



Essays on Impact Evaluations of Land Consolidation Program in Vietnam

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Abstract

This dissertation evaluates the impact of a land consolidation program (LCP) using a case study of two provinces in rural Vietnam. Under this program, local governments followed a collective and centralized approach, in which many farm households simultaneously exchanged plots based on the top-down government plan.

In the first main chapter (Chapter Three), I examine the economic and social impacts of the LCP using five-wave household panel data from the Vietnam Access to Rural Household Survey (VARHS 2010-2018). I use a sample of more than 700 farm households, of which 40% participated in the plot exchange started in late 2012, and employ a Difference-in Differences (DID) approach. Empirical results suggest that the LCP promoted technology adoption, reduced on-farm labor inputs, and increased migration. However, there is no program impact on land investment, land transfer, and land productivity. In addition, the program led to a significant reduction in land use right certificates (LURC) from 2012 to 2018. Specifically, households lowered approximately 50% LURC share in the first four years; and about 25% in the sixth year since the program started. Moreover, the regression results suggest that households reduced collective action in farming and mutual trust with people within the community. The decline in land tenure security and social capital may have some implications for the program impacts. The results are robust using alternative approaches such as DID with propensity score matching; and DID with multiple time periods, which was developed by Callaway and Sant'Anna (2021).

In the second main chapter (Chapter Four), I investigate if political connections play a role in this land consolidation program. I define household's political connections

by identifying whether any relative living outside the household works in a bureaucratic position with political power. Using the four latest rounds of the VARHS 2012-2018, I found that political connections neither affected the program selection process nor the progress of obtaining LURC. The households participating in the LCP reduced the LURC share regardless of their political connection status to a similar extent (approximately 40 percentage points). In addition, there is no evidence that connected households achieved higher agricultural productivity than those unconnected.

The dissertation provides some policy implications for policy makers in designing the land consolidation program, specifically, improving land tenure security as the key factor for farmers so as to fully exploit the potential benefits of land consolidation in agricultural production.

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Chapter One

Introduction

1.1. Overview

Land fragmentation is a phenomenon that is commonly observed in many countries such as Japan, China, Taiwan, India, and Vietnam, where farm households tend to operate multiple small and scattered farm plots. According to this, land fragmentation is defined as the division of farmland into many small and dispersed plots owned by a single farm household. The main cause of land fragmentation could be land reform, population growth, and equal inheritance practices among siblings (Ali et al., 2019). To be specific, due to national land reform in some countries, collective farmlands were divided into numerous plots and distributed to individual farm households, leading to land fragmentation. In addition, high population density and the number of children per household also put pressure on land. Once the children get married and have their own families, it is expected that parents will give part of their land to their children. Therefore, big household size may be associated with the degree of fragmentation.

Land fragmentation raises production costs such as travel costs between plots and monitoring costs of dispersed plots. Moreover, it prevents farmers from using machine and, hence, fails to utilize the economy of scale, which negatively affects land-use efficiency and agricultural growth (Hung et al., 2007, Kawasaki, 2010; Kompas et al., 2012, Nguyen and Warr, 2020; Tran and Vu, 2021, Tran et al., 2022). Thus, it is important to understand the multi-faced influence of land fragmentation and find the most suitable solutions to tackle the problem.

Land consolidation, which is defined as restructuring fragmented plots to form a larger plot, has often been suggested as a good instrument to deal with land fragmentation. Empirical evidence has documented numerous positive effects of land consolidation on reducing production costs, improving productivity, fostering sustainable use of land (Pasakanis and Maliene, 2010; Jiang et al., 2017; Liu et al., 2018b; Qu et al., 2019), increasing technology adoption, reducing on-farm labor input (Nguyen and Warr, 2020; Tran et al., 2022), and alleviating poverty (Zhou et al., 2019; Yamauchi, 2014; Pham and Nguyen, 2019).

Land consolidation can be done by individual plot exchange between farmers. However, such voluntary plot exchange only takes place on a small group scale since it is not easy to find a partner who also wishes and agree to exchange plots in consideration of their qualities and sizes. To implement land consolidation on a larger scale, it is necessary to have an intervention of a third party. For example, in China, the government set up land transfer service centers to facilitate the process of land consolidation. They will collect information on whom is looking to exchange or rent out the land, the price, and other conditions related to the rental/exchange contracts. In Vietnam, land consolidation has been done with the involvement of local governments. First, local governments design the plan of plot exchange for their communes. Next, farmers simultaneously exchange plots based on a commune's plan. Different countries have different strategies for carrying out the land consolidation project. Therefore, it is crucial to carefully examine the impact of land consolidation by taking into account country-specific factors.

This dissertation aims at assessing the effect of a land consolidation policy in rural Vietnam since the 2000s. There are a number of reasons why we chose Vietnam as a case study.

First, land fragmentation is quite prevalent in rural Vietnam. It is estimated that there are about 80 million parcels of farmland in the whole country (Nguyen and War, 2020). Approximately 85% of the rural population are small-scale farm holders who own less than one hectare of farmland (FAO, 2018). On average, a farm household cultivates 4.7 plots (World Bank, 2016) located 4.8 km from home (Markussen, 2013). Given the fact that 65% of the population lives in rural areas and operates farms as the primary means of living (World Bank, 2016), land fragmentation became one of the most important structural problems issues to be modified, as mentioned in the National Target Program, Decision No 800/QD-TTg dated in June, 2010.

