 wards.

The notion that sprawl may contribute to more inter-ward equity may be counterintuitive: Usually, outward urban growth via sprawl is associated with growing inequalities. This is especially the case if authorities are forced to provide an equal level of services to the suburbs and, combined with political developments, spend less on increasingly dilapidated city centers. This is a process well described for the United States and other advanced economies (Jargowsky, 2001). In Japan, however, one could witness a distinct

[31] Another factor to support this claim is the relatively small size of Tokyo's garbage trucks and road construction equipment.

model whose "development philosophy based upon expansion and urban-rural mixture [can be regarded] as a more useful and realistic prototype for the rapidly-industrializing countries of Asia" (Hebbert, 1986, p. 156).

One question we need to ask ourselves is precisely where and when the positive effects of unplanned sprawl in peripheral farmland, primarily beyond the ward area, ceased to have the positive effect we ascribe to it. The suburban sprawl Sorensen describes as having taken place in the 1970s in the Tama region (Sorensen, 2000) is different from the process we described for the peripheral wards in the 1950s and 1960s. The former areas are much further away from Tokyo's city center, requiring ever longer commutes. The urban form found in the newly-urbanized areas in the ward area compared to that in the mixed-use former *shitamachi* areas is significantly different. Defining a typical Tokyo neighborhood typology beyond some common features, of which we have identified several (*sentō,* commercial infrastructure, construction establishments, narrow roads), may therefore prove elusive and unhelpful.

Towards a "civil minimum"

Tokyo's politics changed significantly toward the end of the 1960s. Running with Communist and Socialist support, independent candidate Minobe Ryokichi was elected Tokyo governor in 1967. A Marxist economist and former professor of economics at the University of Tokyo, Minobe was the first progressive, non-LDP member in this position. He represented a wave of "new politics" that had swept through Tokyo's political system after preliminary assembly elections were called in 1965, in which the Socialist Party won the most seats. Popular support for Minobe stemmed mainly from the public's growing frustration with the negative side effects of rampant economic growth, e.g. pollution, congestion and stubbornly low housing standards. Minobe was reelected twice and served as governor until 1979. A discussion of his administration's hallmark "civil minimum" will conclude this chapter. The civil minimum represented an innovative method of conceptualizing living standards in cities and was aimed at guiding social urban policies. Large amounts of data were collected and analyzed, in line with the global trend toward quantitatively-driven social policies.

Reflecting his academic roots, Minobe's governorship began with a significant research effort in order to take stock of Tokyo's condition in the late 1960s. These studies were aimed at providing the theoretical and quantitative basis for his social policies. Besides the consultancy reports by Professor Robson mentioned above, they contained a series of white papers, several of which were translated into English. They were "An Administrative Perspective of Tokyo" (TMG, 1968; TMG, 1974), "Sizing up Tokyo" (TMG, 1969b), "Budget of Tokyo for Fiscal 1969 (First Step Toward Civil Minimum" (TMG, 1969c), "Tokyo Fights Pollution (An Urgent Appeal for Reform)" (TMG, 1971), "Tokyo's Housing Problem" (TMG, 1972c) and finally "Tokyo for the People (Concepts for Urban Renewal)" (TMG, 1972d). Written in at times dramatic tone at odds with the dry rhetorical style of public administration publications, these studies shone a light on problems intrinsic to Tokyo: "Housing is inadequate, trains are overloaded, roads simply cannot handle the volume of traffic, pollution poses a major health hazard, there are not enough parks and playgrounds, nor facilities for the aged", wrote Minobe in one of the introductions. "The list goes on ad infinitum" (TMG, 1972d, foreword).

The term "civil minimum" first appeared in the English translations with the 1969 budget report, where, in the introduction, Minobe described the concept as such:

> As to what should be the goal of the Medium-Term Plan, I hit upon, after deep deliberation, the "Civil Minimum" as the goal of metropolitan administration. The term may be unfamiliar to you. In a word, it represents the minimum standard necessary for the citizens of Tokyo to enjoy their life, which is the same thing to say, you may take it for the minimum provision of public facilities that a big, modern city like Tokyo should naturally have. But it is a very difficult proposition to figure out the Civil Minimum in quantity. Therefore, the idea and method of figuring out the Civil Minimum are not necessarily uniform in all problems. (TMG, 1969, pp. 1-2)

The term "minimum" implies that there was a focus both on distribution (with parallels to other defined minima such as minimum wage, minimum living space, etc.) and on the limited resources municipalities had at their disposal. The civil minimum does not deny that even better living standards are desirable, but that a minimum must first be achieved for all citizens of the city. This was in fact one of the criticisms of the civil minimum: While they were intended to be realistic and attainable within a certain period of time, the various minima were often criticized as being too low (Rix, 1975, p. 536). However, it can be argued that the civil minimum's ambitious aim of equality and its dose of realism (i.e. small and gradual steps toward improvement) echoed Tokyo's postwar development path until then.

Minobe's use of the civil minimum was the first time such a concept had been employed in metropolitan governance. It "put into concrete policy the essence of progressive local government—service to the citizens." It also "established a local claim to a policymaking sphere beyond the judgment of conceptual standards of the national government." This "was a claim with potentially revolutionary effects on the traditional conceptions of center-local relations" (Rix, 1975, p. 535). Similar concepts were soon adopted by other, even conservative, municipalities and became widespread by 1975. The civil minimum was the integral component of Minobe's political agenda, which complemented the earlier focus on research into urban problems with a much more technical and quantitative "framework of detailed welfare planning, scientific pollution control and grand conceptions of the tasks of urban government" (Rix, 1975, p. 535).

In academia, the idea of the civil minimum was articulated concurrently, most prominently by political sociologist Matsushita Keiichi in his *shibiru minimamu no shisō* (1971). Matsushita was a pivotal figure in the emerging field of "urban sociology" that reflected the growing importance of citizens' and residents' movements of the 1960s and early 1970s, "especially in their ties to local reformist administrations in major urban areas" (Barshay, 1996, p. 241). Matsushita had headed a housing committee before, which argued that citizens had certain rights to a set of minimum conditions (L. Hein, 2004, p. 196), and from where his convictions of minimum conditions for urban life in general had stemmed. The civil minimum rested on the premise that living standards in an urban context were different from national-level aggregates. We have already discussed these particularly urban dimensions of wellbeing in chapter three. They include a focus on housing (thought to be in structurally short supply in cities), water and sewerage, clean air and park space, roads and public infrastructure, among others. In Tokyo, medium-range plans begun to be made in 1968 and contained various civil minima for specific areas of urban life. They covered three broad areas, i.e. housing, "metropolitan living base" (urban infrastructure) and community structure (schools, etc.) (TMG, 1972d, pp. 81-103).

The civil minimum was innovative in that it did not simply replace aggregates at the national level with urban ones, but also paid heed to regional features within Tokyo. It subdivided the ward area into a set of groupings (distinct from the ones used elsewhere in this dissertation). The distinction between different areas was mainly done so "that solutions may be sought to fit their particular needs" (TMG, 1972d, p. 24). A detailed analysis of the various areas was performed (TMG, 1972d, pp. 27-43). The plan to achieve civil minima in the areas housing, infrastructure and community were specified for these areas given their varied stage of development, e.g. connection to the municipal sewerage system. In other words, "the civil minimum took the form of an intricately graded, intensely detailed map of urban life" (L. Hein, 2004, p. 197).

What then were some of these minima in concrete terms? As regards housing, a household of two people, regardless of where it would be located in the city, was meant to have at least 9 tatami between them (i.e. 4.5 per capita), while a four-person household was expected to have at least 15 tatami (3.8). In addition to floor space, other factors needed to be taken into account, e.g. "sunlight, heating, ventilation, room arrangement, and other aspects that cannot be ignored in establishing a good living environment" (TMG, 1972d, p. 81). The civil minimum was to be achieved by significant investments into public housing, both into its redevelopment as well as new construction within the ward area and beyond. The guiding principles would be a focus on its adequacy regarding household composition (in other words reflect the needs of the urban nuclear household), fair rents, the upholding of strict fire and other safety regulations, public service provision and reasonable commuting distances (TMG, 1972d, p. 89). This suggests that the qualities of urban life were thought of in significant granularity and with local context in mind, also in order to avoid falsely equating a statistical aggregate with the lived experience on the ground.

In terms of public infrastructure, plans were set up to improve the provision with roads, water, sewage and waste disposal. Congestion on roads was to be limited by restricting the flow of automobiles, the access for pedestrians and bicycles were to be facilitated, because "in addition to being used by motor vehicles, they are open spaces of the community, spaces where people can meet and mix" (TMG, 1972d, p. 92). The plan also included to increase running water access to 100%, which had almost been achieved for the ward area at the time of the report but remained a significant problem in the Tama region. Sewerage was the most inadequate set of public infrastructure, with only 43% of the ward area equipped. The aim here was to increase this number to 100%, although no time horizon was given here (TMG, 1972d, pp. 93-94), and for which one needed to refer to the relevant publications by the sewerage authorities (TMG, 1963; 1972). Finally, waste collection and disposal intervals were to be increased in line with the increasing volume of household garbage and waste (TMG, 1972d, p. 94). TMG's focus on public infrastructure was not per se innovative. However, the focus on concentrating investments in residential areas, where a significant part of citizen life took place, certainly was. The improvement of narrow roads as well as the retrofitting of neighborhoods with other public infrastructure were good examples of this.

Lastly, in terms of community, "uniform standards must be established for the community's public facilities". These facilities included those for "education, medical care, the physically handicapped, the aged, youth, for recreation, and other activities common to all communities" (TMG, 1972d, pp. 95-96). No thresholds or other quantitative criteria were provided for these facilities. The report suggested that the planning for facilities of community infrastructure would differ from area to area, acknowledging their local conditions. TMG defined four model areas with similar social characteristics. Model area A comprised residence, factories and shops; model area B congested wooden apartments; model area C areas of urban sprawl; model area D farm areas within the metropolis. The purpose of their creation was to "secure civil minimums for each type of community" (TMG, 1972d, p. 97). This suggests once more that TMG was wary of having a one-size-fits-all policy for its civil minimum.

The civil minimum tried to go beyond simplistic measurements. It was "not enough to specify that the amount of park space should be 3 square meters or 6 square meters per citizen". Instead, it was also necessary to specify "how much of such space should be secured for neighborhood greenbelts and recreation areas, and what space be allocated for roads to make these areas accessible to local citizens" (TMG, 1972d, p. 14). The idea was also to distinguish between the required park size in crowded areas of asphalt streets compared to that in a suburban area with private gardens. In other words, "civil minimums must be measured to suit local needs and have a systematic relationship with one another" (TMG, 1972d, p. 14). This was another example of the adaptation of civil minima to local contexts and a move toward more granular indicators. Another example, were daycare centers, the civil minimum for which "won't be met by just getting enough daycare centers. We must try to figure out the best scale of operation, their ideal distribution, the best method of building them, and plan that all out" (Minobe, as cited in L. Hein, 2004, p. 197).

Minobe believed in planning to overcome the urban problems he was elected to fight. This focus on planning and the requirement of detailed statistics was labor-intensive: "Prefectural officials gathered voluminous information on each specific civil minimum achieved, such as the quantity of sewer pipe laid, the expanse of park land created, and whether the desired per capita park area was achieved" (L. Hein, 2004, p. 197). These indicators were part of a much wider effort at trying to quantify urban life in order to guide the civil minimum policy. In this, policymakers in Tokyo engaged with the latest developments in public administration science.

The trend toward social reporting originated in the United States in the mid-1960s, although its roots go back to the prewar period (Noll, 2002). The early literature grappled with the notions of "objective" vs. "subjective" measurements of living standards and defined various types of indicators to measure these, i.e. direct policy-oriented indicators, descriptive indicators and analytical indicators (Sheldon & Land, 1972). There were concurrent movements toward the measurement of specifically urban living standards. Again, in the United States there was a "need of urban managers and public officials for better insights into the non-economic dimensions of the urban environment" (Day & Weitz, 1977, p. 423).

A pivotal study by the Washington, D.C. based Urban Institute started the compilation of indicators for a range of urban areas in the U.S., not least in order to compare them amongst each other (Flax, 1972). However, to use these indicators for a comparison of cities rather than guide their policies was already a concern voiced back then (Day & Weitz, 1977, p. 422), echoing today's headline-grabbing international rankings of cities. The question then and now was whether the complexity and variety of cities can be adequately captured with the help of composite indicators. Seemingly objective indicators "will probably say little about the life experienced by the individual" (Day & Weitz, 1977, p. 435). Therefore, and in order to make these indicators more meaningful to the realities as lived by the city's inhabitants, they were often complemented with survey data, allowing a citizens' voice in the determination of their importance (Angrist & Belkin, 1976, p. 197).

In Japan, many self-governing bodies and private organizations took part in the exercise of such social accounting, although no nationally agreed indicator came out of the initial work (Mieno, 1977, p. 45). As with the civil minimum, Tokyo was the trailblazer in the area of social reporting (Rix, 1975, p. 533). In 1973, TMG's Statistics Bureau was tasked with gathering data and developing a Tokyo Metropolitan Social Indicator. It published its initial findings a year later (TMG, 1974) and annually from then on. The report was highly technical. It relied on complex statistical calculations with the aim to find the most efficient approach to improving the urban condition. In other words, it represents a technocratic, evidence-based document of public administration that was not intended to speak to the electorate, but to a small group of policymakers inside TMG.

The first part of the report contained a data for a total of 263 indicators that had been collected on an aggregate, i.e. Tokyo prefecture wide level, for a period of 13 years from 1960-1972. These were split into nine categories, i.e. income and consumption (20 indicators), residential conditions (17), health (48), education (38), public safety (20), environment (57), transport and communication (10), work and leisure (23) as well as social security (30). They ranged from traditional measures such as income per capita and tatami per person to less common ones, e.g. total welfare allowance for single mothers and the number of street trees per one kilometer of street. A second set of data included 41 measurements that were collected at an individual ward level. The report lamented that data availability at such level of granularity was particularly poor (TMG, 1974, p. 1), but was required in order to effect welfare policies that were targeting very local issues (TMG, 1974, p. 3).

In the second half of the report, the authors present their progress in creating a preliminary composite social indicator for Tokyo. They attempt to address one of the major shortcomings of composite indices, which is that there is usually a lot of cross-correlation between their individual constituents. A famous example is the HDI, whose three elements income, education and health show significant correlation among themselves. In order to focus the analysis and public spending on the areas with the highest impact, however, there needed to be some kind of weighting of the indicators commensurate with their importance. The authors analyzed changes in these indicators across time (1960-1972) and across the various administrative entities of Tokyo's prefecture (including the 23 wards), thereby directly taking into account their variability as this study has attempted to do. Owing to the complexities of plotting 70 indicators across the two dimensions time and place, the authors decided to employ a principal component analysis (PCA), the method of choice for social reporting during this period (Mieno, 1977).

Perhaps owing to the new political realities (the governor of Tokyo was now the right-wing Shinohara Shintaro, a declared foe of Minobe), the social indicator reports were discontinued in 1999. At this time, the interest in composite indicators was in fact growing considerably, also because of the increasing availability of ever more amounts of data and the resulting difficulty at analyzing and interpreting such a wealth of information. The HDI was a case in point. However, it remained controversial "whether composite indices offer appropriate tools for monitoring the quality of life". Furthermore, there remained "too many methodological as well as substantial problems related to [their] construction and use..., such as identifying components, aggregation algorithm, or weighting" (Noll, 2002, p. 25). In short, the problems that TMG was trying to address with its work on the civil minimum in general and social indicators in particular were nowhere near being resolved a quarter of a century after work had begun inside TMG.

The civil minimum found an even earlier end. There were problems from the start. First, the plans for the different civil minima were initially enacted in a "rolling" fashion, i.e. their goals were revised annually in line with changing socio-economic conditions and altered demands, a practice that was stopped in 1974 due to the lack of long-term visibility, the resulting rush in planning and focus on quick results (Rix, 1975, pp. 355–356). Moreover, the civil minimum was conceived during a time in which a specific political climate led to the "optimistic idea that societal structures and processes could be comprehensively modeled and actively guided by politics" (Noll, 2002, p. 3).

The implementation of civil minimum policies was also hampered by fiscal realities following the 1973 oil shock. Although Minobe had previously argued for the unsustainability of the high-growth model, the Tokyo government was ill-prepared for recession and the resulting squeeze on public finances. This was not least due to the fact that the national government continued to place restrictions on TMG in terms of public finance. The failure to calculate for the combined effect of continued fiscal centralization and lower economic growth had severe consequences particularly for the social welfare projects, with many of them shelved. Therefore, "Minobe's third term ended with a whimper. He is for this reason remember more for his symbolic standards than his practical accomplishments" (L. Hein, 2004, p. 210).

Finally, and more important for our purposes, is another fundamental criticism of the civil minimum. While the varied strategies to achieve the minima in the different geographical areas identified in TMG's research had their justification—conditions differed on the ground and a one-size-fits-all-policy would not have been appropriate—they also led to "the problem of distribution, how to reflect the needs of different areas within the Metropolis and of different classes and social groups" (Rix, 1975, p. 536). In other words, there may have been inherent contradictions in both guaranteeing a minimum standard of urban life across the city *and* accounting for the varied socio-economic geography of the city. One answer to this problem was found in the design of ever more elaborate statistical analysis of urban life, as we have shown above. Decades of experience in the field of social reporting, however, have shown that there is no simple way to measure and model urban life using quantitative indicators.

Conclusion

This chapter has detailed some of Tokyo's institutional developments during the period of observation. They helped put Tokyo's postwar socio-economic history into the context of the financial relationships between TMG and the wards as well as TMG's evolving approach to urban planning. We have argued that, despite a reputation for its administrative incapacity, TMG was rather successful in terms of redistribution of resources across the 23 wards. In this, TMG defied those wards that had hoped the Allied focus on more autonomy for the local level would be permanent. Instead, decision making remained relatively centralized, not only in TMG but also the central government, not analyzed within the confines of this chapter.

Fiscal redistribution is one of the major tools for preventing social stratification among administrative entities of a city. Owing to the centralization of decision making power at higher layers of government, ward governments had comparatively small budgets. However, they contained important spending on (primary) education and later social security, affecting the daily lives of ward citizens significantly. Therefore, redistribution was important in safeguarding a certain, relatively equal level of expenditure across the various ward governments irrespective of their financial health. Later, TMG would also indirectly redistribute resources by spending disproportionately on welfare and social housing in relatively less affluent wards. We believe this is an important learning from the period of Tokyo's megacity growth: In contemporary megacities, unequal municipal spending and investments often exacerbate spatial inequalities.

We then moved on to an institutional history of urban planning with regards to Tokyo. Perplexingly, and despite Tokyo's importance for Japan as a whole—politically, economically and symbolically—grand plans for urban redesign tended to be too ambitious and costly for the central government to shoulder. When passed, the implementation of such plans was often disappointingly small. The postwar period was no exception. Inspired by the *tabula rasa* of a largely annihilated Tokyo, urban planners envisioned radical change. As people moved back into the city en masse, their plans were soon made obsolete by the haphazard and unplanned reconstruction the city underwent by default and out of necessity. The Olympic Games were the first occasion on which significant resources were available the city's prewar infrastructure and improve the inadequate sewerage network. Some reorganization of urban space also took place via land readjustment, primarily in central locations around train stations and in the northern and eastern periphery of the ward area. However, planning had little transformative power overall during the period of observation, and the city's living standards improved in its absence. This was achieved by retrofitting neighborhoods as well as an incremental upgrading process, helped by low average building ages and a pervasive culture of "scrap and build".

