Report on Ph.D. Thesis Defense

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1. Abstract

I-1 Objectives and findings

Why Thailand lagged behind Japan in entering the “epoch of modern economic growth” in the definition of Simon Kuznets (1966) in spite of their similar initial conditions in the mid-19th century has been one of the major puzzles in the modern history of East Asia. This study aims to shed light on this question from the aspect of the interactions between education and natural resource endowments. The basic hypothesis tested in this study is that Thailand, which was traditionally endowed with abundant natural resources relative to Japan, has felt it less compelling to increase the productivities of the resources for surviving in international competition and, hence has had smaller incentives to invest in education as a key variable for promoting agricultural intensification and industrialization beyond the scope of traditional rice farming.

This study tries to test this hypothesis by means of both the documentation of institutional changes in the course of economic development and an econometric analysis based on newly prepared long-term time-series data. Korea, in addition to Japan and Thailand, is included in the comparison as it represents a case characterized by meager natural resource endowments similar to Japan and has achieved better educational and economic developments than Thailand after World War II. While the quantitative analysis will mainly pertain to the period after World War II, the study of institutions that influenced educational development and economic changes in these

countries, particularly Thailand and Japan, will cover the period from the latter half of the 19th century when both countries began to actively participate in trade with Western nations.

Entering into international trade at the same time under different endowments of natural resources, Thailand and Japan experienced different patterns of economic growth involving different institutional changes in the late 19th and early 20th centuries. Throughout those years, rice cultivation based on traditional technologies was the major source of food and income for Thailand, and its educational development objective in the late 19th century did not extend beyond the purpose of training a limited number of top elite for staffing government offices under the king. Mass education was not promoted until the early 1920s, and an overall economic development policy was not initiated until the early 1960s.

Unlike Thailand, Japan, under strong population pressure on limited land resources, has had to promote modern economic growth based on productivity improvements in agriculture and industry since the Meiji Restoration. Meiji Japan invested heavily in building modern economic institutions including education and research in support of modern economic growth. It began to promote mass education in the early 1870s.

An econometric test by applying the cointegration and error correction regression models on pooled time-series data of Thailand, Japan, and Korea confirms the negative effects of land resource endowments on educational investment, agricultural intensification, and industrialization. It also confirms the positive effects of the educational stock on agricultural intensification and industrialization. These results imply that Thailand failed to effectively mobilize the incomes generated from the exploitation of natural resources for investment in physical and institutional infrastructure including education and research. Such investments are critically important for bringing about modern economic growth involving the processes of agricultural intensification and industrialization.

Thailand, however, did not entirely neglect investment in education and other infrastructure for modern economic growth during its vent-for-surplus development stage. Though much slower than in Japan, by the 1970s, Thailand's stock of education as measured by the average number of years of schooling per person in the working-age population had reached the level of Japan in the 1920s, which could well be sufficient to support the spurt of labor-intensive industries. It is most likely that accumulated investment in education since the vent-for-surplus stage had prepared an important condition for Thailand to join in the East Asian Miracle in the recent three decades.

Yet, it is also very likely that, if Thailand had used its incomes obtained from the

exploitation of natural resources more efficiently, its entry into epoch of modern economic growth would not have lagged so far behind Japan. Thailand's experience in the late 19th and early 20th centuries seems to imply that today's developing countries endowed with abundant natural resources will not be able to achieve sustainable economic growth unless they effectively mobilize incomes generated from the exploitation of their abundant natural resources for investment in education and research, among others, to support agricultural intensification and industrialization.

I-2 Organization

This dissertation is organized as follows:

Chapter 1 Introduction

Chapter 2 Theoretical framework

Chapter 3 Data sources and estimation procedures

Chapter 4 Historical overview of educational and economic developments in Thailand compared with Japan and Korea

Chapter 5 Econometric tests

Bibliography

Appendix

Chapter 1 specifies the objectives and approaches of the dissertation.

Chapter 2 discusses the theoretical issues concerning the importance and determinants of educational development for long-term economic growth through detailed review of the relevant literature. This chapter argues that educational development plays a vital role in economic development because it enhances people's information processing ability, which is important not only for workers to perform a certain task more effectively using a given technology, but also for facilitating development and the adoption of new technologies. However, educational development is a complicated process with its scale and speed affected by various factors including social environments and resource endowments. Two countries with similar social environments but different natural resource endowments may have different timing in accelerating investment in education for entering modern economic growth characterized by productivity improvements in both agriculture and industry. The chapter will also postulate basic hypotheses on the effect of abundant natural resource endowments on the lag of Thailand relative to Japan and Korea in entering the "epoch of modern economic growth" in the Kuznets definition.