Second, the land consolidation program in Vietnam contains a number of unique features. Specifically, Vietnam followed a government-dominated model of land consolidation, in which local governments play a dominant role in planning, design, funding, and supervision during the whole process. They conducted collective and centralized plot exchanges based on a top-down plan, merging small plots into larger ones; and reallocating land to farmers. Such approaches were taken place in many provinces in Northern Vietnam in the 2000s. During 2012-2016, more than 70% of small and fragmented agricultural plots in the Red River Delta were consolidated into bigger sizes with better shapes¹. Half of the program's budget was funded by the city-level government, 20% by the district-level government, and the rest by the commune-level

¹ Thanh Chau. 2012. "Hanoi promotes land consolidation by plot-exchange". Government News, 20 March. <https://baochinhphu.vn/ha-noi-thuc-day-don-dien-doi-thua-102121890.htm>

government and individual households². Although the land consolidation policy (LCP) is a large-scale public intervention for which the government puts enormous resources and time into fixing the severe land fragmentation of this country, there are only a few studies to evaluate its impacts and assess its effectiveness. Therefore, we pursue our research on this topic to understand multi-dimensional aspects of the land consolidation process.

Third, Vietnam is a network-oriented economy (Pham and Talavera, 2018); thus, political connections in Vietnam are economically important (Markussen and Tarp, 2014). Existing studies show that households having connections with Vietnamese government officials increase their chances to credit access, land investment, and household welfare (Markuseen and Tarp, 2014; Markussen and Ngo, 2019). However, does having such connections with government officials matter in the land consolidation process? Anecdotal evidence suggests that political connections may matter as farmers in many provinces reported the incidences of “good lands” being reallocated toward the relatives of local government officials, land traders, and even commune outsiders (see, Appendix). Despite the spate of media reports, virtually no empirical evidence examines the impacts of land consolidations and their interactions with political connections. Therefore, exploring the linkage between political connections and land consolidation can be one of interesting research questions.

Thus, our dissertation focuses on (1) assessing the economic and social impacts of the land consolidation program; and (2) investigating if having connections with government officials plays any role in the land consolidation process. We examine the

² Hanoi city, Decision 04/2012/NQ-HDND on implementing land consolidation.

first purpose in Chapter Three, while the second one will be discussed in Chapter Four. Here we summarize the main findings of the two chapters.

In Chapter Three, we find that the LCP promoted technology adoption, reduced on-farm labor inputs, and increased migration. However, there is no program impact on land investment, land transfer, and land productivity. In addition, we find a significant reduction in formal land titling (LURC) from 2012 to 2018. Specifically, households lowered approximately 50% of LURC share in the first four years; and about 25% in the sixth year since the program started. Moreover, the regression results suggest that households reduced collective action in farming and mutual trust with people within the community. The decline in land tenure security and social capital may have some implications for the program impacts. Our results are robust using alternative approaches such as DID with propensity score matching; and DID with multiple time periods, which was recently developed by Callaway and Sant'Anna (2021).

In Chapter Four, we find that political connections were not involved in the program selection process; and the progress of issuing formal land titles after land consolidation. Households with and without political connections lowered the share of land with formal land titles by approximately 40 percentage points after the program. In addition, we do not find a heterogeneous program impact on agricultural productivity between households with and without political connections.

Although we analyze the effects of land consolidation in the Vietnamese context, we believe that the findings suggest some policy implications and can be generalized to some extent in other countries, which are also facing land fragmentation issues.

1.2. Literature review

1.2.1. Studies on land consolidation

(a) Land consolidation

Most of international studies have so far focused on the impacts of land consolidation on structural adjustment and technology adoption as the main channels for improving agricultural productivity. For example, Hiironen and Riekkinen (2016) show that land consolidation is an effective tool to improve property structure and reduce the farming costs. By analyzing 12 land consolidation projects in Finland, the author found that land consolidation increased the average farm size, decreasing the number of plots and average distance between plots, thus reducing production costs by 15%. Similarly, Colombo and Manuel (2019) found a remarkable improvement of property structure and production cost savings of between 5.8% and 15.3% by examining a land consolidation projects on olive farming in the Andalusia region. Nilsson (2019) investigated the role of a land consolidation project in Rwanda. He found that land consolidation led to an increase in irrigation and non-organic fertilizers, thus improving crop yields. However, the positive effect on crop productivity was only found among the larger farms with landholdings greater than one hectare. Arimoto (2011) found a positive effects of a land consolidation project in Japan on structural adjustment, in the form of machinery-work outsourcing by employing community-level panel data and difference-in-differences matching methodology. Zhang et al. (2019) examined a company-dominated pattern of land consolidation in Southwest China. They found that land consolidation reduced the total number of plots, enlarged the average plot size and plot shape. In addition, agricultural infrastructure and soil quality are both improved, which facilitated mechanization, leading to an improvement of land productivity. Similarly, Lai et al.

(2015) shows the link between land consolidation, technology adoption and crop production in China. Specifically, consolidating an average farm of 0.31 hectares increased machinery use by 10%, which in turn increased crop production between 0.5% to 1%.

In the context of Vietnam, several empirical studies have examined the impact of land consolidation on farm productivity, farm output, and labor allocation. For example, Tran and Vu (2019) show that land fragmentation has a negative effect on crop income using one wave data in 2014 and an instrumental variables approach. Similarly, Do et al. (2022) show that land consolidation reduced production cost and increase farm income in rice production by applying the time-variant stochastic frontier model. Nguyen and War (2020) examine the impact of land consolidation on rice farming using national household survey (VHLSS) in 2004, 2006, and 2008. The authors employed a number of plots and Simpson index as a measurement of land fragmentation, and an instrument variables approach³. The results show that land consolidation increased machine use, farm productivity and farm income. In addition, land consolidation reduced farm labor inputs and enables labor reallocation to off-farm sector. Tran et al. (2022) exploited the variations in household participation in a plot exchange policy to evaluate the impact of land consolidation on labor allocation and land productivity. Using two-way fixed effect regression, the authors found a negligible program impact on land productivity, but significant impacts of land consolidation program on agricultural labor inputs, irrigation and machinery rental.