Tokyo's growth "is not the triumph of urban planning". The city undergoes constant changes on its own. These changes mean that no one becomes sentimental about the "neighborhoods of the past". As these changes are gradual and incremental, "they do not ruin the neighborhoods as places to live". The fact that Japan does not have a strong systematic planning track record is all the better, because "neighborhoods should be created by the people in them. If we follow rigid concepts of what a city must be, the result will be unnatural and unlivable" (Ushio, 1983, pp. 139–140).

5: Conclusion

The main objective of this dissertation was to recount the period of Tokyo's megacity growth from 1945-1970. We described that the city's growth model was based on the city's strong and unique manufacturing sector. A large degree of small and medium sized factories and their unique distribution across the 23 wards were among the reasons that the ward area remained relatively homogenous in terms of its living standards. There were a series of spatial factors underlying these trends. In terms of the manufacturing sector, we used these spatial factors to establish land as a unique factor of production, but also to better describe labor and the various dimensions of demand in this urban setting. In terms of the egalitarian distribution of living standards, we noted a certain number of neighborhood attributes that proliferated with the growing city. We then looked at institutional factors that contributed to this spatial configuration inside the 23-ward area. On the one hand, TMG actively distributed resources between the wards depending on their financial condition. On the other hand, TMG was largely inactive in terms of urban planning. This led to urbanization in the ward area proceeding along tried and tested traditional methods instead of invasive, expensive and possibly stratifying interventions into Tokyo's urban fabric.

The following chapter concludes this dissertation. Rather than provide another summary of the various chapters, we will refocus the attention back to the issues discussed in the introduction, as well as raise some questions for future research. These pertain to the applicability of Tokyo's experience to the study of other megacities. More importantly, what are the concrete lessons today's developing megacities can draw from Tokyo's experience? We can summarize them under the headers urban industrial policy, a focus on spatial inequalities and metropolitan institutional capacity. In this reading, Tokyo's postwar period may become an important source of policy inspiration for today's urban development discourse. We conclude by looking at some contemporary issues Tokyo is facing and in how far they echo the themes developed in this dissertation.

To begin with, we revisit the contention that Tokyo, during the period between 1945 and 1970, blurred the boundaries between what we would now consider a developing and a developed city. This makes its experience relevant to cities in emerging economies today. However, this view is not without some inherent challenges. First of all, "developing" and "developed" defy a clear-cut definition, and often imply the existence of a more or less linear continuum between different stages of development. Did Tokyo proceed alongside this continuum, graduating from its status of an underdeveloped city to advanced status by mirroring the experience of those (Western) cities ahead of itself? Or did Tokyo proceed alongside an altogether different path toward modernity? Despite the rhetoric of TMG, which tried to compare Tokyo to Western cities and applied findings from there to its discourse, in reality the city charted a very unique path.

During the period from 1945 to 1970, Tokyo's ward area represented a "transitional space", in which developmentalism took place. Rather than just being the arena for this process, this transitional space was also a direct variable in accounting for the success of developmentalism. Specialized clusters and corporate headquarters in the central wards became more important without compromising the other major facet of the city's productive base, i.e. that most industries were in fact spread very evenly across the 23 wards. If we understand Tokyo's experience to be representative of Japanese cities during this period, we can better appreciate how urban space not only played a key role in industrial upgrading but also ensured more egalitarian living conditions among an increasing population that was now living in cities. In addition, the relatively little that was spent on social overhead by TMG and the wards freed up resources for national development, e.g. infrastructure for heavy industrialization along the Tōkaidō corridor.

In our reading, Tokyo's urban space attains developmental qualities itself. The peculiar blend of labor-intensive industrialization worked only in tandem with space-intensive urbanization. We echo the Lefebvrian notion that space is not only a passive recipient of meaning but becomes its generator. In other words, urbanization and industrialization need to be understood in tandem, in an appreciation of their two-way, interlinked relationship. This allows us to better understand the period of rapid postwar economic growth.

We are realistic enough to qualify Tokyo's experience vis-à-vis today's world. Significant changes in global manufacturing have taken place since the 1950s and 1960s. This pertains both to the technology employed even in traditionally labor-intensive segments as well as to the more pronounced international division of labor, which increases the scale of production. Moreover, certain concepts and understandings of living standards defy an easy translation across cultures, as we have shown in the literature review of chapter three. This is not just valid spatially, but also temporarily. In other words, residents of New York, London and Berlin had to live on much less space per capita during the period observation, making Tokyo's living standards during this period look relatively better than that of developing cities today.

However, we emphasize that what makes Tokyo's experience stand out is the speed of its transition, and the role space had to play in facilitating and causing it. Never before had a city grown as rapidly from such a high initial population before. Rapid economic growth coincided with improving living standards. And although they improved only slowly, they did so equally across the wards. Public space, too, improved. Neighborhoods remained relatively safe and were provided with water, food and energy. There surely remained spatial inequalities, and some of the declines in variability we observed were because of long overdue investments in sewerage in the peripheral ward area, to name an important example. And yet, the increasing homogeneity in terms of living space per capita, crowded housing conditions, reproductive health, culture and safety was remarkable considering the speed of the transition of the Japanese economy and its cities.

The resulting growing pains were in full display towards the 1960s and led to popular unease with a model that emphasized economic growth above all else. While the Japanese (urban) population had accepted many of urbanization's downsides, perhaps as an unavoidable feature of the path toward prosperity, their demands for a better living environment grew when this prosperity arrived. This first led to the election of a majority of Socialist Tokyo Metropolitan Assembly members in 1965, and eventually governor Minobe in 1967. Despite their Marxist origins, Minobe and Ōuchi were not only interested in class differences but had a much wider understanding of social welfare, particularly in cities. The readiness to subordinate economic growth to welfare and distribution signifies an extremely important turning point in the history of the developmental city. It is no surprise that the civil minimum emerged in Tokyo.

In hindsight, there may have been a philosophical conflict between the Minobe administration's focus on planning as well as quantitative social reporting and the city's ability to grow successfully without much planning in the first place. Whether the Tokyo model can be quantified, and hence replicated, is perhaps one of the open questions of this dissertation. We have no simple answer. It is commendable that the Minobe administration started collecting data with such rigor. However, the complexity of models can take on a life of its own. Whether or not we are able to assign cause and effect, or whether much of the explanation will remain residual, is unclear. What we have done by means of statistical analysis is to show one trend in the data that is almost universally shared, and we have called it, perhaps controversially, "egalitarianism". It is a simple yet powerful interpretation of Tokyo's experience that this dissertation has pioneered.

The other key insight of this dissertation was how spatial factors may explain certain outcomes during Tokyo's postwar development, in particular its peculiar blend of labor-intensive manufacturing as well as the relatively equal distribution of living standards. Moreover, analyzing institutional features with a spatial lens has brought important insights with regards to fiscal redistribution and (a general lack of) urban planning. There are some major implications of this spatial focus for developing megacities. In what follows, we will highlight an urban industrial policy, a focus on intra-urban inequalities and human development as well as institutional reform. Why do we pick these three areas? It is across these three that we can detect the qualities of the ward area's transitional space, whose path was very different from that charted by cities in the West before, and which is therefore interesting for contemporary developing megacities.

The first area of interest is Tokyo's peculiar model of labor-intensive industrialization in an urban setting. In this, Tokyo developed on a very distinct path from cities in the West, which followed a more capital-intensive model with larger firm sizes and a more stratified industrialization pathway. The choice of urban location for manufacturing firms is often in recognition of the benefits of agglomeration, offset by the cost of congestion. Our literature review in chapter two has already introduced the major economic concepts of this debate and we need not further dwell on them here. We have seen that by establishing space as a factor of production, we can shed light at peculiarly urban attributes of the ward area's land which benefit small firms producing here. They are more likely to exist in mixed-use settings, i.e. their owners and employees often live and work in close proximity. This does not only economize on a city's public infrastructure, it also benefits neighborhoods. If the economic fortunes of an entrepreneur improve, so does the quality of his housing and that of his employees (e.g. in dormitories). The integration of living space for workers also helps prevent income stratification by way of poor, exclusively working-class neighborhoods. Scarce land in Tokyo has also meant an efficient usage of land by firms, often encouraging mixed-use. Their owners could economize on having to pay for rent in addition to the upkeep of the factory. Furthermore, mixed-use neighborhoods are more intensive. While the concept remains vague, it emphasizes human interactions in a dense environment, benefiting information spillover, social cohesion and safety.

Jane Jacobs had already identified the positive features of a mixed-use urbanism in her *The Death and Life of Great American Cities* (J. Jacobs, 1961). Her conflict with New York's chief planner Robert Moses echoed many of the subsequent debates about the merits of urban planning. It would lead to the realization among city planners that some form of mixed-use is preferable to the strict separation of uses. This is also evident in the urban development discourse. Some cities in India, e.g. Delhi, now pursue high-density mixed-use neighborhoods. However, the often neglected dimension in such zoning regulations is scale, i.e. the difference between a small-scale food retailer and a large supermarket (Nohn, 2011, pp. 11–12). In Tokyo's case, zoning ordinances were strong enough to (eventually) restrict large polluting factories from the ward area, while small factories were hardly restricted at all.

It is not just important to consider the quantity but also the quality of small factories that settle in medium- to high-density urban areas. As discussed, the productivity of small firms in Japan was higher when compared to ASEAN countries (Amjad, 1981). This dissertation has shown that this was particularly the case in Tokyo. Today, a large proportion of production in developing megacities remains informal, low value-added, and often located in low-income areas of these cities. As a result, the urban manufacturing sector often plays a more important role in poverty alleviation. The formalization of the informal economy can play an important tool of industrial upgrading, even in what are widely considered to be "backward" segments of the urban manufacturing sector (Nohn, 2011, p. 15). Factories were less capital intensive in Tokyo, but the difference in capital intensity between small and large firms got smaller than in Japan as a whole. This was also the case in sundry sectors, an important lesson for developing cities that industrial policy does not only need to target high-end sectors. As more and more people migrate to megacities, employment represents one of the most important bottlenecks. Labor-intensive industries in small factories can hold an important key in providing a livelihood to the newly-arrived, reducing inequalities, and upgrading urban space along the way.

However, Tokyo's experience needs to be contextualized. We highlighted important historical continuities in the city's economic geography (for a wider reading, please consult the ensuing supplement to chapter one, following this chapter). The changing distribution of factories over the 23 wards between 1945 and 1970 represented a continuation of a trend that had already begun in the prewar period. Some industries clustered, particularly the successful fabricated metals and components industry in Ōta ward. Idiosyncratic factors account for their success here. This is important to consider for megacities without a strong tradition of urban manufacturing. Tokyo's unique pathway is not merely the existence of competitive small-firm manufacturing clusters in certain industries, but their coexistence with a much more evenly-distributed productive capacity in most other industries. While we have focused on the manufacturing sector in this paper, small firms also dominated Tokyo's retail and distribution sectors. The prevalence of small firms, equally spread over the city, appears to a major factor accounting for low income inequalities. Supporting small and medium sized firms may therefore appear to be a relatively universal policy implication for today's megacities.

The second area of interest to megacities is the ward area's egalitarian growth amid rapid growth during the postwar period, which we learnt of by analyzing intra-urban inequalities. There is no real equivalent in the West to compare Tokyo's experience with given the unprecedented speed at which Tokyo transformed after the war. Furthermore, if we compare Tokyo to other megacities, we need to account for some important advantages the Japanese capital had at the beginning of our period, i.e. a well-educated labor force that returned to the city, as well as a good transportation network that was repaired with relative ease. Nonetheless, Tokyo's experience from 1945 to 1970 suggests that growing spatial inequalities are not an inevitable side effect of rapid economic growth.

The multidimensionality of human development in an urban context is today well-established, as evident by a raft of indicators and indices, some of which we showed in chapter three. Specifically, UN-Habitat has worked on numerous initiatives of cities' distinct development challenges, and how to address them. However, the measurement of intra-urban inequalities is not standardized. Recent studies have been carried out for OECD countries (OECD, 2018), but consistent data is lacking to analyze long-term trends especially in developing cities.

A focus on intra-urban inequality is important, not least for the large presence of slums in developing cities. In fact, since the Agenda 21 Declaration in 1992, urban inequalities have frequently been mentioned as a key focus area for sustainable development (Martínez-Martín, 2005, p. 3). If megacities are to be places of opportunity and social mobility, we need better data on the spatial distribution of socio-economic indicators, also in order to target policy accordingly. More importantly, analyzing this variability over time provides an insight into the nature and sustainability of the city's growth. The underlying contention is that increasing spatial inequalities are bad for development, as they catch residents in spatial poverty traps and lower overall economic growth.

There have been attempts to calculate HDIs at a sub-city scale. In their HDI Report 2009, Mumbai's authorities reasoned that "if and when inequalities and inequities are listed, and a qualitative assessment then made possible, it would enable the urban policy-makers to fine tune their priorities and make appropriate allocations not only for provisioning of facilities, but also help develop approaches that could improve access to them" (Municipal Corporation of Greater Mumbai, 2010, p. 12). The national level HDI's indicators were unavailable at the ward level in Mumbai, too. Therefore, proxy variables had to be identified. They include slum population, marginal workers, literacy rate, infant mortality rate and average age at death. All 24 wards were then ranked, revealing substantial spatial variations in human development across Mumbai. The southern wards

D (Nana Chowk) and C (Marine Lines) were significantly better in terms of their human development than wards L and M/E. The latter, enclosing the area of Chernbur (East), had a slum population almost 80%, almost ten times the infant mortality than ward, the lowest literacy rate, and, at 40 years, the lowest average age of death in the whole city. While these geo-spatial variabilities are intuitively known in the discourse of the megacity, the systematic data gathering, and construction of indices can help guide public policy, e.g. by providing the quantitative basis for fiscal redistribution.

The question of scale is very important. Mumbai's wards are big, their average population size is larger than that of Tokyo's 23 wards. A large degree of inequality is also present within the administrative boundaries of a ward, as slum and non-slum areas exist in close proximity. A promising avenue for advancing our understanding of intra-urban inequalities, therefore, is GIS-based analysis (geographic information system), allowing the researcher "to depart from conventional measures of segregation at the scale of fixed spatial units, such as census tracts or other predefined neighborhood areas" (OECD, 2018, p. 22). The OECD study establishes spatial units at a 100 meter by 100 meter grid level, allowing inferences about inequality with much more spatial precision. This also makes inequality data, in theory at least, comparable to that of other cities, a major drawback of studies such as the one from Mumbai, and ours. Nonetheless, this study focuses on OECD countries (plus Brazil and South Africa) and even here, there are issues with data integrity that may limit the comparability, as the study notes.[32]

[32] In terms of work exclusively focusing on developing countries, another study focusing on Rosario in Argentina has also shown the benefits of GIS-based monitoring of intra-urban spatial inequalities (Martínez-Martín, 2005).

There is another subtler drawback of relying solely on more granular spatial data which differs substantially from administrative realities. They may make spatial inequalities look like a governance issue that can be best tackled at such small scale. However, as we have seen, spatial inequalities within a city have a strong political component for which administrative units may represent the better analytical unit. It is here that redistribution and conflicts over it take place. Using small units may instead result in the empowerment of local governments: They may after all be better placed to tackle issues at such small scale. However, as we have shown, the experience of Tokyo cautions us to unilaterally embrace fiscal decentralization to lower layers of municipal governance. Therefore, a calculation of spatial variabilities following the geography of political constituencies should at least still be performed.

This relates directly to the third and final area in which we believe megacities stand to gain from studying Tokyo's experience between 1945 and 1970, i.e. its urban governance setup. Although TMG repeatedly complained about what it considered to be excessive central government control over its finances, it actually managed to amass a significant amount of decision making authority. This allowed it to emerge from the "30 percent autonomy" system, named after the fact that only 30 percent of total government revenues were raised, and that subnational governments had to rely on the central government for the remainder. In Tokyo, the system was eventually reversed, and TMG's "policy stance…had a tremendous effect on the more than 3,300 local governments of Japan" (Sasaki, 1998, p. 248). TMG also fended off attempts by the wards to gain more autonomy, a right they believed the Allied postwar reforms had granted them.

A powerful intermediary layer of government for megacities may be a more optimal configuration than overly strong central government influence on urban governance, or too much devolution toward local-level governments. It can be argued that at this intermediary level, both overview and insight can be balanced. Overview refers to the understanding that smaller spatial units are part of a larger, geographically diverse region, which may require significant coordination, e.g. in infrastructure investments. Insight refers to the knowledge of local conditions that may result in spending with a spatial focus, e.g. more social expenditure in a poorer part of the city. Despite the theoretical advantage of intermediate layers of government, megacities are often arenas in which state influence remains strong due to their strategic importance (Kübler & Lefèvre, 2017). Moreover, governance in developing countries also tends to be more centralized than in industrialized countries (Bahl, 2013, p. 99). Further work is needed to understand how governance choices depend on the level of economic development, and in how far Tokyo's experience may be instructive to developing cities.

We must also reiterate here that Tokyo's success was partly TMG's own failure to implement wide-reaching plans concerning urban development. Many of these were nipped in the bud due to rapid population and economic growth and they had become obsolete quickly as the pace of transformation exceeded even the more optimistic forecasts. They also did not materialize for a chronic lack of resources and the prioritization of public spending elsewhere, in particular on the infrastructure aiding the development and growth of heavy and chemical industrialization along the Tōkaidō corridor. We have argued that this lack of urban planning and large-scale transformation may have spared Tokyo from many of the overly rigid, costly and eventually stratifying interventions performed elsewhere and instead allowed the city to rely on its tried and tested method of urban growth.

[Insert Table 58 here]

To date little work has been done to evaluate the experience of megacities within a historiographical framework. This is no surprise given the fact that the megacity is a recent phenomenon and has followed extremely diverse pathways, both in terms of geography, underlying national economic development as well as spatial variation. We suggest in Table 58 above several Asian megacities whose experience could be drawn upon for comparative work, i.e. Taipei, Seoul, Shanghai and Mumbai. Distinct 25-year periods from these cities' history have been chosen: They represent the most suitable timeframe for comparison with this dissertation's period of observation (1945-1970).

We note that population growth in all cities except Mumbai exceeded that in the Tokyo agglomeration. (The Indian metropolis experienced its most rapid population increases before 1990.) Manufacturing employment at its peak was highest in Tokyo and Shanghai. The form of urban governance is contingent upon a binary classification of "democratic" and "authoritarian" at the given time, but also depends on how the city was integrated into center-periphery relations at the national level, and whether it is the capital or primate city or not. In terms of national context, economic growth in Japan during the 25-year period shown here eclipsed that in the other countries during their comparator period. This table provides only a very cursory look into these distinct cities and deserves more research. This is particularly the case for data on spatial stratification, which is not readily available.

We conclude this chapter by looking at more recent developments in Tokyo that resonate with our work on the postwar period. Several trends began during the end of our period: Tokyo became more high-rise as important regulations were relaxed and zoning allowed the construction of higher apartment buildings alongside widened arterial roads. Non-wooden materials replaced wood as the most important building material during the 1960s when measured in square meters, a trend that continued thereafter.[33]

Manufacturing employment declined to levels below those of Japan. However, this process was not one of deindustrialization as witnessed in Western cities, but an "elaboration of a division of labor in manufacturing stretching from the urban core into Greater Tokyo and the national capital region" (K. Fujita & Hill, 2005, p. 20). Clusters in Ōta and Sumida continued to be competitive and woven into national and increasingly also global supply chains. More recently, however, this model has come under pressure due to an increasing focus on cost-cutting, the ageing of the factory owners, technological progress (e.g. 3-D printing) and other factors. While Tokyo may no longer be an important site of production, it remains a center for research and development and product design. Meanwhile, a *shitamachi* boom is leading to a revival of urban-based craft workshops, also as tourism in Tokyo reaches new records ahead of the Olympic Games.