Chapter 3 is devoted to explaining the data sources and the procedures of preparing

the data of macroeconomic statistics such as GDP, population, and labor force as well as the data on educational investment and educational stock in Thailand. GDP will be measured in 1990 US dollars in terms of purchasing power parity and labor force in employed persons in the working-age population (the 15-64 year-old population). School enrollment ratio in the school-age population (the 6-20 year-old population) and school enrollment ratios by different levels of education will be used as proxies of investment in education, whereas the average number of years of schooling per person in the working-age population will be used as a proxy of the educational stock. This chapter also explains the sources of data for the proxies of natural resource endowments, agricultural intensification, and industrialization in the three countries under study.

Using historical documents together with the data prepared in Chapter 3, Chapter 4 compares among Thailand, Japan, and Korea in terms of their natural resource endowments, economic and educational developments since the late 19th century in order to provide a concrete historical perspective on the hypotheses to be tested in Chapter 5. The comparison involves different policy choices that caused different economic and educational developments in these three countries. It is confirmed that Thailand has been more favorably endowed with land resources, while its economic growth involving the processes of agricultural intensification and industrialization as well as educational development have been slower compared with those of Japan and Korea. These descriptive statistics provide intuitive support for the hypothesis that Thailand's slower economic development compared with Japan and Korea has been largely due to its slower educational development induced by its more abundant endowments of land resources. This hypothesis implies that abundant land resource endowments have a negative effect on educational investment, resulting in slower growth in the stock of education that is crucial for modern economic growth. Abundant land endowments may also impede modern economic growth directly because they may give a negative incentive on the provision of public support other than education for agricultural and industrial productivity improvements.

Chapter 5 attempts econometric analyses of the three operational hypotheses emerging from the discussions in the previous chapter. The cointegration and error correction regression models applied on pooled time-series data of Thailand, Japan, and Korea are used to test the following three operational hypotheses: (1) land resource endowments have a negative effect on educational investment, (2) educational stock has a positive effect on agricultural intensification, while land resource endowments give a negative incentive on the provision of public support other than education for agricultural intensification, and (3) educational stock has a positive effect on

industrialization, but land resource endowments give a negative incentive on the provision of public support other than education for industrialization. The regression results confirm these hypotheses.

Chapter 6 concludes the study and provides some policy implications.

2. Result /Notes from the Examining meeting / Final Evaluation

この論文は、19 世紀中ごろから西欧列強の圧力の下に開国を迫られたタイと日本とを比較して、種々の条件において類似した 2 国のうち、なぜ近代的経済発展においてタイが日本に比して大きな遅れをとったかという東アジア近代史の大問題に答えを与えようとする野心的な試みである。

タイと日本は、(1) 伝統的に稲作を中心とする経済であり、(2) 文化的には仏教を共有し、(3) ほぼ同じ時期に西欧から通商を迫られながら、(4) 植民化から免れることができ、(5) 立憲君主制の下に近代化の道を歩んできた。このような多面的な類似性にもかかわらず、サイモン・クズネッツが定義した「科学知識を生産活動に応用することによって国民 1 人当たり平均所得の継続的な増加を実現する」ことを特徴とする近代経済成長 (Modern Economic Growth) に入るにあたってタイが一世紀近くも日本に遅れたのはなぜだったのか。

本論文は、その原因を天然資源、なかんずく農耕可能な土地の賦存量の差に求める。すなわちタイには耕作可能な土地が大量に存在し、人口増加につれ、伝統的な耕作方法のままで耕作面積を拡大し、食糧の国内需要を満たすのみか、海外に輸出して国にとって必要な外貨を稼ぐことができた。そこでは農耕技術の近代化や工業化を推進する必要性は強く感じられなかったであろう。その点において、タイは開国の時期から耕作面積を拡大する余地に乏しかった日本とは大きく異なり、したがって農業の近代化や工業開発への努力において日本に遅れを取ったと考えられる。