³ The authors tried several instrumental variables such as initially inherited land plots, number of land use certificates transferred in the commune, communal population density, and the area of annual crop land titled by certificate.

(b) Land consolidation and Social capital

While most of existing literature have focused on the economic aspect of land consolidation, very few studies investigate the social aspect. Takayama and Nakatani (2018) examined the impacts of a farmland consolidation project on community-level social capital in Japan. They found that the project enhanced social capital. Specifically, land consolidation increased the number of community meetings, and collective activities for irrigation management. Scott (2003) and De Vries and Vof (2018) emphasized that social aspects such as beliefs, perceptions, opinions and views on landscape, influence people's action and behaviors. Thus, it is necessary to consider social aspects along with economic aspects in land consolidation (Pasakarnis et al., 2020; Matsatso et al., 2022). In sum, the impact of land consolidation on social capital is still poorly understood, which calls for the need of more empirical evidence on this issue.

(c) Land consolidation and Land tenure security

Land tenure security plays a crucial role in rural development and poverty alleviation (Kompas et al., 2012; Tran et al., 2022). A growing economic literature have showed that increasing land security through a land certification program could enhance agricultural productivity and household crop income through several channels. First, land certificates can be used as collateral, which increases the probability to obtain credit from formal and informal financial institutions (Ghebru and Holden, 2015). Such credit is important for farmers to finance their land-related investment (Gebremedhin and Swinton, 2003; Deininger and Jin, 2006; Holden et al., 2009; Besley and Ghatak, 2010; Deininger et al., 2011; Fenske, 2011), which in turn induces higher agricultural productivity. Second, land certification reduces land transaction costs, facilitating land transferability from less to more productive farmers, thus increasing land use efficiency (Deininger et al., 2008;

Deininger et al., 2011; Holden et al., 2011b). Third, formal land titles reduce conflicts related to land boundaries among neighboring landowners (Holden et al., 2011a), reducing mistrust within the community (Teraji, 2008; Bezabih et al., 2011). Improving mutual trust will accelerate collective action, allowing members to help each other when facing with shocks.

Nevertheless, virtually no previous literature has empirically investigated the relationship between land consolidation and land tenure security. In some countries like Vietnam, the land consolidation process requires farmers to have new land certificates for the newly consolidated plots. Therefore, it is important to examine the status of land titles after consolidating land, which has been ignored in existing literature.

1.2.2. Studies on political connections

(a) Political connections

Studies related to political connections have been well developed with reference to two subjects: firm-level and household-level.

At firm-level, political connections are often defined as the personal ties between high-ranked managers (or board of directors) and high-ranked government officials (or politicians). Literature have showed that firms with political connections have preferential access to finance from banks (Li et al., 2008; Claessens et al., 2008; Robert et al., 2015) and higher probability to receive full loan amount it applied for (Jiangtao et al., 2017). In addition, such firms receive valuable information and support from the government in terms of finance and legal system (Jiangtao et al., 2017; Kim and Todo, 2019). Politically connected firms also have higher chance of being direct exporters (Kim and Todo, 2019).

At household-level, political connections are defined as the family ties between household members (or closed relatives) and executive government officials (or politicians). A number of studies have documented that households could gain several benefits from political connections. For example, Linyang et al. (2020) shows that being a member of Chinese communist party positively influences household's access to bank loan. Malik and Malvika (2019) find that political connections increase land investment, credit access, and public transfer in India. Muttakin et al. (2015) found that family firms with political connection perform better than those without in the case of Bangladesh. Caeyers and Dercon (2012) indicate that political connections have positive effects on household food aid after a serious drought in a public transfer program in Ethiopia. Rashesh (2016) exploited the transition period from autocratic regime to democracy in Indonesia to examine the link between political connections and labor income from wage.

In the context of Vietnam, Markussen and Ngo (2019) shows that being a member of Vietnamese communist party leads to an increase in household income by 7%, and household well-being. Moreover, such households have less financial constraint to boost farm and nonfarm income (Markussen and Ngo, 2019). The and Nam (2015) employed the propensity score matching method to investigate how political connections affect tea-leaf farming in rural Vietnam. The authors found a positive link between political connections and household income from tea production. Markussen and Tarp (2015) and Christina and Carol (2015) explored the effects of having a relative in bureaucratic position on credit access, public transfer, land investment, and the establishment and operation of family enterprise in Vietnam.

(b) Land consolidation and Political connections

Empirical studies related to the interaction relationship between political connections and land consolidation is virtually non-existence. In Vietnam, where land consolidation process was dominantly implemented by the governments, having connections with government officials is expected to have some influences. Therefore, it is interesting to examine the role of political connections in a land consolidation program, which has been ignored in existing literature.

1.3. Academic contributions

The dissertation aims to contribute to existing literature in two stands. First, this is among very few studies to explore the links between land consolidation and social capital, land tenure security, and political connections. Therefore, our study adds new findings of such relationship in existing studies, thus providing more understanding about various aspects related to land consolidation issue. Second, most of literature define land consolidation using the number of plots, the average size of plots, and the average distance between plots (Kawasaki, 2001; Wan and Cheng, 2001; Van Hung et al., 2007; Rahman and Rahman, 2008; Kompas et al., 2012; Lai et al, 2015; Nguyen and War, 2020; Zhang and Chen, 2021; Do et al., 2023), which are arguably endogenous. In this study, we classify land consolidation as an indicator if households participate in a government top-down land consolidation program. Therefore, the measurement of land consolidation variable is less self-selection biased since participation in the program was not determined by households' decisions but by following a government's plan. In addition, we apply several techniques such as different-in different with household fixed effects and propensity score matching to make our results more robust.

1.4. Roadmap of the dissertation

The remaining parts of the dissertation is organized as follows: Chapter Two presents institutional background, study sites and data. Chapter Three examines the economic and social impacts of land consolidation program on various household outcomes. Chapter Four analyzes the role of political connections in the land consolidation program. Chapter Five summarizes the main findings and discusses policy implications and limitations.