Tokyo will host the Games again in 2020, 56 years after they took first place here. In order to beautify the city ahead of the event, Tokyo governor Koike Yuriko has announced her intention to move overground power lines underground (Yasuhara, 2017). The cluttered infrastructure traversing the city's neighborhoods is an important reminder

[33] However, recent debates in Japan testify to the continued appeal of wood for residential construction. It is argued that the renewable building material can even be used for highly advanced tall buildings (Ravenscroft, 2018).

of Tokyo's haphazard, unplanned growth which this thesis has analyzed for the postwar period from 1945 to 1970. Public and private agents have navigated the labyrinth of these neighborhoods and eventually succeeded in providing them all with infrastructure. "The notion that infrastructure must be adapted to the built environment rather than the other way around itself is revolutionary—particularly when we know that the provision of infrastructure is often used as an excuse to raze and redevelop neighborhoods in many parts of the world" (Echanove, 2015, p. 19). It may not look pretty, but Tokyo's infrastructure is proof that "retrofitting is possible in virtually any urban environment, no matter how densely built" (Echanove, 2015, p. 19). Looking to apply Tokyo's experience to different contexts around the world, urban activists. such as Matias Echanove in Mumbai, have taken these ideas to heart in advocating incremental change in slums rather than their clearance, demolition and reconstruction.

However, the moving of the cables also reveals another aspect of Tokyo's urban space: While the retrofitting with overground lines may have been the most practical and cost-effective way of connecting these neighborhoods to the grid back then, they are not conforming to the look of a "developed" city anymore. They thus represent how Tokyo may have missed the boat in further upgrading its urban space after this dissertation's period of observation. As further proof of this, living standards in Tokyo, particularly for the renting population, remain low in national and international comparison if measured in living space per capita (The Building Center of Japan, 2017, p. 17).

This draws our attention to the wider question of inequality: The Tokyo metropolitan area experienced somewhat widening inequalities between its municipalities from 1980-2007, as shown in a study that also uses coefficient of variation analysis (A. J. Jacobs, 2012).

However, inequality levels remained comfortably below those seen in the West. More important perhaps were changes in the philosophy of urban development seen under the premiership of Koizumi. The particular blend of neoliberal policies and the developmental state caused a focus on growth poles inside the city, primarily the center, in which regulations were eased in order for corporations to invest and which led to "vertical gated communities" (Waley, 2013).

Meanwhile, better data availability has also allowed for the computation of ward-level Gini coefficients. Using housing survey data, researchers have revealed substantial variations in the level of inequality between the different wards. The most unequal ward, Shibuya, has had a Gini coefficient of 0.442 as of 2013, while the most equal ward, Edogawa, had a Gini of just 0.362, according to the income data provided in the survey (NLI Research Institute, 2017). This suggests that in Tokyo, substantial differences between individuals in terms of their incomes exist at more pronounced levels than at the national scale. If spatial egalitarianism is also the result of relative equality of individual incomes, we may see more spatial inequalities going forward.

What do these stories have in common? They all show how the themes developed in this dissertation are not only of relevance to the megacity discourse, but also to interpreting Tokyo's contemporary challenges. Tokyo's urban form, its manufacturing sector, housing and living standards as well as inequalities are as important topics today as they were yesterday.

Chapter 1 supplement: Toward an urban economic history of Tokyo

The Edo period

Tokyo was founded in 1590 AD and made Japan's capital in 1603, when the Tokugawa *bakufu* (shogunate) established its seat of power here. Then named Edo (i.e. bay entrance, estuary), the city developed around the site of what had since the 15th century been a small fishing village along the coast of the Kanto Plain. The Kanto is one of the two large and fertile plains that have historically played dominant roles in Japan—the other being the Kansai Plain, home to the ancient capital Kyoto and the main commercial center Osaka. The Kanto Plain covers an area of about 17,000 square kilometers, roughly the size of the U.S. state of New Jersey. It today encompasses the majority of the prefectures of Tokyo, significant parts of Kanagawa and Saitama prefectures, as well as parts of Chiba, Ibaraki, Gunma and Tochigi prefectures. Mountain ranges delimit the plain on the northern and Western side, with the ocean and peninsulas providing natural boundaries to the south and east. Several rivers cross this territory. The Tone to the north of Tokyo has the largest floodplain and drainage area in Japan and provides much of the plain's agricultural fertility. The Arakawa and Tama are the two most important waterways traversing Tokyo directly, with other, smaller rivers being the Sumida, Edo and Kanda. The Kanto Plain sits alongside seismically active subduction zones. A large earthquake in 1923, the Great Kanto Earthquake, caused widespread devastation.

There has been a long tradition of intensive agriculture in the Kanto region dating back to at least the Yayoi period (300 BC – 300 AD), incidentally named after a neighborhood in Tokyo where important archeological remains were unearthed in the 19th century (Kaner & Yano, 2015, p. 354). The Edo period saw major improvements in agricultural productivity in the region primarily due to technical innovations, e.g. land clearing, hydraulic installations and drainage works (von Verschuer & Cobcroft, 2016, p. 82ff). The construction of irrigation canals that drew water from the Tama and Tone rivers in particular led to the settlement of formerly desolate areas in the west of Edo, with villagers here growing wheat, barley, mullet, buckwheat and *daikon* radish. Villagers in the Kanto Plain also began to grow cotton, providing a nascent proto-industrial spinning industry. Edo's strong population growth primarily in the 17th century required ever larger shipments of goods to the capital. This task of providing the capital city lay in the hands of commerce. *Jimawari* commodities (as opposed to *kamigata* goods, which "flowed down" from Kyoto and Osaka) denoted those sourced and grown in Edo's immediate hinterland and satisfied a significant amount of the capital's demand. In particular rice was—depending on the year—almost entirely met by local sources, although Edo remained heavily dependent on Western Japan for oil and soy sauce, among others (R. Hayashi, 1997, pp. 211–218).

Japan's geographic features, i.e. mountainous and volcanic inland areas on all four main islands (Honshu, Hokkaido, Kyushu and Shikoku), have traditionally made the exercising of central rule difficult. The establishment of Edo changed this to some extent (Gordon, 2003, p. 2), in particular the regularization of the *sankin kōtai* (alternate residence) system between 1635 and 1642. This system required feudal lords from all prefectures across Japan to maintain residences in Edo and attend the capital in alternate years. This measure of political control contributed considerably to the city's pre-modern urban growth. Large feudal entourages settled in "hostage neighborhoods" (Gordon, 2003, p. 14) in the peripheries of Edo, often spending two-thirds of their annual tax revenues on staffing and maintaining their residences in the imperial capital.

As a result of the alternate residence system, Edo's population grew immensely. While a mere 40,000 people inhabited the city in 1600, this number exploded to 1.1 million in 1721 and stayed at about these levels until the end of the Tokugawa period in 1868. This made Edo one of the largest, if not the largest, city in the world throughout this period. The concentration of power and wealth meant that Edo was Japan's largest locus of consumption, it "had become the center of a unified regional marketing sphere, encompassing the Pacific coast of eastern Japan and extending west as far as the provinces of Ise, Mino, and Owari" (Smith, 1986, p. 349). All throughout, the development of Edo's hinterland in the Kanto Plain was encouraged in order to shorten the distances for the shipment of produce and to decrease the dependence on the Kansai and other regions. Simultaneously, there were large amounts of artisans working in the city catering to the large consumer market here (Waley, 2009, p. 7).

Edo was laid out as a castle town with a radius of eight, later 16 kilometers. Most of the city followed topographical features, although some land and streets east of the shogunal palace was arranged in a grid style, allocating different areas around the castle to feudal lords, samurai families and commoners as well as temples and shrines. Edo had some important distinctions vis-à-vis conventional city plans, which were Chinese in origin and had been applied to Japan most prominently in the imperial capital of Kyoto (Naito, 2003, p. 34). There was some limited planned growth around the castle area and commoner area and largely unplanned organic growth along the highways and waterways.

A popular description of the city's spatial organization crystallized itself after the Great Meireki Fire of 1657. The low-lying *shitamachi* (downtown) area was primarily the home of the Edo commoner as well as merchants and craftsmen that supplied the urban marketplace. This traditional Edo-era "city on water" (Jinnai, 1995, p. 5) falls into today's wards of Chūō and Chiyoda. It would later expand to today's wards of Adachi, Arakawa, Kōtō, Sumida and Taitō. The solid hills west of here were granted to the feudal and military aristocracy and their residences. The *yamanote* (literally: mountain's hand), therefore, was the more affluent area, although it too was interspersed with commoner districts primarily in the valleys and rifts. Today's Bunkyō, Shinjuku and Minato wards delineate the original *yamanote* area today, yet it has since expanded in the popular imagination to include other western wards.

Therefore, in contrast to European cities from the Renaissance onwards, Edo's spatial development was deeply tied to its natural environment of the Musashino uplands and the low city in the reclaimed delta lands facing the water in the east. In the latter and closer to the city's geographical center, a checkerboard-style organization into square units subdivided the land (Jinnai, 1995, pp. 16–18). Due to its more varied topography, the high city had more variety in its spatial organization. The *shitamachi* / *yamanote* dichotomy remains central to urban discourse on Tokyo, although one must remain conscious of the changing meaning and precise geography of the terms throughout history (Waley, 2002).

The main craft centers of Edo were in Kanda and Kyōbashi, surrounding the main commercial center of Nihonbashi (Waley, 2009, p. 8). The *bakufu* required skilled artisans of one occupation to live in the same general area. This led to the development of artisanal districts primarily within Kanda and Kyōbashi, each with their own occupational headmen (Naito, 2003, p. 78). Towards the end of the Edo period, proto-industrial production expanded away from these traditional centers primarily towards the north and east, alongside the existing water-based infrastructure, a process that would accelerate with the onset of the Meiji Restoration.

What are the lasting legacies of the Edo period for the Tokyo under consideration in this dissertation? We suggest dividing these into four categories, i.e. political, economic, social and environmental. In terms of political legacies, the Edo period established the city as Japan's political capital. The central government has had a physical presence in the city for more than 400 years. The nation's transportation network was based on the centrality of Edo and the importance of connecting it with the outlying provinces, e.g. via the so-called Five Routes (*gokaidō)*. The alternate residence system institutionalized the importance of physical proximity to power by forcing feudal lords to be present in the city every other year and maintain large estates and retinues in Edo. Despite the end of shogunal reign, Tokyo maintained the attributes of a "city of power" (Smith, 1978), as the national government of the modern Japanese nation state was located here, with its growing set of institutions.

In terms of economic legacies, there are both elements on the supply and the demand side with continuities connecting the Edo period with the postwar period. On the supply side, Edo had a rich tradition of craft-based, artisanal workshops. They produced a range of consumer products, including brushes, kitchenware, palanquins, candles and tatami mats, among others. They were often organized in clusters. Edo's craft center was Kyōbashi ward. Here, blocks would almost exclusively be dedicated to one craft. The main roads featured shops selling a particular set of products, e.g. iron tools. Workshops were located in the back alleys, with artisans usually living on these premises. Most of these workshops employed apprentices, who would spend up to ten years to become a master of their own and open their own workshop. The importance of manual skills and the unique spatial organization of production into clusters are both important continuities from Edo to postwar Tokyo. On the demand side, Edo and postwar Tokyo both represented a large urban market with the purchasing power similar to that of a country, at very short distances. This urban market was also the most sophisticated with regards to the varied consumer preferences, short product cycles, and later the synthesis between foreign and domestic that it facilitated.

Social legacies of the Edo period include a series of neighborhood level infrastructure. The commoner districts of Tokugawa cities were not governed together as a homogenous unit, "but as an assemblage of disparate administrative blocks, the *chō"* (Smith, 1978, p. 50). The *chō* were assigned functions of local government, which they carried out autonomously. The social overhead spent on neighborhoods was low, and they were largely responsible for policing, firefighting and waste recycling themselves. There was a large degree of mutual surveillance and mutual responsibility, making their governance very similar to that of a rural village. Emerging from this form of governance were certain social relations inside the *chō,* where landowners were conceived as parent-like figures of their back-alley tenants (Smith, 1978, pp. 51–52).

Environmentally, we have already noted the re-routing of the Tone river as an important man-made intervention in the geography of the Kanto region. Transportation in Edo was largely water-based, and its location "at the head of the country's largest expanse of flat land had contributed early to the development of riverine traffic, as had the construction of numerous artificial waterways" (Waley, 2009, p. 14). Waterways continued to shape the economic geography of the city even beyond the times of water-based transportation. Some railway lines, particularly in the east of the city, were built along rivers to facilitate onward transport. The postwar elevated expressway system was often built on top of canals and rivers in order to avoid the purchase of expensive land. Other environmental features that continued to shape Tokyo's economic geography were the ampler availability of land in the northeast of the city, although it was more prone to flooding than the hillier *yamanote* area in the west. Here, topographical features also caused some social stratification of neighborhoods, with high-lying areas on ridges usually preferred locations for prefectural domains and low-lying valleys—prone to flooding—home to commoners (Jinnai, 1995). Remnants of this micro-stratification were still in place in the postwar period, as some initial research has shown.[34]

Prewar Tokyo

The fall of the shogunate in 1868 had already been preceded by the abolishment of the *sankin kōtai* system in 1862. This was the main reason for Tokyo's swift population decrease to just under 600,000 inhabitants in 1874 (Saito & Takashima, 2015, p. 16). The transition from Edo to Tokyo ("Eastern Capital") represented an upheaval to the very fabric the city was built upon. The economy was hit hard, a fact compounded by strong inflation. Merchants saw demand for their wares diminish, primarily those catering to a feudal clientele. Large parts of the population were out of work, in particular from the *samurai* class. However, Tokyo retained its privileged position within Japan's new

[34] I have assisted Professor Jordan Sand, Georgetown University, in a study of substandard housing districts from the Meiji period to 1959. We aim to publish our findings. They include a degree of continuity in the location of these districts as well as change, particularly following major events like the 1923 Great Kanto Earthquake.

political realities. The move of the imperial capital here from Kyoto as well as the opening of Yokohama as the major foreign port in 1857 affirmed Tokyo's primacy in the new Japan as well as spurred further integration with its economic hinterland (Smith, 1986, p. 351).

The port, in particular, stimulated Tokyo's economy. The majority of imports to Yokohama went through Tokyo, from where they were then forwarded. The silk regions of the northern Kanto plain grew and fueled the development of an early railway network with Tokyo at its center. Yokohama itself was connected to Tokyo's Shinbashi station in 1872 by Japan's first modern railway, making the 29-kilometer trip in just a little more than 30 minutes. The (short) physical distance between Yokohama and Tokyo proved important, though: It "obviated the common Asian pattern by which a semi-colonial foreign settlement within a traditional city created a clear barrier between the 'old' native city and the 'new' modern city" (Smith, 1986, p. 354). The location of Yokohama as the regional deep port was to have deep ramifications beyond, too, as it spared the central 23 ward-area from some of the benefit but also the burden of heavy and chemical industrialization later on. A significant proportion of these activities would cluster across the Tama River in Kanagawa Prefecture and beyond, drawing on closer proximity to imported fossil fuels and minerals as well as benefiting from more physical space available here.

Like Edo, Tokyo benefited from an increasing centralization of power and especially infrastructure under the new Meiji government. However, modern industrial growth increasingly became the driving force of economic and urban growth, particularly from 1890 onwards. Modernizing forces within the government played an active role in this process, both in an enabling role via institution-building (see e.g. Gordon, 2003, p. 96; Teranishi, 2005, p. 56) as well as active participation in the production process via model factories (Gordon, 2003, p. 71). Although only a small number of these were eventually built, their role should not be underestimated for they "generated faith, both within the government and outside it, in the potential and the importance of the state's role in supporting economic development" (Gordon, 2003, p. 72).

In Tokyo, these model factories, too, played an important role in shaping the spatial patterns of production. They were exclusively located along the Sumida River or on the canals that flowed into it, underscoring the crucial importance of water-based transportation during this period. Here they could also use the large spaces that had previously been used as feudal warehouses during the Edo period and that were now vacated by their former landlords (Waley, 2009, pp. 7–9). These model factories were set up in sectors deemed strategic for economic development, e.g. textiles and machinery. They could draw on an existing local network of proto-industrial workshops and craftsmen that had been present here since the late Edo period. Further businesses were set up by former *samurai*. Consequently, "a complicated pattern of industrial growth developed in the northeast of Tokyo, characterized by its aggregate size and by its diversity, a pattern that has persisted to the present day" (Waley, 2009, p. 9).

Other parts of Tokyo also saw rapid industrialization, including the traditional centers such as the wards of Kyōbashi and Shiba (machinery) and Honjo (textiles and chemicals) as well as newer clusters further south along the Tokyo Bay and Meguro and Tama rivers in Ebara county (*gun*), today's Meguro, Shinagawa and Ōta wards. Several important events help explain Tokyo's transformation from a center of consumption to becoming

Japan's largest manufacturing hub during this period. The 1895 and 1905 wars with Qing China and Russia, respectively, led to the growth of large textile plants and smaller metal and machinery operations. The opening of the Komahashi power plant in Yamanashi Prefecture and the transmission of its first electricity to Tokyo in December 1907 eventually led to sharply lower daytime prices for electricity, aiding its widespread use in manufacturing (Kikkawa, 2012, pp. 7–8). Large electric transformer stations then further disseminated power in Tokyo and led to localized manufacturing booms, e.g. in Asakusa Ward in 1914 (Waley, 2009, p. 9). Finally, and perhaps most importantly, the First World War (1914-1918) led to large-scale interruptions in international trade which Japan could exploit, enjoying broad-based export-led growth in sectors traditionally dominated by the Western powers, above all Germany (Ohno, 2006, pp. 100–102).

While Tokyo initially lagged behind the industrial development of Osaka, it outgrew the former commercial capital as the 20th century took its course. Mosk dates this to his second (1904-1930: transitional growth) and third (1930-1938: unbalanced growth) "long swings" of Japanese industrialization (Mosk, 2001, pp. 243–245). To Mosk, underlying these long swings were "waves of innovation, imitation and creative destruction associated with new technologies, fresh methods for harnessing and distributing energy, changes in the composition of raw materials demanded, and novel products brought to the market" (Mosk, 2001, p. 7). Tokyo overtook Osaka as it was better able to provide the infrastructure for the transitional and unbalanced growth phases. In terms of physical infrastructure, this was due to power grids, electric railroads and tramways as well as better and wider roads in the capital. Institutions of higher learning and finance, too, clustered primarily in Tokyo and gave the city a competitive advantage over Osaka in terms of soft infrastructure.

Heavy and chemical industries grew disproportionately fast during this period for several reasons, including strong policy support, electrification, the absorption of foreign technology and industrial linkages (Ohno, 2006: 104). Large conglomerates (*zaibatsu)* and the civilian and military government invested heavily. Their large plants required more physical space that was found in newly-industrializing areas in the peripheries of bay and riverside Tokyo in the south and northeast of today's 23 ward area. This trend would accelerate with the wartime economy in the 1930s, when the "suburbanization of industry advanced more rapidly than the suburbanization of the population" (Tani, 2017, p. 175). Meanwhile, printing and sundry industries remained in their *shitamachi* locations, supplying the urban marketplace with their products. Comparing this distribution of industry to the postwar period, Tani holds that the basic pattern of industry in Tokyo after the war was determined in the wartime period (Tani, 2017, p. 169).

The 1923 Great Kanto Earthquake contributed to this shift to the periphery of the soon-to-be expanded city. Large parts of the *shitamachi* were inundated by fires that followed on the heels of the tremor, and it is estimated that more than 100,000 lives were lost (Schencking, 2013). The destroyed areas represented the traditional and established industrial zones, while those spared from disaster were the newly-industrializing zones to the south and east of the then-15 wards (Imaizumi et al., 2016, p. 59). Immediately after the earthquake, the number of factory workers had fallen precipitously in affected areas, to less than one third of pre-disaster levels. The undamaged areas, meanwhile, hardly saw the number of factory workers fall at all. It is therefore understandable that the cataclysm is seen as perhaps the most important caesura for the city's prewar history (e.g. "Low City, High City: Tokyo from Edo to the Earthquake", Seidensticker, 1983). In terms of its industrial development, the earthquake accelerated certain trends that had already been underway before and that would continue to shape prewar and thus by implication postwar Tokyo (Tani, 2017, p. 167).