この仮説の妥当性は、韓国を比較に加えることによって強化される。韓国は日本によって植民地化されたという不利な条件にもかかわらず、第 2 次大戦後独立を果たしてからの経済成長はめざましく、タイをはるかに上まわる高所得水準を達成した。この差をもたらした要因のひとつとして、日本とならび土地賦存において不利であった韓国において農業近代化や工業化の必要性がタイにおけるよりはるかに高かったからであると考えるのは不自然ではなからう。

以上の基礎仮説を検証するため、本研究はタイにつき、日本および韓国と比較可能な形で、1885-1995 年にわたる長期時系列資料を整備し、計量経済学的分析をおこなった。天然資源賦存の豊富さが経済成長に不利に働くとする仮説は新しいものでもなく、それについての計量分析もおこなわれてきた。しかしこれまでの研究はすべて 1 時点における多国間横断面 (cross-section) 資料にもとづく分析であり、資源賦存の多い国の成長率が低いと

いう傾向は確認できて、どのような過程を通して資源賦存のマイナス効果が実現したかは分析されなかった。

本研究の時系列的分析は、この点で大きな独創性を持つ。すなわち、資源賦存量という変数と農業近代化や工業化を代表する変数との間に教育と言う変数を入れて分析する。クズネッツの定義による近代経済成長の特徴は科学知識の生産過程への応用であり、その基礎は学校教育に基づく人的資本（human capital）の増加にあることは明らかであろう。そこで本研究は、まず学校教育に対する投資の指標として就学率を選び、これと土地資源賦存量の指標との回帰式を推定して土地賦存の豊富さが教育に対する投資を減退させる傾向を確認する。さらに過去の就学率を累積することによって求められる国民1人当たりの平均就学年数を農業近代化および工業化の指標とに回帰させ、前者の後者に対する効果がプラスで統計的に有意であることを明らかにした。かくしてタイにおける土地賦存の豊富さが日本や韓国に比して低位な教育投資をもたらし、それにもとづく人的資本形成の遅れが、近代経済成長への参加を遅らせたという因果関係の連鎖が統計的に確認されたわけである。

これら計量経済分析に用いられたモデルはきわめて簡単なものであるが、サンプル数が限られ、過去に遡るほど観測誤差の大きい長期時系列データに対しては適切であり、その結果は頑強性（robustness）を持つと考えられる。また単純なモデルながら、その推定には先端的な時系列分析の手法が適切に応用されている。さらに強調すべきは、本研究が過去約1世紀にわたる期間について、日本や韓国と比較可能な形でタイの時系列データを作成した点である。統計の整備に遅れた途上国につき、その作業はきわめて困難であり、その成果としてまとめられた data appendix は今後世界の多くの研究者にとってきわめて貴重な分析素材となるであろう。

以上をまとめれば、本研究は（1）東アジア近代史における重要な疑問点の解明を目指し、（2）タイにつき日本と韓国と比較可能な長期的時系列データを作成し、（3）単純ながら頑強なモデルを先端的な手法で推定し、（4）タイがその相対的に豊富な土地資源に恵まれていたがゆえに教育投資につき相対的に不熱心であり、その結果として近代経済成長において日本や韓国の遅れることとなった過程を明らかにした点において、きわめて大きな学術的貢献であると思われる。この評価は、本論分の要約版が、すでにアジア経済研究における有力な国際的学術誌 *Journal of Asian Economics*（オランダの Elsevier 社刊行）の審査をパスし、掲載予定になっていることによっても裏付けられている。

最後に、本研究の国際開発政策に対する貢献について一言を加えよう。元来、ある国の天然資源が豊富であることは、その国の発展にとって有利な条件なはずである。現在でも、アジアのカンボジアやラオス、あるいは東アフリカや中南米の多くの国々は、人口に比して豊富な天然資源の開発を通じて発展する余地は大きい。だが、天然資源は開発すればやがて涸渇するもので、それに頼ってはいは経済成長は永続しない。本研究の示すところは、タイのように資源の豊富な国は、その発展の初期において資源開発からもたらされる収入（一般に resource rent と呼ばれる）を教育をはじめとする近代経済成長に必要なインフラ

整備に対して有効に投資してこそ、急速にして永続的な発展が保証されるのである。本研究の政策的含意は正にこの点にあるといえよう。

以上によって、審査委員会は、本論文を理論及び政策分析の双方において博士論文にふさわしい学問的業績であると結論する。