Chapter Two

Institutional background, Study sites, and Data

2.1. Institutional background

2.1.1. Land system in Vietnam

In Vietnam, all land belongs to the State. The “equity-oriented” land reform in 1988, commonly known as the Doi Moi reform, transferred the agricultural land use from collective to individual households for long term use (from 20 to 50 years) based on egalitarian principles to minimize the conflicts of interest between households. Under the land reform, each individual was assigned an equal amount of farmland based on different types of land in different locations. As a result, households got the total number of plots as equal to the household size. On one hand, the reform has strengthened individual usufruct of farmland, raised farmers' enthusiasm for production, and reduced poverty (Nguyen and Warr, 2020; Tran et al., 2022). On the other hand, however, the farmland distribution has resulted in land fragmentation and efficiency losses in production. This negative consequence of the land reform became more significant as lands were further subdivided through inheritance.

In 1993, the land certification program began, which granted households a land use right certificates (LURCs), commonly known as red-book, allowing them to transfer, lease, mortgage, and bequest the usage right of the land. However, the government still retains their interventions in many aspects of the agricultural land, especially paddy land. For example, they designated the specific plots to plant rice, which was known as crop choice restrictions (Markussen et al., 2011), restricted converting from paddy land to non-agricultural use, and restricted building structures on paddy land so as not to distort the

soil quality. In addition, the government has power in land acquisition. They have the right to confiscate the land for the purposes of socioeconomic development and public interests (Land law 2003, article 5.2 and 22.1).

The government also influences the agricultural land market by imposing the maximum amount of land owned by each household. For example, depending on land categories and regions, each household can only possess 2-3 hectares of annual crop land, 10-20 hectares of perennial crop land, and 20 hectares of forest land. Such restrictions make the land market inactive, which slow down the process of consolidating land through the land market (Le et al., 2013).

2.1.2. Land consolidation program in Vietnam

The necessity for Vietnam to consolidate land has been recognized since the 1990s as the Government encouraged individual households to exchange plots voluntarily. However, such one-by-one voluntary plot exchanges did not progress due to a few “double coincidences of wants ” (Arimoto et al., 2016). Fear of change, concern about asymmetric information on soil quality, and insufficient awareness of the benefits of land consolidation are the most frequently cited reasons for the stagnant of the plot exchange⁴(Hung et al., 2007; World Bank, 2016). Concerned about such situation, local governments started facilitating land consolidation programs in many provinces in Northern Vietnam in the 2000s.

⁴ Lam Dao An. 2021. “Consolidate land to develop agriculture production”. Vietnam Fatherland Front Magazine, 31 July. <http://m.tapchimatran.vn/kinh-te/don-doi-ruong-dat-de-phat-trien-san-xuat-nong-nghiep-hang-hoa-40263.html>

(a) The implementation process

The land consolidation process was implemented in a decentralized approach at provincial level. Thus, the implementation process may vary across different provinces. The primary objective is to fix land fragmentation by reducing the number of plots per household to 1-2 plots. Under this program, households exchanged plots with the local governments following a top-down plan along the cascade of the province, district, and commune. First, the provincial government sets up a quota of exchangeable land by districts and years. Subsequently, each district decides how many hectares of land to be consolidated for each commune. Communes are responsible to make a detailed plan and implement it.

The implementation process can be summarized as follows:

Step 1: Communes established a steering committee to facilitate land consolidation between households.

Step 2: Communes prepared a draft plan for plot exchange.

Step 3: Meetings were organized in each village to meet the consensus of people on the draft plan.

Step 4: Communes sent the draft plan to upper levels for approval and received financial support to implement.

Step 5: Communes conducted the consolidation work according to the approved plan.

Step 6: Communes reallocated the restructured land to households by casting lots.

Step 7: Certificate of land use rights were renewed and given to the households.

Accordingly, land consolidation was designed and implemented by the communal governments, funded and supervised by the provincial government. During the whole process, communal governments took the leading position, while farmers played the role

of co-operators by providing feedback on the plan, transferring land-use rights to local governments, and waiting for the restructured land in return.

Moreover, the program was de facto compulsory as in practice, the plan could be implemented with the agreement of landowners in the program areas based on the majority rule. It is also important to note that private land ownership does not exist in Vietnam. Although agricultural land was given to farm households for long-term use (50 years), it can be confiscated for socio-economic development and public interest (Land Law 2003, Article 5.2 and 22.1). In sum, such a de-facto compulsory program's participation is not the farmers' choice. Hence, the fact helps us avoid self-selection bias in the estimation of the causal effects of the program. However, there may be a selection bias due to program placement. For example, local governments may select the plots for consolidation based on several factors such as the degree of initial fragmentation, topographical features, and so on. Thus, we aim to mitigate such issues by applying several econometric methods.

(b) Reissuing land use rights certificates

The land consolidation program requires farmers to have new land use certificates (LURC) for the new land. Decree 43/2014/ND-CP (article 76.1c) stipulated the procedure for issuing LURC after land consolidation. Accordingly, farmers must submit documents to the Department of Natural Resources and Environment at the district level. The required documents include:

- Application form,
- The former land use certificate (the original one),
- A written agreement of plot exchange between households,
- A commune's plan for plot-exchange that was approved at upper levels.

By 2016 (two years after the land consolidation program's first implementation), only 3 out of 15 districts in Ha Tay province started issuing LURC for participating farmers⁵. Anecdotal evidence suggests that the delays come from administrative officials rather than the farmers' side. The two most frequently cited reasons are insufficient funding and inconsistent guidelines from upper levels. First, although fees related to LURC issuance (i.e., cadastral survey, mapping, and certificates) were fully supported by the provincial government, such fees often came late or insufficiently, which slowed the LURC implementation process. Second, according to Decree No 43/2014/ND-CP in 2014, farmers must provide a written agreement on the plot-exchange between households in the LURC application set. However, Decree No 29/HD-SNN, the guidance on how to implement land consolidation in 2012, did not mention such document. All the participated farmers exchanged plots with local government following the top-down plan and received the restructured land by the cast lots. Such inconsistent guidelines further contributed to the delays of LURC progress.