[Insert Table 59 here]

It needs to be said that not all industry was wiped out in the damaged areas.[35] In fact, a large number of factories were rebuilt, also thanks to relatively lax zoning regulations that were not enforced on existing factories before 1936 and if anything, only governed those with more than 15 workers (Imaizumi et al., 2016, p. 57; Sorensen, 2002, pp. 117–118). Therefore, primarily small factories sprung up where they had been before the earthquake. Some of these small urban workshops may had even seen their fortunes increase as a result of the ensuing reconstruction efforts, e.g. thanks to wider roads and better urban infrastructure (Schencking, 2013, pp. 263–300).

By 1936, factories in the damaged areas exceeded their absolute pre-earthquake employment levels with the exception of the former Fukagawa and Kyōbashi wards. Relatively speaking, however, the damaged areas became much less important in terms of city-wide manufacturing employment as Table 59 indicates. While the damaged area accounted for just under half of the total manufacturing employment share on the eve of the earthquake (a figure that would drop temporarily to just over 20% after the quake had hit), it recovered its share to only about 30% by 1936. The undamaged areas, therefore, grew much faster between 1922 and 1936 (167.6% growth) than the damaged areas (34.3%). This growth took place primarily in the counties (*gun)* of Minami Katsushika,

[35] Imaizumi et al. define this area as encompassing the wards of Nihonbashi, Asakusa, Fukagawa, Honjo, Kyōbashi, Kanda, Shitaya, Kōjimachi, Shiba, Hongo.

Kitatoshima and Ebara, which together accounted for almost 60% of the employment in the undamaged areas.

The 1930s saw a significant rise in manufacturing employment, from 1936 onwards driven primarily by military production for the war. There were less than 300,000 factory workers in 1933 (4.6% of the total prefecture's population) compared to almost 900,000 by 1942 (12.1% of the population). Despite its later vulnerability to aerial bombardments during World War Two, the concentration of military production in the city was primarily due to the proximity of the government, a tradition since the Meiji period. The government was "involved more intensively in the production and distribution", and because "only a limited number of firms with relatively high technological capabilities could produce special parts" (Okazaki, 2010, p. 8). As discussed, a substantial proportion of these armament factories was situated in the newly-industrializing districts south of the 15 original wards. These factories also contributed to a change in commuting patterns in the city, as now many workers had to use public transport to get to their employers (Tani, 2017). However, just as with the model factories during the Meiji period, these large military factories would also sub-contract parts of their production processes to smaller suppliers, both in the vicinity and in other wards.

This unique feature of the urban economy drew the attention of the Allied forces. Studying the possibilities of aerial bombardments of Tokyo in 1944, the American military reflected on the relatively high importance of small workshops in Japan's cities. These "small-scale units often serve as feeder plants and parts-manufacturers to large factories. There is considerable evidence that small-scale units are producing parts for airplanes, machinery, ordnance items and other war material." They could often "hardly be distinguished from dwelling units", and they were "located in quite random fashion through the business, industrial and residential areas." Ominously, the report notes, the "[d]estruction of residential areas by fire would probably account for many small-scale manufacturing enterprises" (USSBS, 1944, p. 4). Given their intricate involvement in production of wartime products via sub-contracting, the report concludes that "their destruction might well cause economic dislocations out of proportion of their absolute role in production" (USSBS, 1944, p. 5).

The Allied Firebombing of 1945 represents Tokyo's second major 20th-century calamity. The destruction wrought upon the city was even larger than that of the Great Kanto Earthquake in 1923. The major source of destruction proved once again to be fire, fueled by strong winds during the time of the aerial bombardments. Almost 40 percent of the city were destroyed, equivalent to an area of 16,000 hectares. 770,000 homes were lost, many of them built of wood (Ichikawa, 2003, p. 50). Again, the effect of the destruction was distributed unevenly across the city. Some of the central and industrial wards were almost completely destroyed, while the more outlying and less developed wards got away almost unscathed.

Tokyo's postwar economic geography

What were the long-term effects of the war on the economic geography of the city? Similar in method to Imaizumi et al.'s analysis cited above, we are interested in the recovery of the population as well as factory employment across the different wards. For this, we choose three distinct points in time. 1940/41 as the "prewar peak", 1945/48 as the immediate postwar and 1955 as the point at which, in aggregate at least, recovery had been achieved. This section will build an important bridge to the prewar period, allow us to point to continuities and change and set the stage for the next chapters.

[Insert Table 60 here]

Table 60 shows the varied impact of the Allied Firebombing on the different ward groupings' buildings as a percentage of the 1941 stock as well as the population as a percentage of the 1940 Census. As was the case with the 1923 earthquake, certain areas were disproportionately affected while others were hardly hit by bombs nor suffered from subsequent fires at all. The old industrial wards suffered the highest damage. Only 17.2% of this traditional area's building stock survived, and just 16.9% of the population remained as of November 1945. Its dense pattern of wood-built houses was almost entirely obliterated. Kōtō was the worst affected: Just 6.0% of its building stock survived, an area representing 81.0% of the ward was devastated. Only a fraction of the population remained in the ward (6.0%). The least affected area were the northern and eastern industrial wards. Here, 66.4% of the buildings survived, and 62.2% of the population remained. The ward with the least amount of damage was Katsushika, with 2.8% of its area war-devastated. In terms of physical stock, there were in fact 3.8% more buildings in 1945 than in 1941 and a 12.1% higher population.

The post-war recovery across the 23 wards varied sharply. By 1955, the central business wards and the old industrial wards still had fewer buildings than in 1941 (71.5% and 68.1%, respectively). The northern industrial wards as well as the western wards saw strong growth, taking their 1955 building stocks to 126.7% and 133.5% of 1941 levels, respectively. Their populations, too, swelled, reaching 115.4% and 123.8% of 1940 levels in 1955, respectively. A large degree of Tokyo's postwar population growth, therefore, occurred in the newly-urbanizing territory of the areas that had become part of the ward area in 1932, a trend that had been underway long before the war as evident from Table 1 at the beginning of this chapter. As a result, population density in the central wards (primarily in the *shitamachi* areas) decreased, while that in the periphery increased.

How did the bombardments affect the economic geography of the city, speaking in terms of its manufacturing base? To answer this question, we amended factory employment figures for 1940 (which were available for the 35 then-existing wards) so we can align them with post-1943 statistics for the 22-ward area (23-ward area after 1947). The first year for which comprehensive statistics are available after the war is 1948. 1955 is the year chosen as the recovery point in line with the TMG housing survey cited above.

[Insert Table 61 here]

The table above allows drawing more granular conclusions about the varied recovery of parts of the city following the Allied Firebombing whose effects on the demographic and economic geography we want to compare to the 1923 Great Kanto Earthquake. Imaizumi et al calculate the various wards' shares in the total factory workers of the post-1932 ward area. However, given the sizable population shifts that occurred as a result of the war and which are outlined above, it is also the relative number of factory jobs in a given ward as of that ward's population that is also as important. We can see that overall, factory jobs as a proportion of the 23 wards' population recovered only between 1955 and 1960 (1940: 9.8%, 1955: 9.5%, 1960: 13.6%). In 1948, this figure had dropped to 7.6%. It was presumably even lower in the immediate aftermath of the war, for which data is not readily available.

In 1940, the number of factory jobs as a proportion of a ward's population was as high as 18.0% in the southern industrial wards, with Ōta (22.4%) standing out. It is important to note that this does not imply that 22.4% of the Ōta's inhabitants worked in its factories. Many of the factory workers came from other wards and commuted to their workplace, in Ōta particularly so given the comparatively large average size of factories, which required workers to be drawn in from much larger distances (Tani, 2016). The corresponding share for wards without any meaningful manufacturing activity was as low as 3.6% in the western wards, with Suginami having factory jobs to the equivalent of just 1.0% of its population. In terms of their shares in overall factory jobs, the southern industrial wards were the most important centers of factory employment, accounting for 30.0% of the 23 wards' total factory jobs. In terms of single wards, the four most important wards in 1940 were Ōta (accounting for 17.9% of all of the wards' factory jobs), Shinagawa (11.0%), Kōtō (10.3%) and Sumida (9.1%). The western wards had only 3.6% of all factory jobs located within them. In terms of single wards, there were very few factory jobs in Setagaya (1.1% of all wards' factory jobs), Nakano (0.6%) and Suginami (0.4%).

The economic geography changed considerably in the immediate aftermath of the war. Not only did the total ward population fall drastically from 6.8 million in 1940 to 4.6 million in 1948, but the share of factory workers of the population also decreased to 7.6%. The absolute population decrease was the most acute in the heavily-destroyed old industrial wards. The relative share of factory workers actually increases from 9.3% to 10.9%. Many of the factories in these wards were owner-operated small workshops, particularly in Kōtō and Sumida. These workshop owners were more likely to remain or return here after the war, given the close connections of both work and residence. The often haphazard rebuilding of their workshops also meant a reconstruction of their residential homes. Kōtō was now the ward with the highest factory worker share (25.3%), albeit against a much lower total population (118,105 compared to 419,154 in 1940). Drastic falls in manufacturing employment can also be observed in the southern industrial wards (factory worker share of 10.4% in 1948 compared to 18.0%). This drop was mainly due to Ōta, the ward with the highest concentration of wartime-related manufacturing. Here, the factory worker share fell from 22.3% in 1940 to 10.3% in 1948. The ward with the lowest factory worker share was Suginami (1.8%). All in all, we can observe a slight dispersal of manufacturing taking place across the city in weighted terms, together with a continued maintenance of small works hops in the former *shitamachi* area. The statistical measures of variability show slightly conflicting signs: While the coefficient of variation increases slightly from 64.1% in 1940 to 66.3% in 1948, the population-weighted Theil index shows a slight equalization of factory worker shares from 0.2066 in 1940 to 0.1887 in 1948.

The next year shown, 1955, evidences a growing share of factory workers as a proportion of the total population across all the ward groupings. The wards with the highest factory worker share are the central business wards (14.7%), those with the lowest share the western wards (3.5%). The ward with the highest share in factory jobs as a proportion of its population is now Chiyoda (21.3%), a result of both the ward's population decline and the substantial growth of its printing industry. Although accounting for 10.5% and therefore the largest contingent of the 23 wards' factory jobs, Ōta has not yet recovered its pre-war peak, when it was home to 17.9% of all ward-based factory jobs. The ward with the lowest factory worker share was Nerima (1.2%). The variability indicators now both show an equalization in the differences between the wards regarding their factory worker share. The coefficient of variation decreases 57.9% and the Theil index to 0.1717. This suggests that factory jobs decentralized across the 23 wards.

By 1960, factory employment, as measured by the relative factory worker share as of total population, exceeds its prewar peak substantially, reflecting the addition of almost half a million of factory jobs in the territory of the 23 wards during this period. All ward groupings increased their factory worker share. The wards with the highest share were now the southern industrial wards (20.8%) just like before the war. The western wards continued to trail with factory jobs to the amount of 4.8% of their combined population. The ward with the highest factory worker share was now Sumida (30.0%), the one with the lowest Nerima (3.1%). The expansion of factory employment was broad-based, i.e. did not coincide with the spatial stratification we would see if some wards benefited disproportionately from this growth. In fact, the indicators of variability remain stable: The coefficient of variation decreases slightly to 55.3% and the Theil index increases marginally to 0.1723.

In the above section, we have discussed some continuities and changes from the prewar to the postwar period with regards to population and manufacturing activity. As Tani holds, the postwar industrial structure of the city was to a very large extent shaped in the wartime period, with comparatively big factories settling in what had been the southern industrial periphery before (Tani, 2017). However, the destruction of the wartime economy also produced the largest shocks here, from which wards like Ōta would take several years more beyond 1955 to recover. Meanwhile, manufacturing dispersed slightly across the territory of the 23 wards, mirroring the developments in the ward populations. The data above represents an important backdrop to the argument made throughout this dissertation, i.e. that Tokyo's postwar development was broad-based and even egalitarian if we understand this to mean the narrowing of differences between the different wards.

Annex

Note on primary sources

The data presented in this dissertation has been compiled from numerous original sources. By degree of importance, these are the Tokyo Metropolitan Government's Statistical Yearbook, the Housing Survey (national), the Population Census (national), the Manufacturing Census (national), the Tokyo Industrial Census and the Commercial Census. For a complete overview of the various sources and their library locations, please see the relevant section below.

Data drawn from the *TMG Statistical Yearbook* is provided in all three major chapters and represents one of the major sources for this research. It has been published in its current form in Japanese since 1952, and from 1957 onwards, bilingually in Japanese and English. It is prepared each year by TMG's Statistics Division of the Bureau of General Affairs, and includes important and basic statistical data on demographic, economic, social and cultural subjects. The continuity of information is generally good, and a large variety of data is available on a ward level rather than only aggregates for the entire prefecture and the ward area. However, there are several discontinuities, and the content of the yearbook changes regularly. This is particularly relevant for later years, which see the addition of new indicators on social and environmental topics. This means that not all metrics can be calculated for the entire period of observation, particularly for the early years. Moreover, there is a dearth of data for the period before the yearbook has been published, i.e. 1952. There are thus instances in which the information from the yearbook is complemented by other sources. Wherever this is the case, a relevant note has been made. There are also several restatements, i.e. revisions for prior years when information is presented in time series, especially for personal income, tax and budget data. Although we deem these to be overall immaterial to the argument presented, we have generally preferred restated information from later years.

The *Housing Survey* (today's *Housing and Land Survey*) is Japan's main statistical survey on housing conditions. It has been published every five years since 1948 and provides information on the condition of buildings and their inhabiting households. The first three editions are of limited use for the purposes of this research given that they do not include information on a ward level. The surveys from 1963 onwards follow the National Census format in that it provides prefectural data via separate volumes, which allows for detailed ward-level analysis. More varied and detailed information on households and housing attributes becomes available from 1963 onwards, so that for most intents and purposes, this study relies on only two data points, 1963 and 1968, for its analysis. However, the 1960s are the decade during which housing conditions improved the most, and changes within this five-year period are worth highlighting. The survey is carried out by the Statistics Bureau of the Ministry of Internal Affairs and Communication.

The *Population Census* has been conducted every five years since 1920 with the exception of 1945. It is carried out by the National Statistics Center, which is an incorporated administrative agency. Its results are published by the Statistics Bureau. Large-scale censuses are carried out every ten years (1920 onwards), with simplified versions produced in the alternate years. The difference between these two versions relates to the number of questions asked. The Census is used primarily to ascertain the living standards of the ward population as well as provide detailed information on households living here. The information published is available on a ward and, for 1970, even neighborhood level. Large parts of chapter three build on the information given here, in particular the tatami per person living space allocation by rental and owning population. The labor section in chapter two also draws on the Census, in particular regarding quasi-households and home-based work as well as education levels across the 23 wards. As with the other sources, published information between the various editions differs, some is discontinued. Detailed prefectural data is released in separate volumes.

The Ministry of Economy, Trade and Industry (METI, MITI until 2001, i.e. Ministry of International Trade and Industry) prepares the *Census of Manufacture* in order to clarify the conditions of the manufacturing industry. Data is usually presented by industry nationally or by prefecture. This means that the analysis using the MITI census data is for Tokyo prefecture instead of the 23-ward area. Moreover, the census has varying firm size thresholds, and very small firms with one to four workers are omitted in several census years. Nonetheless, we have relied on MITI's data for numbers of firms by size and firm employment in order to compare Tokyo's manufacturing sector with that of the nation as a whole. Moreover, we have used the census's fixed asset data for 1970 to establish the national baseline against which to compare the 23 wards as well as to understand the different investments made in land in that same year. For the time series on capital intensity, however, we did not take MITI data but instead turned to Ministry of Finance data provided on the Statistics Bureau's website.

More detailed information on the manufacturing sector in Tokyo came from the *Industry in Tokyo* yearbook. TMG independently compiles this information, which complements the MITI/METI data from the Census of Manufacture. It contains profit and loss data as well as numbers of factories and workers per industry and for each of the 23 wards, all classified by size of factory. The 1970 edition of the Census is of special importance for this dissertation as it contains the second year (after 1969) for which some balance sheet information is available, in particular figures on fixed assets. This allows us to calculate capital intensity figures by industry and by ward. The numbers do not align perfectly with the 1970 MITI Census figures for Tokyo. This is because MITI figures include the Tama region and employ different firm size thresholds. It is not essential that the figures from different surveys align 100% with each other as long as the longitudinal trends shown are the same, and as long as we use one source per cross-sectional analysis.

The *Commercial Census* provides information on the number of business establishments and employees as well as the amount of goods sold by industry and by firm size. TMG publishes the Tokyo component of the national edition, whose compilation is coordinated by METI. We use two survey years for our research purposes, i.e. 1958 and 1968. These two years were chosen because, as opposed to the 1960 and 1970 editions, they contain information on a ward level and thus allow us to compare the densities of certain commercial establishments, e.g. food retailers, furniture shops and construction firms, across the city. The 1968 edition also contains information on the number of restaurants by ward.

The ward budgets have been taken from the *Tokyo Municipal Finance Budgets*. The years were chosen primarily based on the volumes' availability in the archives at the University of Tokyo Economics Library. The publication contains ward-level municipal statistics other than budgetary information. The presentation and components of ward budgets changed significantly over the years in line with administrative changes and the revision of laws governing municipal finance. We have therefore consolidated individual budget items into relatively simple categories such as tax and other income and transfers on the revenue side and total spending and education spending on the expenditure side to avoid the effect of these changes skewing the data too much.

This dissertation draws heavily on publications from TMG. It had been publishing information in English throughout its history, but starting with the governorship of Minobe, TMG began translating some of its flagship publications in 1969. The first of its kind was the *Administrative Perspective of Tokyo*, followed by the 1969 Budget for Tokyo, *The First Step Toward "Civil Minimum",* referring to one on Minobe's signature policies, discussed in detail in chapter four. The third publication, *Sizing up Tokyo*, is a 170-page, specially shortened version of the 1969 *White Paper on the Administration of Tokyo*. It was translated by Kenneth Ishii, the former Tokyo chief editor of the Associated Press, and is, like most other publications, written in impeccable English. Several topical publications followed, e.g. *Tokyo Fights Pollution, Tokyo's Housing Problem, Tokyo for the People, Financial History of Tokyo,* and *Minor Industries and Workers in Tokyo,* to name but a few. Many of them provided background information for various sections of this dissertation.

The growth in English language publications was at least partly due to the increasingly international outlook of the municipal leadership, above all governor Minobe himself (L. Hein, 2004, pp. 182–211). As the nation's capital, Tokyo accounted for a disproportionate share of Japan's dealings with the outside world. Tokyo became increasingly international not least thanks to the Japanese economy's strong export growth during this period. A large proportion of the firms accounting for these exports had their headquarters in Tokyo. Moreover, continuing in the old tradition of seeking foreign advice, Governor Minobe also invited preeminent urban studies academic Professor William Robson of the London School of Economics to Tokyo for several weeks on two occasions. We refer frequently to the two resulting consultancy reports in this text.

By focusing on literature available in English (although there are publications in Japanese as detailed in the primary source references) has both advantages and disadvantages. In terms of disadvantages, we are clearly confined to a subjective decision as to what was deemed worthy for translation and what was not. This could leave out important narratives and threads captured only in Japanese. However, besides representing a much more digestible body of information, there are also advantages of being confined to English language sources: First, we can focus on what TMG wanted an international audience to know. While we argue that Tokyo's postwar experience holds lessons for developing cities today, Tokyo's authorities clearly saw themselves as part of the developed world and thus spoke to an audience in London, New York and elsewhere. Second, the English-language body of TMG publications also contains unique information that is not available in Japanese. The two Robson reports are a case in point, as they were only published in English.