The prolonged process of issuing LURC accompanied with the LCP might have an implication on how farm households managed the new land during the land transition period. We will further discuss this matter in the next Chapter.

⁵ NN-NT Journalist groups. 2016. "Reissue red-book after land consolidation – The urgent work". 14 March. Hanoimoi.com.vn/tintuc/Kinh-te/827947/cap-lai-so-do-sau-don-dien-doi-thua.

2.2. Study sites

In this study, we focus on two provinces, Ha Tay and Nghe An, where the land consolidation program took place. In 2012, two provinces issued Resolution 04/2012/NQ-HDND and Resolution 08-CT/TU, which announced the implementation of the land consolidation program⁶.

Ha Tay is the former name of one of the provinces in Vietnam. Since 2008, it has been merged to be part of Hanoi city. Located in the Red River Delta, it was subdivided into 14 districts and 405 communes. The total land area is 1,648 km² (in 2009), two-thirds flat and the remaining is mountainous. The population density is 1,100 persons per square kilometer. Agricultural land covers 123,399 hectares, among which annual crops cultivate 104,270 hectares. Before 2012, the land for agricultural production was quite fragmented. An average household owned 5-6 plots with an average plot size of 373 m². In 2012, the province implemented some policies on accelerating land consolidation.

Nghe An is the largest province in Vietnam, with a total area of 16,490 km². It is located in the north-central region, bordering Laos and the Gulf of Tonkin. It is subdivided into 17 districts and 431 communes. The total population was 3,327,791, of which 85.3% live in rural areas and 14.7% in urban areas (in 2019). The population density was 220 persons per kilometer. The province has a diverse geography, including high mountains, midlands, river delta, and coastal areas. Most of the population is concentrated in flat areas with a high population density of 500 persons per kilometer. An average household owned 4-5 plots (in 2012). Considering the high degree of fragmentation of agricultural lands, the province issued Decision 08-CT/TU in 2012 on

⁶ The two Resolutions were made in May and August 2012, and the programs started at the beginning of 2013.

mobilizing land consolidation and accumulation for large-scale production in agriculture. The province targeted 313 out of 431 communes with a total of 88,891 hectares of agricultural lands for the consolidation.

Figure 1 shows the locations of the two provinces on the Vietnamese map.

[Figure 2.1]

2.3. Data

2.3.1. Data source

The main data source used in this dissertation comes from the Vietnam Access to Rural Household Survey (VARHS). The VARHS was conducted biannually in July and August in 12 provinces⁷, and its sample represents rural households of the target provinces. The data conducted jointly by the Institute for Economic Management, Ministry of Agriculture, Ministry of Labour in Vietnam, and the Research Group of the University of Copenhagen.

This study employs five-wave household panel data of two provinces, Ha Tay and Nghe An, where the government-led land consolidation was implemented during the survey period. We divide the study period into “pre-program” for the years 2010 and 2012, and “program period” for the years 2014, 2016 and 2018. The 2012, 2014, 2016, and 2018 survey covers 823, 817, 802, and 785 households respectively. The attrition rate for the period 2012-2014, 2014-2016, 2016-2018 are 0.9%, 3% and 2.6% respectively. We check panel attrition bias using household covariates in 2012 (baseline survey) and the probit model. Results from Table 2.1 report no statistically significant differences between those

⁷ 12 provinces are ex-Ha Tay, Nghe An, Khanh Hoa, Lam Dong, Dak Lak, Dak Nong, Lao Cai, Dien Bien, Phu Tho, Quang Nam, Long An and Lai Chau.

who leave and those who remain in the follow-up surveys. The results suggest that the likelihood of attrition does not correlate with the baseline household characteristics.

[Table 2.1]

2.3.1. Key variables

We restrict the sample to farm households who have at least one agricultural plot (either own, rent-in, or rent-out)⁸. In each survey year, households were asked whether they had any plot exchange, if yes, who they exchanged the plot with, when, and how the plots were taken. We carefully stratified our sample by several steps. First, we excluded 10 households that had any plot exchange before the announcement of the consolidation program (from 2008 to 2012) to have a clear definition of the control group. For example, households did not participate in the consolidation program (after 2012) because they have implemented the plot exchange in the past.

Treated variable. We categorized households as a treated group if they had any plot exchange with the “local government”. We exclude 8 households that privately exchange plots with neighbors, friends, or others for the reason of “being given a good offer”, “don’t need” or “other reasons”. Focusing on the plot exchange conducted by the local government rather than “individual exchange” can mitigate some sources of self-selection bias. In total, we have 258 households in a treated group. Our unbalance panel data include more than 700 households over 9 years.

Political connections. We constructed political connections variable based on three questions from the VARHS household questionnaires:

⁸ We exclude 133 households that do not have any agricultural plots.

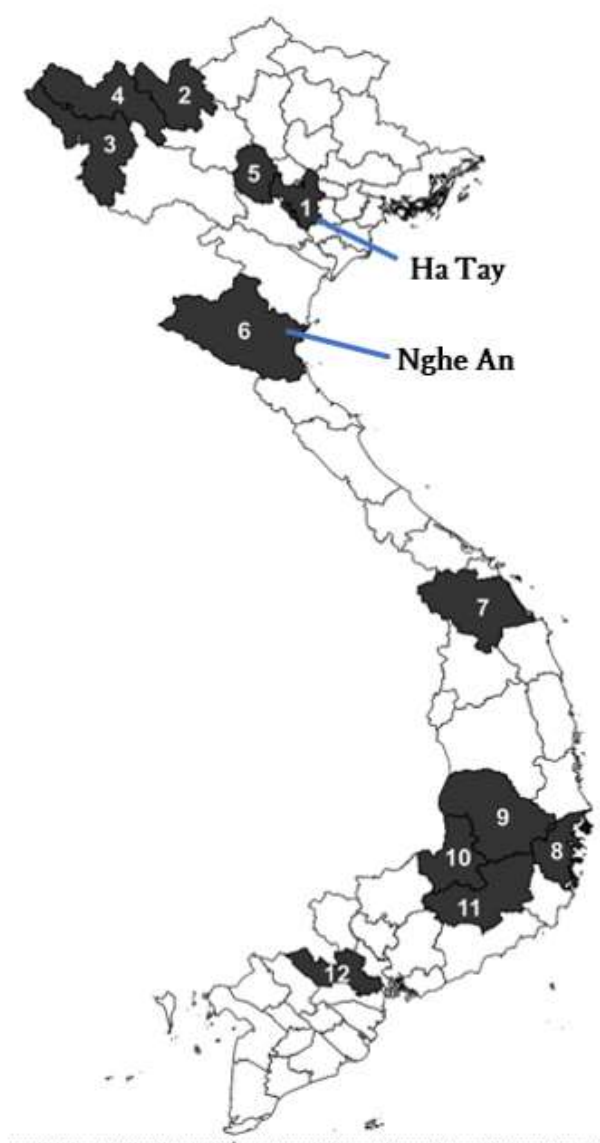
- (1) Does any family member hold any position at the commune or higher level in the government office?
- (2) Do you have any relatives living outside your home holding any position at the commune or higher level in the government office?
- (3) Do you have any friends holding any position at the commune or higher level in the government office?

whereas “holding position in the government office” refers to the bureaucratic positions with political powers (i.e., executive, middle-rank officials, and leaders of mass organizations⁹). In addition, each household can list more than one connection at the same time. Thus, these categories are not mutually exclusive.

Since political connection status is not randomly assigned, it may cause the issue of endogeneity due to a self-selection bias or reverse causality. For example, households participating in the LCP may be more likely to seek a job as local officials or make friends with officials if they expect to gain some benefits from these connections. Therefore, following previous literature (Makussen and Tarp, 2014; Christina and Carol, 2015; Kim and Todo, 2019), we define a *household with political connection* (Politic=1) if any relatives living outside the household are public officials, and *households without political connection* (Politic=0) if they did not possess such connections. We argue that focusing on political connection through extended families (relative) is plausibly more exogenous. For example, a household’s decision to participate in the land consolidation program does little to affect the probability of a relative in *another household* to get a job as public official.

⁹ Mass organizations refer to social groups such as farmer union, and women union.

Figure 2.1: Study sites



Source: Finn Tarp. (2015). Structural transformation and inclusive growth in Vietnam. UNWIDER.

Table 2.1: Non-attrition probability

VARIABLES	Attrited=1
Male head	0.002 (0.208)
Age of head	-0.006 (0.007)
Education of head	-0.008 (0.025)
Household size	-0.073 (0.094)
Number of adults	-0.091 (0.120)
Distance to commune, log	0.128 (0.092)
Number of plots	-0.043 (0.045)
Total land holdings, log	-0.055 (0.115)
Total asset value, log	-0.028 (0.072)
Total livestock value, log	-0.048 (0.032)
Political connection=1	0.164 (0.177)
Program participation=1	-0.191 (0.193)
Constant	0.445 (1.043)
Observations	739

Baseline survey. Probit model. Dependent variable is a dummy taking value 1 if a household leaves in the follow-up survey, and 0 if they remain at the end of the sample period

Chapter Three

Assessing the Economic and Social Impacts of Land Consolidation Policy in Vietnam

3.1. Introduction

The agricultural sector is the main income sources for households in many developing countries such as Vietnam, where approximately 65% of the population lives in rural areas and operate farms as the primary means of living (World Bank Vietnam, 2016). Land plays an important role in agricultural production. Therefore, factors inhibiting the land use efficiency have implications for the rural development and poverty reduction. Land tenure insecurity and land fragmentation are the two major problems that Vietnam is facing with.

Land tenure insecurity is an important factor affecting households' behavior in land use and land performance. Existing studies often use formal land titling (land use right certificates – LURC) as a proxy for land security and show a number of benefits of having secured land. For instance, LURC increases farmers' long-term investment in land since it reduces farmers' concerns about land confiscation by the local governments and land disputes with neighboring farmers (Besley and Ghatak, 2010; Deininger et al., 2011; Fenske, 2011; Holden et al., 2011a). LURC also facilitates land transfer from less productive to more productive farmers through the land market since it lowers the transaction costs (Deininger et al., 2008; Deininger et al., 2011; Holden et al., 2011b). Moreover, farmers have better access to formal and informal financial institutions thanks to LURC, which are often used as collateral (Gebremedhin and Swinton, 2003; Deininger and Jin, 2006; Holden et al., 2009; Ghebru and Holden, 2015).

Land fragmentation is a phenomenon that farm households tend to operate many small and scattered plots. Such phenomenon is prevalent in Vietnam, where the majority of rural population are small-scale farm holders with an average of 4.7 farm plots per household (World Bank, 2016). Small and fragmented farmlands could have negative implications for agricultural production since they hinder mechanization and the economy of scale. Also, distance boosts transportation and monitoring costs, leading to inefficiency in production (Tan et al., 2008; Kawasaki, 2010; Sklenicka et., 2014; Lu et al., 2018; Hung et al., 2007; Kompas, 2012). Therefore, both land tenure insecurity and land fragmentation may lead to lower agricultural productivity and hamper rural development.