Finally, some original source material from the Allied forces is presented in this dissertation, too. It was located in the National Diet Library's Digital Collections, Materials on the Allied Occupation of Japan.

Note on ward groupings

Rather than presenting its data for all 23 wards separately, this dissertation uses a set of ward groupings to facilitate its analysis. This is done in order to show similarities across a range of wards (shared experience) as well as to limit the amount of information on display. By choosing a distinct set of ward groups, we also reject the readily-available organization of the 23 wards into the five areas of *jōsai, jōhoku, jōtō, jōnan* and *tōshin.* They denote the four cardinal directions as well as the center of the ward area. These designations are being used by TMG, for example in its industry promotion activities. We argue, however, that they reflect today's economic geography and are hence imperfect for this study's period of observation.

[Insert Table 62 here]

The table above shows the two ward categorizations and the groups' respective wards. The *tōshin* area comprises the three central business wards as well as those to their immediate west and north. It is today's center of Japan's capital and hosts government, judicial and executive agencies, as well as a substantial contingent of corporate headquarters and foreign embassies. A large number of commercial services are situated in the so-called "sub-centers", e.g. Shibuya and Shinjuku and Toshima, alongside the *yamanote* line. They only became important business centers towards the end of the period of observation, although all three stations had been important commuter hubs before.

Shinjuku gained importance as a corporate and administrative center with the development of the area west of the train station, beginning in the late 1960s. TMG's headquarters moved from its location in Yūrakuchō to here in April 1991. Shibuya, especially the bustling area surrounding its eponymous train station, experienced the onset of rapid growth following the decision of Seibu Corporation to open a department store here in 1968, competing head-on with incumbent Tōkyū (Havens, 1994, pp. 98–107). Toshima, in particular the commercial district around Ikebukuro station, was transformed into the business district it is today primarily due to the Sunshine City project. The redevelopment of the Sugamo Prison that stood here had already been envisioned in the 1960s, but the high-rise development only opened in 1978 (source). With the exception of a considerable printing industry in Shinjuku, neither of these "sub-center" wards have a strong manufacturing sector. We have therefore added all three of them (i.e. Shinjuku, Shibuya and Toshima) to the western wards category. The decision regarding Shinjuku was not an easy one. However, as of 1970, the ward fits not yet in the central business ward group, nor is its postwar manufacturing growth as rapid as that in the old industrial wards.

Bunkyō on the other hand is better placed in the "old industrial wards" category along with Taitō, Sumida and Kōtō. The ward represents the fusion of the two pre-1932 wards Hongo and Koishikawa. The former is known for hosting institutions of higher education, in particular the University of Tokyo. Koishikawa, on the other hand, has historically been a center of urban manufacturing, e.g. of weapons and ammunition and printing, to name but two examples. Taitō's two constituent wards of the 1943 merger, Shitaya and Asakusa, have a long tradition of manufacturing, too. The densely populated Asakusa ward was a center of textile manufacturing and metals and machinery just before the Great Kanto Earthquake (Waley, 2009, p. 17). The other two old industrial wards, Kōtō and Sumida, contained the pre-1943 wards of Honjo and Fukagawa, which were the most important industrial centers of the old ward area (*Tōkyō shi*, 1940).

There is alignment between TMG's ward classification and the one used in this research regarding the *jōnan* area and the southern industrial wards. These include Meguro, Shingawa and Ōta and therefore coincide with the area of the former, pre-1932 Ebara *gun*. This area was fast industrializing before the war, primarily due to the growth in heavy and chemical industries as well as wartime production. A principal location of this growth was in Kamata ward, today part of Ōta. The northern and eastern industrial wards have sizeable manufacturing sectors predating the war. However, their growth is a more recent phenomenon than that of the old industrial wards and was related to the spatial dispersion of manufacturing activity taking place in the 20th century, accelerating after the Great Kanto Earthquake in 1923, as discussed in the historical supplement to this chapter. As opposed to TMG's *jōtō* group, the northern and eastern industrial wards used in this study do not include Sumida, Kōtō and Taitō wards. The wards that are left, i.e. Arakawa, Adachi, Katsushika and Edogawa are joined by Itabashi ward, which has sizeable manufacturing especially along the Arakawa River.

This leaves the western wards as the grouping comprising the remaining wards. During the period of observation, these wards are characterized by the absence of substantial manufacturing activity, with Shinjuku being the only minor exception to this with a 1970 factory worker share of 10.3% of its population (which would be the lowest share if the ward were included in either the central business wards or the old industrial wards). The western peripheral wards of Nerima, Suginami and Setagaya are at the frontier of urbanization on this side of the ward area, with some agricultural production left. While the same can be said for Edogawa, Katsushika and Adachi wards, these wards did have significant numbers of factories located within their territory even while large parts of their area remained peri-urban. The western wards are also the primary source of white-collar workers who commute to their work elsewhere in the 23-ward area. The fact that Shibuya, Shinjuku and Toshima are included in this category is explained above. Their commercial growth began only towards the end of the period of observation.

The above has established the ward groupings that will be used throughout this dissertation. They mainly serve illustrative purposes and do away with the need to show the entire list of the 23 wards each time data is presented. The ward groupings help detect a spatial clustering of certain socio-economic attributes and developments. However, as has been argued in many places of this research, the differences between the wards were often getting smaller. In this regard, it is important to highlight that one of the most important analytical devices employed, i.e. the measures of variability, are always calculated on an individual ward basis. This means that the ward groupings have no bearing on the measurement of inter-ward variability shown later.

Note on empirical and statistical approach

Most sections of this dissertation contain the analysis of primary quantitative data collated from various original sources. We have inputted this data into spreadsheets and, where appropriate, converted it into consistent units or taken it as the basis for simple ratio and percentage calculations. Precise references for each table are provided in the Annex, along with an explanation of the performed calculations. Many of the tables also contain measures of variability, shown via coefficients of variation (CoV), Theil index and Gini coefficient. Together they represent one of the core methodological tools which make this thesis's argument. What follows is a short explanation of these measures, how they are calculated and what their benefits and shortcomings are.

The CoV is defined as the ratio of the standard deviation σ to the mean μ: $c_v = \frac{\sigma}{\mu}$. It shows the variability in relation to the mean of the sample. In other words, it shows how varied a dataset is. The higher the value, the greater is the level of unevenness. If all values are identical, the CoV is zero. The CoV has the advantage of being scale-insensitive, i.e. it can be applied to the same dataset displayed in meters, kilometers, or miles, and still returns the same value. If a sample retains the same number of constituents, the coefficient can also be used to analyze the changing variability over time, which is the main purposes in this dissertation. Rather than doing cross-sample comparisons with regards to variability (e.g. "Is the variability of living space per capita higher than that in income per capita?"), the CoV helps answer questions such as "is the variability of living space per capita per ward getting more or less pronounced over time?" Finally, the CoV is easy to calculate.

Among the CoV's shortcomings are that it does not have an upper limit like other inequality measures (e.g. the Gini coefficient, from 0 to 1). This makes the comparability between different datasets and their variability difficult as indicated above. Related to this is the fact that there are no intuitive values denoting "high" or "low" inequality. Arithmetically, the CoV can be skewed by outliers at the lower or upper bound of the dataset given that its two components, the standard deviation and the mean, are highly influenced by extreme values (De Maio, 2007, p. 850). Lastly, the CoV represents an unweighted measure of inequality. For example, the variability of income per capita between Tokyo's wards is determined equally by wards with a very small or very large population. This can be both desirable and undesirable: On the one hand, a fictitious, tiny ward with one extremely rich inhabitant would inflate our measure of variability although the spatial inequality remains hardly visible in most of the city. On the other hand, it is important to capture the effect of small, but outlying areas, as they may represent a very important facet of spatial inequality, e.g. the persistence of pockets of poverty such as slums, or small enclaves of the super-rich.

Data from Tokyo's 23 wards as presented in this thesis can be interpreted for spatial inequality using the CoV. Although this is of course relative, and other cities may have a more equal population distribution across administrative boundaries, the wards are relatively homogenous without extreme outliers at either top or bottom: Their population shares range from less than one percent (Chiyoda) to about nine percent in 1970 (Setagaya), with mean and median being both about in the middle of these values at 4.3%. This compares to the United States in 2017, where 20 out of 50 states are home to less than one percent of the total population, while California (12.1%) and Texas (8.7%), account for relatively large shares of the total population. Mean (2.0%) and median

(1.4%) are also relatively far apart. The variability of the 23 wards' shares of the total ward population in 1970 is lower (CoV of 46.9%) than that of the 50 states in the U.S. in 2017 (113.0%). This suggests to us that the 23 wards are compared more readily using CoV analysis than the 50 states.

From a policymaker's perspective, the CoV offers the most straightforward measure of inequality that does not discriminate based on population size (and therefore votes) of a certain area. Is it therefore the fairest of the measures? We will come back to this question in the section on the "civil minimum" in chapter three. To conclude, the CoV offers a convenient snapshot of inequality at various points in time. Analyzing the trend, we can detect either no major change (stable CoV), spatial stratification (increasing CoV), or decreasing inequality (decreasing CoV). We do not weight for population: This is both desirable and undesirable depending on the situation: If we are interested in the pure variability in conditions across a geography, the CoV allows for making statements on that. If we instead want to comment on the inequality weighted by population, i.e. assign a bigger arithmetic importance to areas with larger populations, then the CoV falls short.

For this, this dissertation employs the Theil index. The Theil index is another statistic to measure the extent of inequality. In technical terms, it represents the maximum possible entropy of the data minus the observed entropy. The formula for its calculation is: $Theil\ index(\alpha) = \frac{1}{\alpha(\alpha-1)}\left[\frac{1}{N}\sum_{i=0}^{N}\frac{y_i}{y}\ln(\frac{y_i}{y})\right]$. The value of the Theil index can range from 0 (perfect equality) to infinity, with higher values denoting a larger degree of inequality. In practical terms, the Theil index is the sum of individual Theil elements of a dataset. The calculation for, say, a Tokyo ward's contribution to overall income inequality as measured by the Theil index is the product of its population share, the quotient of its income over the 23-ward wide average income and the logarithm of the same quotient and can be positive or negative.

[Insert Table 63 here]

The sum of the 23 individual Theil elements, always positive, yields the overall Theil index for living space per capita as measured in tatami per capita in 1970 (0.0066). This is lower than the Theil index for prior years (e.g. 1950: 0.0115), suggesting that the difference in per capita living space had decreased between these two data points. The first factor in the equation, i.e. the population share of each constituent, shows that the Theil index offers a weighted measure of inequality as opposed to the coefficient of variability. The larger the ward and the further its observed indicator is from the ward-wide average, the bigger its contribution to the total dataset's inequality. At the same time, of course, the larger the ward is, the bigger will be its influence on the average, reducing the effect of outliers.

In general, throughout this dissertation, the CoV and the Theil index tend to show the same basic trend of either stratification or homogenization. In the example above, the Theil index suggests living space per capita became more equal between 1950 and 1970 *across* the 23 wards. The coefficient of variation shows that *the wards* became more equal in their average living space per capita (1950 CoV: 15.1%, 1970 CoV: 11.8%). The difference in wording is important but will not be stated each time in the text. Whenever CoV and Theil index show a discrepancy, we will point this out. We do not prefer one over the other indicator for our assessment of inequality trends as both show different aspects of a dataset's distribution.

Finally, this paper uses the most common measure of inequality, the Gini coefficient, just once, in chapter four. The Gini coefficient is the most widely used measure of income inequality due to its intuitive use and interpretation. It is based on the Lorenz curve, which is a cumulative plotting of income shares by parts of the population, usually split in quintiles or deciles depending on the data availability. The Gini coefficient is the ratio of the area between the line of equality (plotted in a 45-degree angle) and the Lorenz curve, and the area between the line of equality (plotted in a 45-degree angle) and the Lorenz curve plus the area below the line of equality. For our purposes, we have divided the population into 23 equal parts, i.e. Tokyo's 23 wards. The formula for the Gini coefficient is $Gini = 1 - \frac{1}{23}\sum_{i=1}^{23}(y_i + y_{i-1})$.

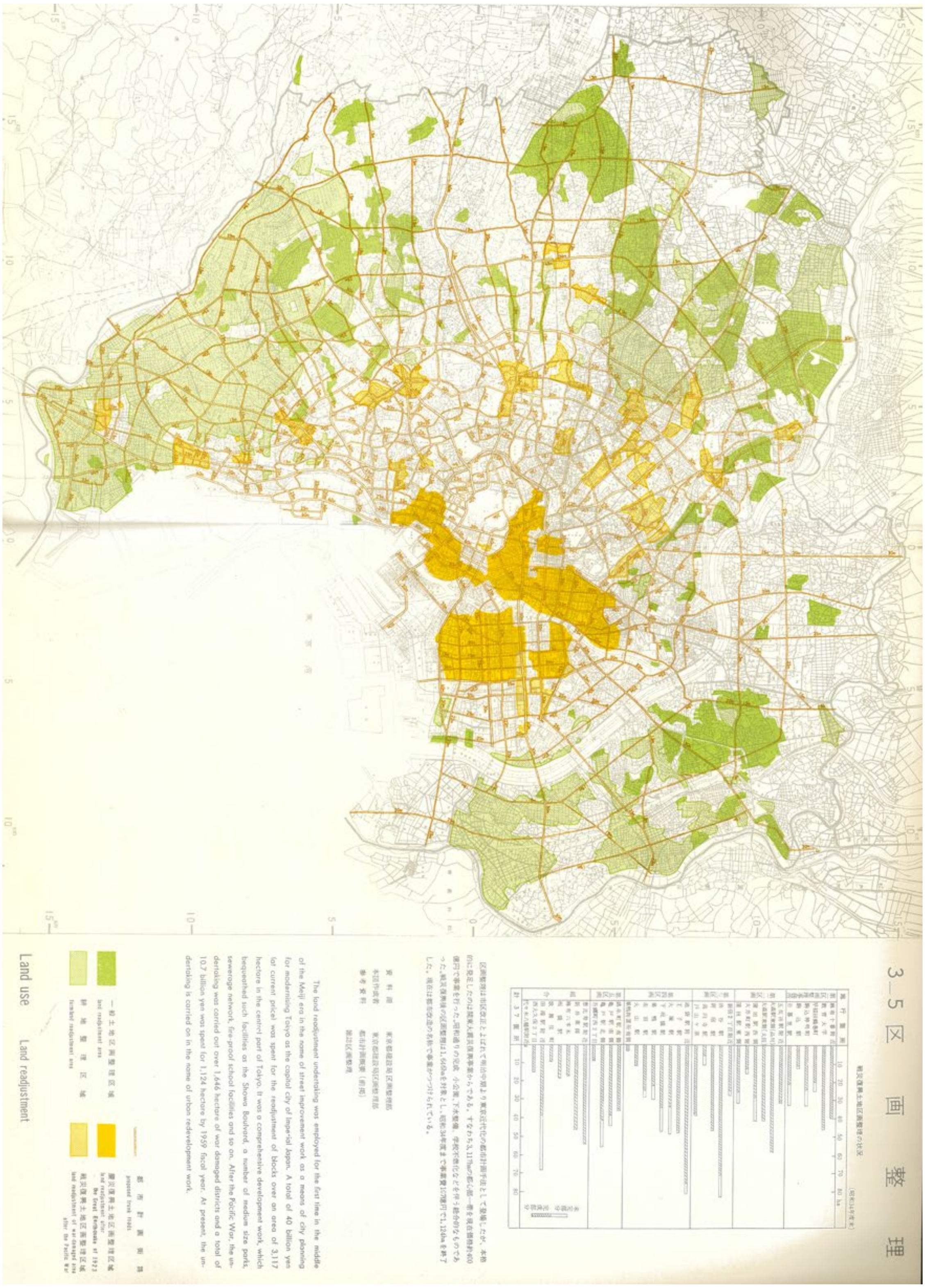
[Insert Table 64 here]

The sum of the Gini components (G) can then be used to calculate the Gini coefficient for the dataset, as can be seen in the table above (last row). As the Gini coefficient's value is by definition between 0 and 1, it can be used intuitively across datasets, in our case pre and post-redistribution ward income. We easily show the effect of fiscal redistribution on the combined ward budgets with a pre and post-redistribution Gini. The post-redistribution Gini is lower than the pre-redistribution Gini, suggesting that fiscal redistribution has reduced inequality in ward income. We can also use the Gini coefficient to comment on inequality trends across time given that it is mean independent, i.e. is not influenced in its measure of inequality by strong increases in nominal ward budgets due to inflation and general growth in public expenditure witnessed during our period of observation.

Among the shortcomings of the Gini coefficient is that, unlike the Theil index, it is not decomposable. However, as we make little use of the decomposability of the Theil index, this is not the reason why we use the Gini coefficient sparsely throughout this dissertation. This, in turn, has to do with the fact that the Gini coefficient is normally calculated for fixed intervals, e.g. equal sections of a population, and therefore needs no adjustment for population weight. In our case and in the example above, however, this means that each ward represents 1/23rd of the total length of the x-values of the Lorenz curve, although it does not represent 1/23rd of the total ward population. If we were to use the Gini coefficient consistently throughout this paper, we would face the same limitations as with the CoV, i.e. we would not yield a real measure of the inequality that the 23-ward inhabitants faced, but instead a measure of the inequality in the per capita ward income or other indicators.

The calculation of spatial inequality measures in studies similar to ours broadly confirms our reading above. In a study on the Tokyo metropolitan region from 1980 to 2007, A. J. Jacobs employs a CoV analysis to determine growing inequality in per capita incomes across the Tokyo metropolitan region (A. J. Jacobs, 2012). Chakraborty suggests that CoV is among the most common summary measures of inequality but notes that the Theil index or other entropy measures provide a better gauge of between- and within-group inequality (Chakravorty, 2006, pp. 171–172).

1961 TMG map on land readjustment



Source: TMG, 1961, p. 10

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National Census (国勢調査, Kokuseichōsa)	Educational attainment and quasi households (chapter two), living space per capita and homeownership (chapter three),	1950, 1955, 1960, 1965, 1970	5003104877 1128074307 1128074290 1124340924 1124340933
Housing and Land Survey (住宅土地統計調査, Jūtaku tochi tōkei chōsa)	Statistics on mixed-use and age of housing stock (chapter one), and living standards (chapter three)	1963, 1968	3120777556 3121068731
Yearbook on Industry in Tokyo (東京の工業, Tōkyō no kōgyō)	Tokyo 23 ward factory statistics (chapter two)	1955, 1960, 1965, 1970	3120560638 3120560745 3120560843 3120560941
Census of Manufactures (工業統計表)	Japan and Tokyo Prefecture statistics on factories (chapter two)	1950, 1955, 1960, 1965, 1970	Available online: http://www.meti.go.jp/statistics/tyo/kougyo/archives/index.html
Commercial Census (商業統計調査報告, Shōgyō tōkei chōsa hōkoku)	Private commercial infrastructure density (chapter three)	1958, 1968	3120623442 3120623540
Tokyo Metropolis Municipal Finance Statements, (東京都区市町村勢要覧, Tōkyōto-ku shichōson-zei yōran)	Fiscal redistribution and ward budget analysis (chapter four)	1949, 1954, 1959, 1961, 1966, 1970	University of Tokyo, Economics Library: Call number 50F.2

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Tables

Table 1. *Number of Asian cities in top 30 global cities ranking and Tokyo's rank*

	1500	*1700*	*1825*	*1850*	*1875*	*1900*	*1950*	*2010*	*2030*
Number of Asian cities	17	17	15	13	7	7	7	17	20
Tokyo's rank	-	2	5	6	11	7	2	1	2

Sources: Jedwab and Vollrath, 2015, p. 26; UN Population Division, 2014

Table 2. *Population developments for the various "Tokyo" entities*

	1920	*1930*	*1940*	*1945*	*1950*	*1960*	*1970*
15 wards	1,509,338	2,054,874	2,333,601				
23 wards	3,358,186	4,986,913	6,778,804	2,777,010	5,385,071	8,310,027	8,840,942
Tokyo Metropolis	3,694,003	5,402,936	7,347,610	3,488,284	6,277,500	9,683,802	11,408,071
Agglomeration					11,274,641	16,678,821	23,297,503
15 wards / 23 wards	44.9%	41.2%	34.4%				
23 wards / Tokyo Metropolis	90.8%	92.2%	92.2%	79.6%	85.8%	85.8%	77.5%
23 wards / Tokyo agglomeration					47.8%	49.8%	37.9%

Sources: Tokyo Shi, 1941; TMG, 2010; UN, 2018

Table 3. *The "Tokyo Moment", urban agglomerations doubling their already large populations (> 4 million) in the beginning of each time frame within the next 20 years*

Time frame	*Cities*
1950-1970	Tokyo, Osaka, Los Angeles
1955-1975	Mexico City
1960-1980	Mexico City, Mumbai
1965-1985	Mexico City, Mumbai, Sao Paulo
1970-1990	Mumbai
1975-1995	Mumbai
1980-2000	New Delhi, Shanghai
1985-2005	New Delhi, Shanghai, Dhaka, Beijing
1990-2010	New Delhi, Shanghai, Dhaka, Beijing, Bangalore, Chongqing, Tianjin, Lagos
1995-2015	New Delhi, Shanghai, Dhaka, Beijing, Bangalore, Chongqing, Tianjin, Lagos, Kinshasa, Johannesburg, Guangzhou

2000-2020	Dhaka, Beijing, Bangalore, Lagos, Kinshasa, Guangzhou, Chengdu
2005-2025	Beijing, Hangzhou, Lagos, Kinshasa
2010-2030	Lagos, Kinshasa, Luanda
Total cities	20
Of which Asian	13 (65.0%)

Source: Calculated using data from UN, 2018

Table 4. *Manufacturing employment (share of total) and average establishment size (workers), Japan and Tokyo prefecture, 1951-1972*

		1951	*1954*	*1957*	*1960*	*1963*	*1966*	*1969*	*1972*
Manufacturing labor share	Japan	31.9%	33.0%	34.0%	34.8%	34.8%	33.2%	33.1%	31.7%
	Tokyo	35.9%	36.6%	38.1%	39.5%	36.5%	33.8%	31.6%	28.6%
Average establishment size	Japan	11.2	11.7	13.8	16.2	16.9	17.0	17.1	16.8
	Tokyo	11.7	13.7	16.4	19.9	19.4	18.0	16.9	15.6

Source: Social Research Institute, Cabinet Office, Government of Japan

Table 5. *Manufacturing employment by firm size (share of total), Japan and Tokyo prefecture, 1950-1970*

		1-9	*10-29*	*30-99*	*100-299*	*300+*	*Total*
Japan	1950	21.5%	19.0%	16.9%	42.6%		100.0%
	1955	20.0%	21.5%	18.6%	12.9%	27.0%	100.0%
	1960	14.6%	19.4%	20.4%	15.1%	30.5%	100.0%
	1965	16.1%	17.0%	20.1%	15.6%	31.2%	100.0%
	1970	16.4%	16.3%	18.9%	15.9%	32.5%	100.0%
Tokyo	1951	18.8%	23.3%	21.8%	36.2%		100.0%
	1955	15.9%	24.9%	24.9%	15.4%	18.9%	100.0%
	1960	10.0%	21.2%	25.5%	17.5%	25.8%	100.0%
	1965	16.4%	19.7%	22.5%	15.9%	25.4%	100.0%
	1970	20.7%	19.1%	19.0%	14.6%	26.6%	100.0%

Source: MITI Census of Manufactures, report by industries; Tokyo Census of Industry

Table 6. *Number of manufacturing establishments, index (1960=100%), Japan and Tokyo prefecture, 1950-1970*

	1-9	*10-19*	*20-29*	*30-99*	*100-299*	*300+*	*Total*

Japan	1950	81.7%	53.4%	48.2%	44.1%	44.5%		72.4%
	1955	95.8%	78.7%	69.8%	62.8%	57.1%	61.2%	88.8%
	1960	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	1965	117.2%	104.7%	99.6%	117.1%	126.1%	126.7%	114.6%
	1970	138.7%	124.9%	100.0%	127.2%	151.0%	153.1%	134.1%
Tokyo	1951	90.8%	47.1%		37.0%	30.0%	20.2%	69.3%
	1955	103.1%	73.7%		61.2%	53.2%	45.3%	87.6%
	1960	100.0%	100.0%		100.0%	100.0%	100.0%	100.0%
	1965	173.3%	104.7%		98.8%	100.0%	100.9%	141.5%
	1970	225.6%	102.0%		82.7%	91.5%	97.0%	167.3%

Source: Statistics Bureau; Tokyo Industry Census

Table 7. *Factories and factory employment (share of total) and average firm size by industry, Tokyo prefecture, 1952-1970*

		Total	Sundry	Paper & printing	Heavy ind.	Fabricated metals	Machinery	Electrics, equipment, measuring	Transport equipment	Others
Share factories	1952	100%	39%	10%	7%	13%	8%	10%	4%	9%
	1962	100%	32%	11%	4%	18%	10%	12%	3%	9%
	1970	100%	29%	16%	4%	19%	9%	11%	2%	10%
Share workers	1952	100%	25%	14%	15%	9%	10%	16%	7%	5%
	1962	100%	20%	12%	10%	13%	12%	21%	6%	6%
	1970	100%	19%	17%	8%	12%	11%	22%	4%	7%
Avg. factory size	1952	14.6	9.3	20.4	32.3	10.0	18.2	23.1	22.8	7.7
	1962	23.8	14.9	26.2	53.4	17.2	29.0	40.6	41.7	15.8
	1970	15.5	10.2	15.7	33.5	10.0	17.7	31.4	36.2	10.6

Source: Tokyo Metropolitan Government, Statistical Yearbook

Table 8. *Share in total factory jobs, Tokyo 23 wards, 1952-1970*

	1952	***1955***	***1960***	***1965***	***1970***
Total	100%	100%	100%	100%	100%
Central business wards	12%	12%	10%	10%	11%
Old industrial central wards	26%	26%	23%	23%	22%
Southern industrial	20%	21%	26%	23%	23%
Northern / eastern industrial	31%	29%	29%	31%	31%
Western wards	11%	12%	12%	13%	13%
CoV23	62.7%	62.3%	71.0%	65.3%	62.4%

Theil23	0.1845	0.2203	0.2313	0.2141	0.2018

Source: Tokyo Statistical Yearbook

Table 9. *Average firm size, Tokyo 23 wards, 1952-1970*

	1952	*1955*	*1960*	*1965*	*1970*
Total	14.7	16.3	22.9	17.3	14.0
Central business wards	21.4	24.3	33.3	27.1	23.6
Old industrial central wards	11.6	13.0	16.8	13.0	10.1
Southern industrial	17.5	18.9	29.2	21.0	17.8
Northern / eastern industrial	14.3	15.9	21.8	16.6	12.9
Western wards	15.8	16.9	25.6	19.9	16.3
CoV23	37.9%	40.1%	42.8%	35.9%	35.8%
Theil23	0.0889	0.0727	0.0840	0.0682	0.0682

Source: Tokyo Statistical Yearbook

Table 10. *Capital intensity and profitability metrics, absolute values (million yen) and index (1960=100%), Japan, 1951-1972*

	Capital intensity		*Fixed asset turnover*		*Total labor cost*		*Compensation*		*Value added*	
1951	0.11	19%	1.39	188%	41.1%	93%	0.06	33%	0.16	36%
1954	0.24	41%	1.03	139%	44.7%	101%	0.11	57%	0.25	56%
1957	0.36	61%	0.95	128%	43.2%	98%	0.15	76%	0.34	78%
1960	0.60	100%	0.74	100%	44.2%	100%	0.20	100%	0.44	100%
1963	0.89	150%	0.59	80%	46.0%	104%	0.24	125%	0.53	121%
1966	1.09	184%	0.66	90%	47.9%	108%	0.35	178%	0.73	164%
1969	1.71	286%	0.72	97%	46.8%	106%	0.58	295%	1.23	279%
1972	2.46	413%	0.66	89%			0.86	439%	1.62	367%

Calculation and units: capital intensity = fixed assets / workers (in million JPY); fixed asset turnover = value added / fixed assets; compensation = personnel expenses / workers (in million JPY), total labor cost = personnel expense / value added[36]; value added = valued added / workers (in million JPY)

Source: Information Systems Department, Ministry of Finance, tables 06-13 and 06-12

Table 11. *Capital intensity Japan vs. Tokyo 23 wards, 1970*

	Total	*Sundry industries*	*Paper and printing*	*Heavy industries*	*Fabricated metals*	*Machinery*	*Electric equipment*	*Transport equipment*	*Others*

[36] Net value added corresponds to gross sales - cost of goods sold - excise tax = net sales

<19 workers									
Japan	0.30	0.27	0.28	0.63	0.32	0.43	0.26	0.37	0.24
Tokyo 23 wards	0.26	0.20	0.25	0.38	0.26	0.35	0.34	0.27	0.23
Ratio TYO / JP	86%	73%	89%	60%	81%	82%	135%	73%	94%
20> workers									
Japan	1.92	1.29	2.06	4.89	1.27	1.41	0.91	2.00	1.21
Tokyo 23 wards	1.21	1.13	1.36	1.82	1.09	1.20	0.87	1.20	0.96
Ratio TYO / JP	63%	88%	66%	37%	86%	85%	95%	60%	79%

Source: Census of Manufactures 1970, MITI

Table 12. *Profitability metrics by firm size, index (1960=100%), Tokyo prefecture, 1955-1970*

	Total labor cost (% of net sales)				***Compensation***				***Valued added***			
Workers	**1955**	**1960**	**1965**	**1970**	**1955**	**1960**	**1965**	**1970**	**1955**	**1960**	**1965**	**1970**
5-9	101%	100%	104%		67%	100%			67%	100%		
10-19	98%	100%	104%	110%	74%	100%	228%	456%	77%	100%	219%	414%
20-29		100%	109%	100%		100%	206%	411%		100%	190%	409%
30-99	96%	100%	119%	111%	70%	100%	199%	383%	73%	100%	167%	344%
100-299	99%	100%	109%	105%	77%	100%	189%	362%	78%	100%	174%	346%
300+	98%	100%	104%	99%	81%	100%	172%	336%	82%	100%	165%	340%
Total	99%	100%	109%	104%	71%	100%	196%	382%	72%	100%	180%	366%

Source: Tokyo Metropolitan Government, Industry Census

Table 13. *Profitability metrics by firm size, values, Tokyo prefecture, 1955-1970*

	Total labor cost (% of net sales)				*Compensation (JPYm)*				*Valued added per worker (JPYm)*			
Workers	**1955**	**1960**	**1965**	**1970**	**1955**	**1960**	**1965**	**1970**	**1955**	**1960**	**1965**	**1970**
5-9	48.7%	48.3%			0.12	0.18			0.25	0.37		
10-19	45.8%	47.5%	49.3%	52.2%	0.14	0.19	0.44	0.88	0.31	0.41	0.89	1.68
20-29		45.9%	49.8%	46.1%		0.23	0.47	0.94		0.50	0.94	2.03
30-99	38.3%	40.1%	47.8%	44.7%	0.17	0.24	0.48	0.92	0.44	0.60	1.00	2.06
100-299	34.6%	35.0%	38.1%	36.6%	0.21	0.27	0.51	0.98	0.60	0.77	1.34	2.66
300+	34.5%	35.0%	36.3%	34.6%	0.28	0.35	0.60	1.17	0.82	0.99	1.65	3.39
Total	37.6%	38.2%	41.9%	40.2%	0.19	0.27	0.51	1.00	0.51	0.70	1.22	2.47
CoV	17.8%	15.4%	15.6%	16.7%	33.7%	24.7%	12.4%	12.3%	46.0%	35.5%	26.5%	26.3%

Source: Tokyo Metropolitan Government, Industry Census

Table 14. *Profitability metrics by industry, index (1955=100%), Tokyo prefecture, 1955-1970*

		Total	Sundry industries	Paper and printing	Heavy industries	Fabricated metals	Machinery	Electrics, equipment, measuring	Transport equipment	Others
1955	Compensation (JPYm)	0.17	0.12	0.22	0.22	0.16	0.19	0.18	0.19	0.11
	Labor cost (%)	39%	34%	35%	33%	47%	48%	48%	43%	39%
	Value added (JPYm)	0.45	0.37	0.61	0.68	0.33	0.40	0.38	0.45	0.28
1960	Compensation	152%	169%	152%	138%	151%	157%	135%	148%	174%
	Labor cost	100%	116%	114%	88%	88%	81%	88%	117%	110%
	Value added	153%	146%	133%	158%	171%	193%	153%	127%	158%
1965	Compensation	291%	344%	281%	244%	314%	284%	258%	265%	376%
	Labor cost	108%	127%	115%	93%	103%	101%	92%	111%	107%
	Value added	270%	270%	243%	263%	305%	280%	280%	239%	350%
1970	Compensation	522%	572%	480%	456%	540%	534%	493%	519%	678%
	Labor cost	100%	118%	108%	87%	100%	91%	84%	74%	110%
	Value added	523%	487%	445%	523%	541%	590%	585%	705%	613%

Source: Tokyo Metropolitan Government, Industry Census

Table 15. *Capital intensity and profitability metrics by firm size, Japan and Tokyo prefecture, 1970*

	Capital intensity		Fixed asset turnover		Compensation		Total labor cost		Value added	
	Japan	Tokyo*	Japan	Tokyo*	Japan	Tokyo	Japan	Tokyo	Japan	Tokyo
1-9					0.37	0.59	36.9%	42.2%		
10-19		0.65		2.59	0.62	0.86	42.7%	45.4%	1.45	1.68
20-29	0.93	0.84	1.75	2.41	0.69	0.92	42.4%	43.7%	1.62	2.03
30-99	1.08	0.91	1.59	2.26	0.69	0.91	39.8%	41.7%	1.72	2.06
100-299	1.57	1.27	1.36	2.10	0.75	0.94	35.4%	35.2%	2.13	2.66
300+	2.75	1.68	1.15	2.02	0.98	1.10	31.0%	32.2%	3.16	3.39
CoV	52.3%	32.7%	18.2%	8.0%	28.7%	19.0%	11.9%	12.9%	33.9%	28.4%

**23 wards*
Calculation and units: capital intensity = fixed assets / workers (in million JPY); fixed asset turnover = value added / fixed assets; compensation = cash earnings / workers (in million JPY); total labor cost = cash earnings / value added
Source: for Japan: MITI Census of Manufactures; for Tokyo: Census of Industry

Table 16. *Capital intensity and profitability metrics by firm size, Tokyo 23 wards, 1970*

	10-19	20-29	30-49	50-99	100-199	200-299	300-499	500-999	1000+	Total
Share in total employment	18.5%	8.7%	11.7%	14.3%	11.9%	6.6%	6.7%	7.6%	14.0%	100.0%
Capital intensity	0.65	0.84	0.92	0.90	1.10	1.58	1.75	1.78	1.59	1.14
CoV23	15.4%	21.7%	18.1%	25.3%	27.5%	41.5%	45.1%	38.6%	25.7%	25.1%

Fixed asset turnover	2.59	2.41	2.21	2.30	2.24	1.92	1.83	1.64	2.34	2.17
CoV23	21.9%	27.7%	18.9%	21.5%	36.9%	42.9%	62.6%	38.4%	39.4%	22.2%
Compensation	0.88	0.94	0.92	0.92	0.96	1.00	1.09	1.04	1.28	1.00
CoV23	7.1%	7.1%	7.7%	8.0%	11.5%	18.1%	16.5%	16.2%	25.0%	14.5%
Labor cost	52.2%	46.1%	45.4%	44.1%	38.9%	33.3%	34.1%	35.3%	34.4%	40.2%
CoV23	9.5%	10.6%	7.5%	9.6%	18.6%	28.0%	27.5%	26.6%	38.4%	12.9%

Calculation and units as per above.

Source: Census of Industry, Tokyo Metropolitan Government Statistics Bureau

Table 17. *Mixed-use dwellings, 23 wards, 1963 and 1968*

	1963			***1968***		
	Total	Mixed-use	Share	Total	Mixed-use	Share
	2,023,900	285,000	14.1%	2,367,680	318,100	13.4%
Central business wards	89,500	29,100	32.5%	89,670	21,610	24.1%
Old industrial central wards	258,300	68,900	26.7%	267,610	69,540	26.0%
Southern industrial	349,100	42,700	12.2%	414,830	48,190	11.6%
Northern / eastern industrial	569,800	75,300	13.2%	693,210	88,660	12.8%
Western wards	757,200	69,000	9.1%	902,360	90,100	10.0%
CoV23		67.1%			61.6%	

Source: Housing Surveys 1963 and 1968

Table 18. *Clustering of industries per ward, Tokyo 1952-1970*

	Sundry industries	*Paper and printing*	*Heavy industries*	*Fabricated metals*	*Machinery*	*Electric equipment*	*Transport equipment*	*Others*
1952	Taitō, Sumida, Kōtō, Arakawa	Chiyoda, Chūō, Bunkyō	n/a	Sumida	Ōta	Shinagawa Meguro	Ōta	Sumida, Arakawa, Katsushika
1960	Taitō, Sumida, Kōtō, Arakawa	Chiyoda, Chūō, Shinjuku, Bunkyō	n/a	Sumida, Katsushika	Ōta	Shinagawa Meguro, Ōta	Ōta	Arakawa, Katsushika
1970	Taitō, Sumida, Kōtō, Arakawa	Chiyoda, Chūō, Shinjuku, Bunkyō	n/a	Sumida, Katsushika Ōta	Ōta	Shinagawa Ota	n/a	Arakawa

Calculation method: Proportion of industry's factory numbers in total ward's factory numbers times industry's factory number in ward as a proportion of industry's factory numbers in 23 wards. If the product is greater than 2.5%, the ward is defined as a cluster for this specific industry

Table 19. *Clustering of industries per ward, Tokyo 1952-1970*

		Sundry industries	*Paper and printing*	*Heavy industries*	*Fabricated metals*	*Machinery*	*Electric equipment*	*Transport equipment*	*Others*
1952	CoV23	38.7%	137.1%	60.8%	47.2%	52.0%	73.4%	65.6%	69.0%
	Theil	0.084	0.366	0.154	0.078	0.152	0.355	0.220	0.211
1960	CoV23	37.7%	121.6%	64.9%	51.8%	52.7%	70.5%	68.3%	59.7%
	Theil	0.158	0.452	0.129	0.083	0.139	0.310	0.234	0.141
1970	CoV23	40.7%	94.5%	51.6%	56.5%	66.1%	76.1%	80.0%	45.9%
	Theil	0.111	0.363	0.104	0.076	0.207	0.345	0.328	0.100
	Trend 52-70	*Stable*	*De-clustering*	*De-clustering*	*Stable*	*Clustering*	*Stable*	*Clustering*	*De-clustering*

Source: Tokyo Statistical Yearbook

Table 20. *Investments in land as proportion of fixed assets, 1970, Japan and Tokyo 23 wards*