To reduce land fragmentation, the Vietnamese government conducted a collective and centralized land consolidation program, in which many households simultaneously exchanged plots based on a top-down government plan. Firstly, the local governments merged the fragmented plots into larger ones, then redistributed them to farmers. The governments played a dominant role in the land consolidation process including selecting households for plot-exchange, designing the exchange plan, funding, implementing and monitoring.

Existing studies show that the program reduced agricultural labor inputs, increased irrigation and machinery rental, however, no significant impact on land productivity (Tran et al., 2022). In addition, the program may affect land tenure security. Since land consolidation program (LCP) requires farmers to have new LURC for the consolidated plots. Anecdotes indicate that the speed of issuing LURC after land consolidation has been slowed, which raises farmers' concerns about confiscation of the land without LURC and boundary conflicts with neighbors. The slow process of LURC issuance may affect household's thinking and behaviors, at least in the short run, until the

farmers get new LURC. Therefore, it is important to examine the status of land tenure security accompanied with land consolidation process, which has often been neglected in previous literature.

This study fills the gaps in existing literature by exploring (i) how land consolidation affected land tenure security; and (ii) how land consolidation and land tenure security affected various economic and social aspects of rural farm households. We use a case study of two provinces in rural Vietnam, Ha Tay and Nghe An, where the LCP was first implemented in late 2012. We employ five-period household panel data from the Vietnam Access to Rural Households survey (VARHS 2010-2018). Our identification strategy is to exploit the household-level longitudinal data covering the period before and after the policy implementation. The de facto compulsory program participation also gives us a good opportunity to estimate the program effects with less concerning self-selection biases since participation in the program was not determined by households' decisions but by following a commune's plan. However, the selection of plots targeted by communes for consolidation is non-random. In planning the program, communes would consider the degree of initial fragmentation, topographical features, and other factors for the selection. Thus, we try to mitigate the estimation biases by applying several econometric methods using household-level panel data.

Empirical results suggest that the LCP promotes technology adoption, reduces on-farm labor inputs and increases migration. However, there is no program impact on land investment, land transfer and land productivity. In addition, we find a significant reduction in LURC from 2012 to 2018. Specifically, households lowered approximately 50% LURC share in the first four years, and about 25% in the sixth year since the program started. Moreover, there is evidence that households reduced collective action in farming

and mutual trust with people within community. The decline in land tenure security and social capital may have some implications for the program impacts. Our results are robust using alternative approaches such as DID with propensity score matching, and DID with multiple time periods, which was recently developed by Callaway and Sant'Anna (2021).

This chapter contributes to existing literature by adding new evidence for the impacts of land consolidations on land investment, migration, land rental market, land tenure security, and social capital in rural Vietnam. The results provide some policy implications for policy makers in designing the land consolidation program. Specifically, improving land tenure security as the key factor for farmers so as to exploit the potential benefits of land consolidations in agricultural production.

The chapter is organized as follows. Section 3.2 proposes several Hypotheses. Section 3.3 discusses the Identification Strategy and Empirical Model. Section 3.4 analyzes the results, and Section 3.5 concludes.

3.2. Hypotheses

What are the potential impacts of the land consolidation policy?

First, since fragmented lands are too small to use machines (Blarel, 1992; Wand and Cheng, 2001), consolidating land leads to formation of larger lands, which enables farmers to apply machine for agricultural production. Hence, agricultural productivity has the potential to be higher. The potentially higher agricultural productivity may make farmers more incentive in farming, thus triggering farm households to put more land investment for agricultural intensification (i.e., improving soil fertility, increasing fertilizer and using high-yield seeds).

Second, land consolidation is expected to reduce on-farm labor input since it saves time to move between plots and substitutes labors by machinery. If it is labor-saving,

there may be a shift to non-agricultural sectors, thus facilitating rural structural transformation.

Third, a reduction in the number of plots per household leads to a reduction in transaction costs of negotiating and managing rental contracts with many landlords. If it lowers the transaction costs, productive farmers (supposed to be the demand side) may accumulate more land to increase the economy of scale in crop production. Thus, land consolidation is expected to accelerate the land transfer from less to more efficient users through the land rental market.

Forth, the slow process of reissuing LURCs after land consolidation may also have some implications on farmer's behavior in land. Since it raises farmers' concerns about confiscation of the land without LURCs and conflicts related to land boundaries with neighboring farmers, participation in land consolidation program may negatively affect agricultural productivity because of tenure insecurity, at least in the short run, until the farmers get new LURCs.

Fifth, land consolidation can also change social capital of local communities. For instance, it may cause the fragmentation of social networks since it changes the farm plot locations and, hence, neighboring farmers. In addition, the formation of larger lands enables farmers to substitute machinery for labor, which may reduce the need for collective action and weaken the bond of social solidarity. The temporary tenure insecurity may also reduce mutual trust with people in the same community for fear of land boundary conflicts.

We formalize these intuitions by several hypotheses as followed:

H1: The LCP enhances agricultural productivity by promoting technology adoption, and increasing land investment.

H2: The LCP facilitates rural structural transformation (i.e., reallocation of labor from farm to non-farm sectors, and transfer land from less to more efficient users).

H3: The LCP might negatively affect agricultural productivity due to temporal land insecurity.

H4: The LCP leads to the decline in social capital.

3.3. Summary statistics

3.3.1. The progress of the LCP

Table 3.1 shows summary statistics of our sample by survey years. The majority of plot-exchange occurred in 2013-2014 (209 households), sharply reduced in 2015-2016 (44 households), and in 2017-2018 (18 households). By 2018, in total, there were 258 households (accounting for 40% of the sample) participated in the program. According to the data, the LCP is in progress with a reduction in the average number of plots per household (from 4.57 in 2012 to 3.2 in 2018), and an increase in the average plot size (from 585 m² in 2012 to 841 m² in 2018).