	Total	*Sundry industries*	*Paper and printing*	*Heavy industries*	*Fabricated metals*	*Machinery*	*Electrics equipment*	*Transport equipment*	*Others*
<19 workers									
Japan	1.6%	1.5%	1.2%	1.7%	2.0%	2.1%	1.7%	1.7%	1.6%
Tokyo 23 wards	1.7%	1.7%	1.5%	2.9%	1.3%	1.7%	1.9%	0.8%	1.9%
Ratio TYO/JP	103%	111%	118%	166%	66%	83%	111%	46%	124%
20> workers									
Japan	1.8%	2.1%	2.1%	1.2%	3.2%	2.5%	2.3%	2.0%	2.4%
Tokyo 23 wards	2.4%	1.9%	2.8%	2.0%	2.3%	2.7%	2.8%	1.8%	3.0%
Ratio TYO/JP	133%	91%	133%	163%	72%	106%	124%	89%	126%

Source: Census of Manufactures 1970, MITI

Table 21. *Percentage of buildings by width of facing street, Tokyo Metropolis*

Construction	*No street*	*<2m*	*2-4m*	*4-6m*	*6m>*	*Average*
Prewar	4.9%	10.3%	34.0%	27.8%	23.0%	4.1
1945-1960	4.1%	8.8%	35.5%	29.5%	22.1%	4.2
1960-1970	3.3%	6.3%	33.9%	33.0%	23.5%	4.4
1971-1975	2.6%	5.0%	28.4%	33.6%	30.3%	4.7
1976-1980	2.2%	4.1%	27.1%	32.7%	33.9%	4.9

Source: TMG, 1993

Table 22. *Educational attainment of population older than 15 years, custom index, Tokyo and Japan, 1950-1970*

	1950	*1960*	*1970*
Total	1.8	2.0	2.2
Central business wards	1.9	2.0	2.4
Old industrial central wards	1.7	1.7	2.0
Southern industrial	1.9	2.0	2.3
Northern / eastern industrial	1.6	1.7	1.9
Western wards	2.1	2.2	2.4
CoV23	14.5%	12.6%	11.0%
Japan			1.9

Source: Population Census, Japan, various years

Table 23. *Labor force employed at home, Tokyo prefecture, 1960*

	All sectors	***Manufacturing***
Total workers	4,549,847	1,729,658
of which: home handicraft	42,836	42,556
Family workers	270,818	88,148
Private business employees working at home	730,997	311,602
Directors working at home	96,540	11,000
Total at home	1,141,191	453,306
% of total	25.1%	26.2%

Source: Tokyo Statistical Yearbook

Table 24. *Quasi households in Tokyo (23 wards), 1950-1970*

	1950	*1955*	*1960*	*1965*	*1970*
Total household members	5,385,071	6,969,104	8,310,027	8,893,094	8,793,123
Quasi household members	171,844	429,957	721,784	788,880	613,057
Quasi HH % of total	3.2%	6.2%	8.7%	8.9%	7.0%
Of which:					
Live-in employees			149,336		39,676
Company dormitory residents			306,058		333,665
Sum			455,394		373,341
Sum (% of quasi HH)			63.1%		60.9%

Source: Population Census, Japan, various years

Table 25. *Cash earnings by type of employment in yen and % of total 23 wards, 1965-1970*

	Salary	*Entrepreneur*	*Salary*	*Entrepreneur*	*Ratio salary/entrepreneur*
			1965		
Total	588,541	577,536	100.0%	100.0%	101.9%
Central business wards	656,408	717,429	111.5%	124.2%	91.5%
Old industrial central wards	531,547	595,666	90.3%	103.1%	89.2%
Southern industrial	596,221	598,138	101.3%	103.6%	99.7%
Northern / eastern industrial	504,619	516,440	85.7%	89.4%	97.7%
Western wards	648,150	589,159	110.1%	102.0%	110.0%
CoV23	14.1%	12.5%			
			1970		
Total	1,011,670	937,796	100.0%	100.0%	107.9%
Central business wards	1,038,794	1,161,966	102.7%	123.9%	89.4%
Old industrial central wards	886,021	980,865	87.6%	104.6%	90.3%
Southern industrial	1,047,298	952,578	103.5%	101.6%	109.9%
Northern / eastern industrial	881,926	868,740	87.2%	92.6%	101.5%
Western wards	1,132,336	944,082	111.9%	100.7%	119.9%
CoV23	12.7%	10.6%			

Source: Tokyo Statistical Yearbook

Table 26. *Consumption expenditure of workers' households, Japan and Tokyo 23 wards 1953-1970*

		1953	*1955*	*1960*	*1965*	*1970*
Consumption (indexed)	Japan	100	100	100	100	100
	Tokyo	110.5	118.9	118.9	120.0	110.3
Of which, food (%)	Japan	45.0%	44.5%	38.8%	36.2%	32.2%
	Tokyo	43.5%	42.3%	37.2%	35.5%	32.4%

Source: Statistical Survey Department, Statistics Bureau, Ministry of Internal Affairs and Communications (20-10-a)

Table 27. *Number of households Japan and by prefecture, 1950-1970*

	1950	*1955*	*1960*	*1965*	*1970*
Japan	16,577,694	17,540,090	19,871,286	23,279,519	27,071,166
Tokyo	1,408,063	1,665,499	2,243,783	2,867,970	3,371,570
Saitama	396,717	416,158	481,489	680,850	973,127
Chiba	405,262	414,710	469,791	621,045	853,318
Kanagawa	515,457	594,707	763,255	1,092,937	1,476,803
Agglomeration, % of Japan	16.4%	17.6%	19.9%	22.6%	24.7%

Source: Statistical Survey Department, Statistics Bureau, Ministry of Internal Affairs and Communications (2-17)

Table 28. *Wholesale statistics, Tokyo prefecture vs. Japan and Osaka, 1952-1970*

		1952	***1960***	***1970***
Density (population / wholesaler)	Tokyo	317	280	260
	Japan	607	413	405
	Osaka	239	214	256
Sales per wholesaler (mln yen)	Tokyo	n/a	146	722
	Japan	n/a	82	345
	Osaka	n/a	197	623
Firm size (average number of employees)	Tokyo	7.9	12.2	15.4
	Japan	6.0	8.5	11.2
	Osaka	8.5	11.8	14.7

Source: METI

Table 29. *Indicators measuring living standards in Tokyo 1945-1970*

Indicator	Category	Trend	Ward variability
tatami per person (overall, owned, rented)	Housing: private living space	Increase (increase, increase)	Lower (lower, stable)
Homeownership	Housing: private living space	Decrease	Stable
Sanitary index	Water and sanitation: private living space	Increase	Lower
Population on less than 3 tatami per person	Substandard housing: private living space	Decrease	Lower
Household consumption of urban luxury items	Urban-specific consumption	Increase	Lower
Stillbirth rate and infant mortality rate	Health: public space	Stable and decrease	Higher and lower
Kindergarten and primary school density	Education: public space	Increase	Stable and lower
Park space and municipal library books	Culture: public space	Increase	Lower
Incidence of crime and fires	Safety: public space	Decrease and increase	Lower

Table 30. *Living space per person (tatami mats), total, 23 wards*

	1950	*1955*	*1960*	*1965*	*1970*
23 wards	2.8	2.9	3.3	4.0	5.0

Central business wards	2.8	3.0	3.7	4.7	5.8
Old industrial central wards	2.4	2.6	3.1	3.8	4.8
Southern industrial	2.8	2.9	3.3	4.1	5.0
Northern / eastern industrial	2.6	2.5	2.8	3.5	4.4
Western wards	3.1	3.2	3.7	4.5	5.5
CoV23	15.1%	13.4%	13.4%	13.3%	11.8%
Theil23	0.0115	0.0142	0.0092	0.0086	0.0066

Source: Population Census

Table 31. *Intra-ward variabilities in per capita living space, 1970*

	Nakano	*Arakawa*	*Bunkyō*	*Ota*
Average tatami p.p.	5.3	4.2	5.5	4.9
Total inhabitants	352,906	232,476	207,580	677,793
Number of chō	85	52	68	198
Average chō *inhabitants*	4,152	4,471	3,053	3,423
CoV chō	10.2%	9.7%	14.1%	21.4%
Theil chō	0.0042	0.0023	0.0071	0.0183

Source: Population Census 1970

Table 32. *Living space per person (tatami mats), owned accommodation, 1950-1970, 23 wards*

	1950	*1955*	*1960*	*1965*	*1970*
23 wards	3.1	3.2	3.8	4.9	6.2
Central business wards	3.5	3.3	4.1	5.3	6.7
Old industrial central wards	2.6	2.8	3.5	4.5	5.6
Southern industrial	3.1	3.3	3.9	5.1	6.3
Northern / eastern industrial	2.7	2.8	3.3	4.2	5.3
Western wards	3.5	3.6	4.3	5.6	6.9
CoV23	17.5%	14.0%	14.0%	13.3%	12.7%
Theil23	0.0145	0.0103	0.0103	0.0096	0.0086

Source: Population Census

Table 33. *Living space per person (tatami mats), rented accommodation, 1950-1970, 23 wards*

	1950	*1955*	*1960*	*1965*	*1970*
23 wards	2.5	2.4	2.6	3.0	3.8

Central business wards	2.7	2.7	3.1	3.9	5.1
Old industrial central wards	2.3	2.3	2.4	2.8	3.5
Southern industrial	2.5	2.4	2.6	2.9	3.7
Northern / eastern industrial	2.1	2.1	2.3	2.7	3.3
Western wards	2.7	2.7	2.9	3.3	4.1
CoV23	12.7%	12.5%	13.2%	14.3%	15.6%
Theil23	0.0079	0.0074	0.0073	0.0073	0.0084

Source: Population Census

Table 34. *Ratio per capita living space rented/owned accommodation, 1950-1970, 23 wards*

	1950	*1955*	*1960*	*1965*	*1970*
23 wards	80.2%	75.9%	68.5%	61.2%	61.2%
Central business wards	76.4%	83.0%	77.1%	73.9%	75.9%
Old industrial central wards	89.0%	80.6%	69.9%	62.1%	62.6%
Southern industrial	81.4%	74.0%	64.9%	57.6%	58.7%
Northern / eastern industrial	78.0%	75.9%	69.9%	64.5%	62.6%
Western wards	78.8%	73.6%	67.4%	58.8%	59.2%
CoV23	10.8%	6.1%	8.2%	9.1%	8.8%

Source: Population Census

Table 35. *Households living in owned accommodation, percent, 1950-1970, 23 wards*

	1950	*1955*	*1960*	*1965*	*1970*
23 wards	51.6%	60.0%	55.3%	49.6%	48.9%
Central business wards	51.3%	61.5%	59.8%	56.8%	56.1%
Old industrial central wards	58.7%	65.5%	59.9%	55.1%	54.5%
Southern industrial	51.8%	59.8%	54.4%	48.7%	47.7%
Northern / eastern industrial	45.9%	56.4%	53.8%	47.7%	47.7%
Western wards	52.7%	60.1%	54.2%	48.5%	47.7%
CoV23	10.4%	6.3%	7.3%	10.7%	12.0%
Theil23	0.0053	0.0018	0.0019	0.0034	0.0040

Source: Population Census

Table 36. *Improvement in living standards, 1963-1968, 23 wards*

	Dwellings equipped with flush toilet	*Dwellings equipped with own bath*	*Share of dwellings with 3 tatami p.p. or less*

	1963	1968	1963	1968	1963	1968
23 wards	34.4%	49.6%	33.8%	39.0%	32.0%	23.1%
Central business wards	94.2%	98.2%	45.8%	53.3%	18.1%	15.5%
Old industrial central wards	70.7%	74.6%	27.1%	32.8%	34.8%	25.7%
Southern industrial	14.9%	27.8%	32.1%	34.9%	32.7%	24.7%
Northern / eastern industrial	25.0%	35.9%	24.8%	33.1%	41.7%	29.6%
Western wards	33.8%	57.9%	41.7%	45.8%	25.1%	17.5%
CoV23	78.3%	54.5%	31.2%	24.7%	31.2%	22.0%

Source: Housing Survey

Table 37. *Household consumption items, 1960-1970, 20 wards (ex Chiyoda, Chūō and Minato)*

	1960	*1965*	*1970*
TVs (per 100 pop)	42.4	64.2	71.1
CoV20	10.2%	8.5%	8.2%
Telephones (per 100 pop)	9.8	15.0	24.0
CoV20	31.1%	26.8%	20.0%
Cars (sedans per 100 pop)	1.2	3.1	7.8
CoV20	38.0%	25.3%	19.9%

Source: Tokyo Statistical Yearbook

Table 38. *Infant health, 23 wards, 1952-1970*

	Still birth rate (per 1,000 live births)					*Infant mortality rate (per 1,000 live births)*				
	1952	1955	1960	1965	1970	1952	1955	1960	1965	1970
23 wards	92.0	105.3	116.5	88.3	66.9	33.4	25.3	20.3	14.5	11.8
Central business wards	99.7	111.1	108.8	74.7	62.2	29.8	18.9	19.3	13.1	13.4
Old industrial central wards	82.7	98.0	118.1	91.6	69.6	34.9	28.5	23.7	14.4	13.4
Southern industrial	89.7	108.6	106.3	75.0	57.2	30.2	22.9	19.9	13.3	11.6
Northern / eastern industrial	85.6	100.4	121.0	90.5	72.2	39.9	31.5	22.1	16.2	11.5
Western wards	103.5	110.8	118.2	92.7	66.0	28.7	19.9	17.7	13.7	11.5
CoV23	14.3%	11.6%	16.3%	20.5%	17.6%	17.9%	25.3%	15.3%	14.5%	12.9%
Theil23	0.0089	0.0057	0.0127	0.0186	0.0156	0.0151	0.0267	0.0117	0.0106	0.0054

Source: Tokyo Statistical Yearbook

Table 39. *Education statistics, 23 wards, 1952-1970*

	Elementary schools per 100,000 inhabitants	*Kindergartens per 100,000 inhabitants*

	1952	1955	1960	1965	1970	1960	1965	1970
23 wards	10.8	10.2	9.4	8.9	9.3	8.9	8.8	10.4
Central business wards	12.6	12.2	12.3	13.2	14.9	14.3	17.5	22.4
Old industrial central wards	10.3	9.1	8.4	9.1	10.1	7.2	7.7	10.8
Southern industrial	10.4	9.5	8.3	8.0	8.3	8.9	8.1	9.5
Northern / eastern industrial	10.8	10.9	9.4	8.7	9.5	6.2	5.8	8.3
Western wards	10.9	10.1	8.6	8.3	7.8	10.6	10.7	11.0
CoV23	12.9%	14.0%	14.9%	24.0%	22.0%	38.2%	47.0%	45.2%
Theil23	0.0062	0.0067	0.0205	0.0108	0.0168	0.0621	0.0781	0.0506
CoV20	10.2%	11.2%	24.6%	10.6%	14.3%	34.7%	37.3%	29.2%
Theil20	0.0052	0.0051	0.0204	0.0053	0.0091	0.0564	0.0626	0.0287

Source: Tokyo Statistical Yearbook

Table 40. *Cultural indicators, 23 wards, 1952-1970*

	Park space (m^2 per capita)					*Municipal library books (per 1,000 inhabitants)*		
	1952	**1955**	**1960**	**1965**	**1970**	**1962**	**1965**	**1970**
23 wards	0.6	0.3	0.5	0.7	0.9	110	145	233
Central business wards	3.3	1.4	1.9	2.2	2.4	421	550	825
Old industrial central wards	0.7	0.4	1.1	1.1	1.4	159	232	354
Southern industrial	0.2	0.3	0.2	0.3	0.5	115	146	227
Northern / eastern industrial	0.3	0.3	0.3	0.5	1.1	67	85	165
Western wards	0.2	0.2	0.4	0.6	0.7	69	101	176
CoV22/21	116.3%	102.4%	111.3%	103.2%	82.0%	61.3%	55.5%	45.9%

Source: Tokyo Statistical Yearbook

Table 41. *Safety statistics, 23 wards, 1952-1970*

	Crime (per 1,000 inhabitants)				*Fires (per 1,000 inhabitants)*				
	1955	**1960**	**1965**	**1970**	**1952**	**1955**	**1960**	**1965**	**1970**
23 wards	28.4	26.1	24.1	21.0	0.5	0.7	0.9	0.8	0.9
Central business wards	71.5	62.8	60.3	54.4	1.1	1.4	1.6	1.6	2.1
Old industrial central wards	38.9	31.4	29.4	23.2	0.6	0.8	1.0	0.9	0.9
Southern industrial	21.6	20.7	21.8	17.8	0.5	0.6	0.7	0.7	0.8
Northern / eastern industrial	19.4	18.4	17.4	15.8	0.5	0.6	0.9	0.8	0.9
Western wards	23.6	25.4	23.4	21.5	0.4	0.5	0.7	0.7	0.8
CoV21	80.3%	73.3%	69.9%	75.8%	52.2%	47.1%	40.5%	45.9%	53.0%
Theil23	0.1878	0.1379	0.1116	0.1220	0.0737	0.0578	0.0439	0.0349	0.0458

Source: Tokyo Statistical Yearbook

Table 42. *Population density, inhabitants per square kilometer, 23 wards, 1945-1970*

	1940	*1945*	*1950*	*1955*	*1960*	*1965*	*1970*
23 wards	10,817	4,431	8,593	11,120	13,260	14,190	14,107
Central business wards	18,686	5,292	11,898	13,365	13,283	11,269	9,793
Old industrial central wards	25,881	4,367	13,590	17,627	19,663	18,979	17,340
Southern industrial	15,199	6,315	11,807	15,805	18,872	19,526	18,873
Northern / eastern industrial	6,186	3,846	7,248	9,216	11,378	13,197	13,495
Western wards	11,053	5,647	8,538	11,414	14,197	15,712	16,232
CoV	61.8%	34.6%	46.6%	44.8%	41.0%	36.8%	33.5%
Theil	0.4160	0.2444	0.2151	0.2083	0.1816	0.1500	0.1316

Source: Tokyo Statistical Yearbook

Table 43. *Road characteristics, 23 wards, 1952-1960*

	Roads (meters per capita)		*Unimproved road share*		*Narrow road share*	
	1952	1960	1952	1960	1952	1960
23 wards	0.6	0.4	37.1%	25.3%	23.8%	33.1%
Central business wards	0.6	0.6	4.2%	1.8%	3.4%	6.1%
Old industrial central wards	0.5	0.4	17.9%	11.1%	11.4%	14.6%
Southern industrial	0.5	0.4	19.8%	15.8%	13.6%	30.3%
Northern / eastern industrial	0.7	0.5	51.6%	39.3%	35.3%	43.2%
Western wards	0.7	0.4	46.4%	27.6%	27.2%	39.0%
CoV23	52.3%	39.7%	62.5%	78.4%	72.8%	54.3%

Note: Narrow roads contain unimproved roads under 4.5 meters width and improved roads between 4.5 meters and 5.5 meters
Source: Tokyo Statistical Yearbook

Table 44. *Road characteristics, 23 wards, 1961-1970*

	Roads (meters per capita)		*Unimproved road share*		*Narrow road share*	
	1961	1970	1961	1970	1961	1970
23 wards	1.2	1.2	46.3%	30.4%	62.5%	53.9%
Central business wards	1.1	1.6	19.0%	3.8%	25.3%	28.0%
Old industrial central wards	0.8	0.9	28.8%	7.8%	34.8%	31.8%
Southern industrial	1.0	1.0	38.1%	36.4%	62.9%	47.0%
Northern / eastern industrial	1.4	1.3	55.3%	29.4%	67.7%	52.9%
Western wards	1.3	1.2	51.4%	41.3%	71.9%	70.2%

CoV21	40.0%	33.7%	38.5%	77.6%	36.8%	41.8%

Note: Narrow roads contain unimproved roads under 4.5 meters width and improved roads below 5.5 meters
Source: Tokyo Statistical Yearbook

Table 45. *Public bath density, inhabitants per sentō*

	1952	***1955***	***1960***	***1965***	***1970***
23 wards	3,537	3,431	3,417	3,348	3,030
Central business wards	3,228	3,153	2,947	2,659	2,233
Old industrial central wards	2,870	2,855	2,866	2,568	2,131
Southern industrial	3,937	3,714	3,699	3,712	3,441
Northern / eastern industrial	3,346	3,232	3,211	3,193	2,901
Western wards	4,093	3,940	3,914	3,933	3,654
CoV	30.1%	19.3%	19.3%	26.5%	32.7%
Theil	0.0252	0.0159	0.0173	0.0356	0.0567

Source: Tokyo Statistical Yearbook

Table 46. *Population per commercial establishment, 1958-1968, 23 wards*

	1958			***1968***		
	Food retail	Furniture	Construction	Food retail	Furniture	Construction
23 wards	166	869	599	168	803	360
Central business wards	138	535	256	112	427	118
Old industrial central wards	151	658	381	137	600	234
Southern industrial	164	886	664	150	760	360
Northern / eastern industrial	173	883	826	178	890	467
Western wards	177	902	688	194	935	526
CoV23	13.3%	21.5%	49.6%	18.1%	26.2%	59.1%
Theil23	0.0063	0.0232	0.1104	0.0131	0.0389	0.1405

Source: Commercial Census, Tokyo

Table 47. *Population per restaurant, 23 wards, 1960-1970*

	1960	*1970*
23 wards	247	152
Central business wards	86	53
Old industrial central wards	204	144
Southern industrial	277	169
Northern / eastern industrial	378	196

Western ward	286	151
CoV23	50.2%	52.2%
Theil23	0.2402	0.2164

Source: Tokyo Statistical Yearbook

Table 48. *Construction starts, 23 wards, 1960-1970*

	Wood ratio (buildings)		*Wood ratio (m²)*		*Wood cost/m²*	
	1960	**1970**	**1960**	**1970**	**1960**	**1970**
23 wards	89.8%	70.7%	57.1%	23.0%	10.7	32.4
Central business wards	67.7%	24.9%	15.5%	2.4%	11.9	36.4
Old industrial central wards	85.1%	54.8%	55.6%	15.5%	10.7	30.2
Southern industrial	91.6%	72.1%	67.7%	21.4%	10.4	32.8
Northern / eastern industrial	92.0%	77.7%	70.6%	37.1%	10.3	30.6
Western wards	93.2%	75.0%	65.8%	28.4%	11.1	34.0
CoV23	12.7%	32.6%	34.2%	60.9%	5.7%	7.0%
CoV21	5.3%	19.7%	21.0%	50.7%	5.0%	6.5%

Source: Tokyo Statistical Yearbook

Table 49. *Metropolitan tax raised, per capita, 1952-1970, yen*

	1950	***1955***	***1960***	***1965***	***1970***
23 wards	3,201	6,928	14,428	25,224	60,617
Central business wards	14,847	40,184	106,801	224,733	644,452
Old industrial central wards	3,689	5,791	11,402	22,331	51,992
Southern industrial	1,942	6,849	14,921	20,187	46,952
Northern / eastern industrial	1,399	2,481	4,630	8,532	19,882
Western wards	1,899	3,065	5,497	13,092	30,505
CoV23	61.3%	78.1%	92.2%	88.9%	105.4%
Theil23	0.4927	0.7409	0.9391	0.8996	1.0329

Source: Tokyo Statistical Yearbook

Table 50. *Ward tax raised, per capita, 1949-1970, 23 wards, yen*

	1949	*1954*	*1959*	*1966*	*1970*
23 wards	352	1,308	1,856	7,147	12,135
Central business wards	761	1,804	2,930	15,989	29,549
Old industrial central wards	398	1,145	1,408	7,403	13,089
Southern industrial	299	1,621	2,231	7,825	13,149

Northern / eastern industrial7	224	962	1,023	4,428	7,662
Western wards	345	1,379	2,309	7,650	12,826
CoV23	54.5%	27.3%	42.4%	52.0%	60.1%
Theil23	0.100	0.031	0.083	0.063	0.074

Source: Tokyo Statistical Yearbook

Table 51. *Ward expenditure vs. TMG general account, 1949-1970, million yen*

	1949	*1954*	*1959*	*1961*	*1966*	*1970*
Ward expenditure	4,860	18,579	33,135	52,824	112,017	210,406
TMG general account	31,084	95,600	158,558	266,253	509,704	991,796
Share	15.6%	19.7%	21.3%	22.9%	23.9%	24.3%
Ward tax revenue	1,871	9,882	15,899	24,508	70,493	116,706
TMG tax revenue	16,206	47,110	96,024	151,701	255,931	548,219
Share	11.5%	21.0%	16.6%	16.2%	27.5%	21.3%
Ward revenue / exp.	38.5%	53.2%	48.0%	46.4%	62.9%	55.5%
TMG revenue / exp.	52.1%	49.3%	60.6%	57.0%	50.2%	55.3%

Source: Tokyo Metropolis Municipal Finance Statements, Tokyo Statistical Yearbook

Table 52. *Ward income versus transfers, per capita, 23 wards, 1949-1970, yen*

	1949		***1954***		***1959***		***1966***		***1970***	
23 wards	453	450	1,808	822	2,570	1,417	8,751	3,846	14,911	8,890
Central business wards	958	230	2,603	663	4,817	1,181	19,861	1,386	34,806	3,228
Old industrial central wards	478	333	1,524	651	2,363	1,346	9,094	3,217	17,108	9,920
Southern industrial	407	472	2,216	787	2,756	1,301	9,508	2,293	16,034	5,241
Northern / eastern industrial	297	592	1,256	1,083	1,596	2,042	5,674	6,988	9,952	15,704
Western wards	448	443	1,978	758	2,896	1,067	9,144	2,616	15,219	5,342
CoV23	50.6%	35.3%	31.5%	38.5%	45.6%	44.2%	54.1%	64.4%	58.3%	64.3%
Theil23	0.087	0.051	0.039	0.066	0.070	0.091	0.067	0.165	0.067	0.177

Source: Tokyo Metropolis Municipal Finance Statements

Table 53. *Ward-level total expenditure and education spending, per capita, 23 wards, 1949-1970, yen*

	1949		*1954*		*1959*		*1966*		*1970*	
23 wards	901	412	2,666	1,250	3,987	1,965	12,597	3,886	23,809	7,524
Central business wards	1,188	432	3,373	1,257	5,997	2,362	21,246	7,351	38,199	10,872
Old industrial central wards	811	334	2,175	952	3,708	1,954	12,311	3,881	27,028	8,227
Southern industrial	879	451	3,163	1,593	4,057	2,037	11,802	3,414	21,275	6,832

Northern / eastern industrial	885	400	2,338	1,241	3,638	2,049	12,662	4,154	25,656	8,875
Western wards	891	435	2,736	1,224	3,964	1,793	11,760	3,384	20,561	6,089
CoV23	13.6%	23.2%	15.4%	20.7%	11.5%	22.4%	9.4%	16.4%	15.9%	20.4%
Theil23	0.012	0.025	0.015	0.023	0.014	0.021	0.017	0.032	0.021	0.023

Source: Tokyo Metropolis Municipal Finance Statements

Table 54. *Municipal financial aid recipients, share of households, 23 wards, 1952-1969*

	1952	*1955*	*1960*	*1965*	*1969*
23 wards	3.7%	3.7%	2.5%	1.8%	1.8%
Central business wards	2.3%	2.2%	1.5%	1.1%	1.0%
Old industrial central wards	3.1%	3.6%	2.5%	2.0%	2.4%
Southern industrial	3.4%	2.9%	1.7%	1.3%	1.2%
Northern / eastern industrial	5.2%	5.6%	3.8%	2.8%	2.7%
Western wards	3.5%	3.2%	2.0%	1.4%	1.3%
CoV23	40.3%	38.5%	41.0%	44.9%	58.7%
Theil23	0.0624	0.0695	0.0799	0.0881	0.1234

Source: Tokyo Statistical Yearbook

Table 55. *Metropolitan housing, share of households, 23 wards, 1962-1970*

	1962	*1965*	*1970*
23 wards	2.3%	2.4%	3.9%
Central business wards	2.3%	2.7%	3.1%
Old industrial central wards	1.6%	1.7%	5.2%
Southern industrial	0.6%	0.6%	1.1%
Northern / eastern industrial	3.8%	4.1%	7.2%
Western wards	2.3%	2.1%	2.4%
CoV23	78.6%	83.5%	95.9%
Theil23	0.2661	0.2978	0.3523

Source: Tokyo Statistical Yearbook

Table 56. *Land readjustment statistics by initiating body, Tokyo, 23 wards, 1977*

	In process		*Completed*		*Total*	
	Districts	Area (ha)	Districts	Area (ha)	Districts	Area (ha)
Individual	1	2			1	2
Association	30	2,028	23	646	53	2,674
TMG	3	583	1	20	4	603
Administrative agency	1	19	10	108	11	127

War-damage reconstruction	3	137	26	938	29	1,075
National institutions (JHC)			2	432	2	432
Total since 1945	38	2,769	62	2,144	100	4,913
1923-1930 reconstruction			65	3,116	65	3,116
Total since 1923	38	2,769	127	5,260	165	8,029

Source: TMG, 1977

Table 57. *Road characteristics, 23 wards, Tokyo, 1961-1970*

	Unimproved road		*Narrow road*		*Narrow improved / narrow*	
	1961	1970	1961	1970	1961	1970
23 wards	46.3%	30.4%	62.5%	53.9%	26.6%	52.5%
Central business wards	19.0%	3.8%	25.3%	28.0%	24.8%	88.1%
Old industrial central wards	28.8%	7.8%	34.8%	31.8%	17.7%	78.3%
Southern industrial	38.1%	36.4%	62.9%	47.0%	39.8%	42.2%
Northern / eastern industrial	55.3%	29.4%	67.7%	52.9%	19.8%	62.8%
Western wards	51.4%	41.3%	71.9%	70.2%	28.8%	44.7%
CoV23	38.5%	77.6%	36.8%	41.8%	47.7%	45.4%

Source: Tokyo Statistical Yearbook

Table 58. *Towards a comparative-historical research approach to the Asian megacity*

City	*Period*	*Compound annual urban agglomeration's population growth*	*Manufacturing employment (at peak)*	*Political structure and territorial organization*	*Compound annual GDP per capita growth, national (1990 Int Geary-Khamis USD)*
Tokyo	1945-1970 (dissertation observation period)	3.7% (1950-1970)	39.5% (1960, p. 45)	Popularly-elected metropolitan government with status of prefecture (TMG)	8.2%
Taipei	1962-1987 (25 years before democratization)	4.5% (1960-1985)	24.1% (1971)	Centrally-appointed municipality	7.4%
Seoul	1963-1988 (Third Republic until Summer Olympics)	4.6% (1965-1990)	26.2% (1987, Rep. of Korea)	Centrally-appointed metropolitan government	7.3%
Shanghai	1979-2004 (Deng Xiaoping reforms)	4.3% (1980-2005)	44.3% (2000)	Directly-controlled municipality (status of province)	6.6%
Mumbai	1990-2015 (most recent period)	1.8%	35.3% (1991)	Popularly-elected municipal government (Municipal Corporation of Greater Mumbai)	4.9%*

*Sources: UN Population Division, 2018; Government of Taipei, 2002; Bank of Korea, 1988; National Bureau of Statistics China, 2000; Singh, 2010; Maddison, 2010; *World Bank Data, 2018*

Table 59. *Manufacturing employment before and after the 1923 Great Kanto Earthquake*

	1922	***1923***	***1936***	***Growth 22-36***
Total	183,521	119,012	376,718	105.3%
Total damaged	85,809	26,361	115,253	34.3%
Total undamaged	97,712	92,651	261,465	167.6%
Damaged share	46.8%	22.1%	30.6%	
Undamaged share	53.2%	77.9%	69.4%	

Source: Adapted from Imaizumi et al., 2016, p. 58

Table 60. *War devastation by ward and postwar building recovery*

	Buildings (1941=100%)		*Population (1940=100%)*	
	Aug 1945	1955	Nov 1945	1955
23 wards	41.5%	102.5%	41.0%	99.0%
Central business wards	29.5%	86.6%	28.3%	71.5%
Old industrial central wards	17.2%	66.2%	16.9%	68.1%
Southern industrial	40.3%	104.6%	41.6%	104.0%
Northern / eastern industrial	66.4%	126.7%	62.2%	115.4%
Western wards	54.3%	133.5%	51.1%	123.8%

Source: Adapted from TMG, 1956

Table 61. *Manufacturing employment prewar / postwar comparison, 23 wards*[37]

	*1940**		*1948*		*1955*		*1960*	
	FW/Pop	FW/Total	FW/Pop	FW/Total	FW/Pop	FW/Total	FW/Pop	FW/Total
23 wards	9.8%	100%	7.6%	100.0%	9.5%	100.0%	13.6%	100.0%
Central business wards	8.7%	10.0%	9.1%	11.3%	14.7%	12.2%	19.8%	9.5%
Old industrial central wards	9.3%	23.1%	10.9%	21.4%	14.6%	24.9%	20.7%	23.0%
Southern industrial	18.0%	31.0%	10.4%	22.8%	12.0%	21.8%	20.8%	26.2%
Northern / eastern industrial	11.8%	26.5%	9.1%	32.4%	10.6%	29.0%	14.9%	29.1%
Western wards	3.6%	9.3%	2.9%	12.0%	3.5%	12.1%	4.8%	12.1%
CoV23	64.1%		66.3%		57.9%		55.3%	
Theil23	0.2066		0.1887		0.1717		0.1723	

** There is no data for Nerima as it was part of Itabashi until 1947; FW: Factory worker, Pop: Population*

[37] All figures are for factories with more than 5 (1940 and 1948) or 4 workers (1955), respectively. This leaves out a substantial number of factories, primarily in the more traditional *shitamachi* districts but does not affect overall employment figures substantially.

Sources: Tokyo Shi Annual Statistics, Tokyo Statistical Yearbook

Table 62. *Ward groupings*

TMG's ward groupings		Ward groupings used in this dissertation	
Tōshin	Chiyoda, Chūō, Minato, Bunkyō, Toshima, Shinjuku, Shibuya	***Central business wards***	Chiyoda, Chūō, Minato
Jōsai	Nerima, Suginami, Nakano, Setagaya	***Old industrial wards***	Bunkyō, Taitō, Sumida, Kōtō
Jōhoku	Itabashi, Kita	***Southern industrial wards***	Shinagawa, Meguro, Ōta
Jōtō	Adachi, Arakawa, Taitō, Kōtō, Sumida, Katsushika, Edogawa	***Northern and eastern industrial wards***	Kita, Arakawa, Itabashi, Adachi, Katsushika, Edogawa
Jōnan	Shinagawa, Meguro, Ōta	***Western wards***	Shinjuku, Setagaya, Shibuya, Nakano, Suginami, Toshima, Nerima

Table 63. *Theil index element calculation example for Chiyoda ward in 1970*

A	B	C	D
Population share Chiyoda in total ward population	Average *tatami* per person / 23-ward wide average *tatami* per person	ln (Chiyoda *tatami* per person average / 23-ward wide *tatami* per person average)	Theil element
= 61,277 / 8,187,560	= 5.90 / 5.02	ln (5.90 / 5.02)	D=A*B*C
0.0075	1.1753	0.1615	0.0014

Table 64. *Gini coefficient calculation example for Chiyoda and Chūō wards in 1949*

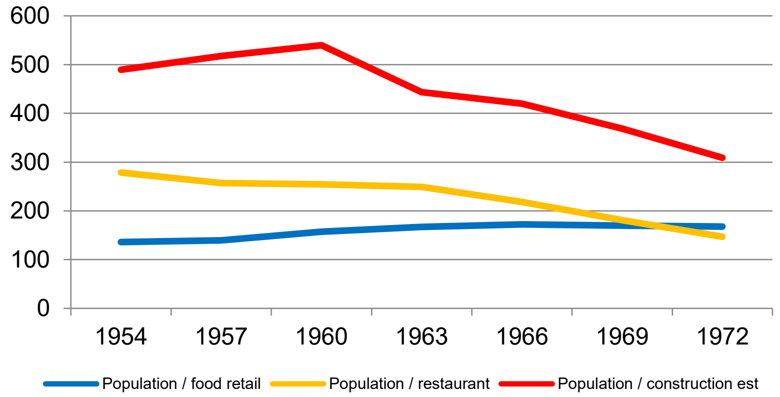
A	B	C	D	E	F	G
Chiyoda						
Share of pre-redistribution total 23 ward income (million yen)	Share in total number of wards	Cumulative share of income	Cumulative share of wards	Sum of C and C of previous ward	D minus C of previous ward	Product of E and F
= 1,155 / 11,340	= 1 / 23					0.0584*0.0435
0.1019	0.0435	0.1019	0.0435	0.1019	0.0435	0.004431
Chūō						
1,061 / 11,340	= 1 / 23	= 0.1019 + 0.0936	= 0.0435 + 0.0435	= 0.1955 + 0.1019	= 0.8695 – 0.0435	= 0.2974*0.0435
0.0936	0.0435	0.1955	= 0.8696	= 0.2974	= 0.0435	= 0.0129
					…	

					Gini coefficient	**ABS $(1 - \sum G)$**

ABS: Absolute number

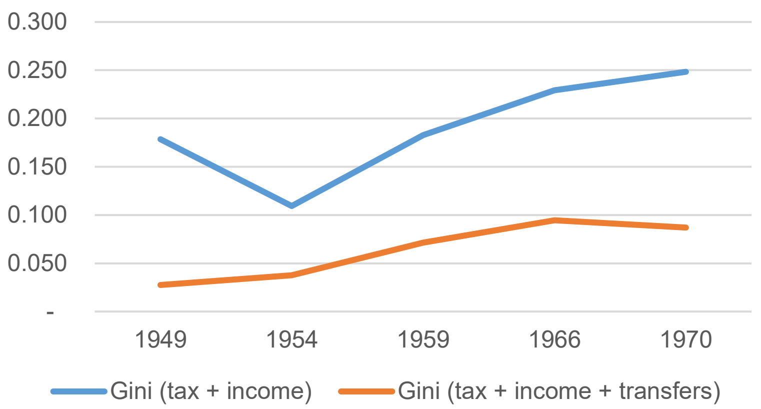
Graphs

Graph 1: Density of retail establishments, restaurants and construction establishments, Tokyo prefecture, 1954-1972



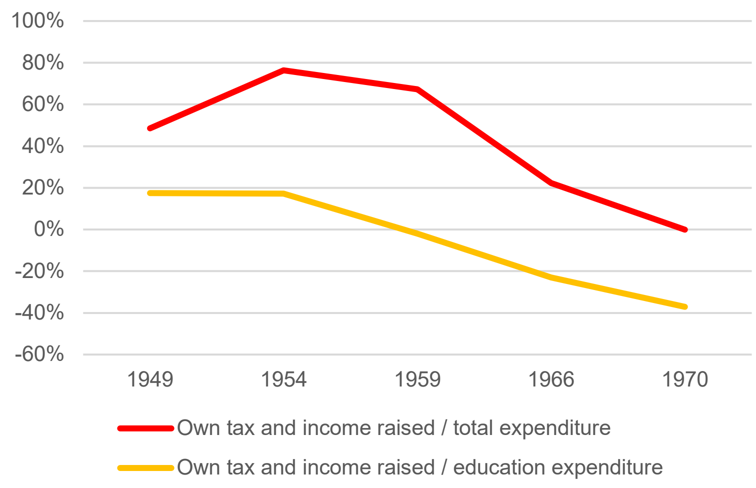
Source: Tokyo Statistical Yearbook

Graph 2: Per capita ward revenue with and without transfers, Gini, 1949-1970



Source: Tokyo Metropolis Municipal Finance Statements

Graph 3: Correlation of ward budget items, per capita, 20 wards



Source: Tokyo Metropolis Municipal Finance Statements