[Table 3.1]

3.3.2. Outcome variables

As shown in Table 3.1, agricultural productivity¹⁰ remains stable over time at around 2.7 thousands VND/ha. Regarding land rental market, approximately 45% of households participate in the rental market. In 2012, on average, 25% of households rented in land while 23% rented out land. However, during 2012 – 2018, there was a decline in the number of households renting in land by 16.33%, and an increase in the

¹⁰ The exchange rate 1000 Vietnam Dong=0.044 USD

number of households renting out land by 35.61%. While the abandonment of farmland area reduced, there is not much change in the total cultivated area. Moreover, we do not see the concentration of farmland among large-scale farmers. The number of households with farmland of more than one hectare is just about 3.5% and hardly increases over time. Land share with LURC reduced from 71% in 2012 to 57% in 2018.

[Table 3.1]

Table 3.2 presents changes in outcomes by treatment status at pre-program in 2012, and three program periods in 2014, 2016, and 2018. “Treated” refer to households who were exposed to the treatment either in 2014, 2016 or 2018 while “never-treated” refer to those who were not exposed to the treatment during 2012-2018. “Not-yet treated” in 2014 and 2016 means that some of the treated in 2014 or 2016 had not been exposed to the treatment yet by that survey year. The asterisks indicate the significant mean difference based on the t-test. First, we observe a substantial difference in the share of land with LURC between the two groups for all survey years. Specifically, before the consolidation program, the treated group had a higher LURC share than the control group, 82% and 66% respectively. However, in the post-program, the LURC share reduced sharply by 21%, 25% and 47% in 2014, 2016 and 2018 respectively among the treated group, while the LURC share of the control group remained unchanged. Second, there is no pre-program difference in agricultural productivity and the rental transactions between the two groups, but a significant change in both rent-in and rent-out transactions in 2016. Finally, we do not observe any differential change in soil investment and fertilizer spending between the two groups after the program.

[Table 3.2]

3.3. Identification strategy and Empirical model

3.3.1. Identification strategy

To identify the causal effect of the land consolidation program (LCP) on several household outcomes, the treatment status (household's participation in the program) should be exogenous. Since the LCP is a national policy, thus it can be considered as an exogenous variable. However, there is possibility that only households having certain characteristics were chosen to participate in the LCP, which raises a concern about selection bias induced by the non-randomness of program placement. To check this possibility, we first perform the balancing test to compare some observable household characteristics between participants and non-participants. Next, we predict each household's probability of joining the program through the OLS and Probit model.

Table 3.3 shows the baseline balance of sample households by treatment status. Of the 720 farm households, 258 households (35%) were categorized in the treated group, while 462 households (65%) were in the control group. The household characteristics consist of the household head's age, household head's education (schooling years), gender of household head (dummy), household size (number of people living in the households), number of working-aged people, household's poverty status¹¹, having a nonfarm job (dummy), a total of durable asset value (thousands Vietnam Dong), monthly food consumption (thousands Vietnam Dong)¹², the number of agricultural plots, total cultivated land (m²). The result shows no systematic differences in predetermined characteristics between the two groups except for *the number of plots* and *gender of the head*. The significant difference in the *number of plot* is understandable since the

¹¹ Households were certified as poor by the Ministry of Labor, Invalids and Social Affairs

¹² The exchange rate 1000 Vietnam Dong=0.044 USD

program's main target is to reduce the number of plots. The significance of *gender of household head* implies that male-headed households were more likely to join the program. However, the magnitude of the difference is small and only significant at 10% level. A joint significance F-test is statistically significant, but it becomes insignificant if we remove the *number of plots* (shown at the bottom of Table 3.3).

[Table 3.3]

Table 3.4 estimates the determinants of program participation using baseline household characteristics in 2012. The outcome is a dummy taking value 1 if households participated in land consolidation program either in 2014, 2016, or 2018. We perform a linear OLS regression (column 1), probit regression (column 2), and commune Fixed effect regression (column 3). Results from all regressions are consistent, showing no significant effects of any variable except total land holdings and the number of plots. The variable *total land holding* is statistically significant in both columns (1) and (2), explaining that households with bigger farms tend to have many small and dispersed plots, thus more likely to participate in the plot-exchange. However, once we added commune fixed effect in the regression (column 3), the significance gone. Meaning that there are not systematic differences in total land holdings between participants and non-participants in the same commune. The positive impact of the *number of plots* is sizable and consistent significant at 1% level in all regressions. The variable *political connection* (either through family members, relatives, or friends) has no significant effect on household's participation in the LCP. Therefore, having political connections does not matter in the program selection process.

[Table 3.4]

The differences in the initial characteristics of the treated and control groups in terms of the *number of plots* might be problematic. For example, households with many plots could be systematically different from those without, which raises a concern about a selection bias. To mitigate the baseline heterogeneity, we employ a Propensity Score Matching (PSM) method, which will be discussed in detail in section 3.3.2.2.

3.3.2. Empirical model

3.3.2.1. Difference-in-Differences (DID)

To examine the effect of the LCP on several outcomes of interest, we apply the Different-in-Differences (DID), which is the common approach to estimating the impacts of policy intervention. We first consider the canonical DID, which considers two time periods (before and after the policy), and two groups (treated and untreated). The regression model as follows:

$$Y_{it} = \alpha_i + T_t + \beta_1 \text{Treat}_{it} + \beta_2 X_{it} + \varepsilon_{it} \quad (3.1)$$

while Y_{it} is the outcomes of household i in year t . Treat_{it} takes the value 1 if households receive treatment in year t . β_1 captures the average treatment effect of land consolidation program. X_{it} is a vector of household characteristics (i.e, age, gender, education of household head, household size, and number of working-aged members). α_i denotes household fixed effect. The inclusion of household fixed-effect removes time-invariant unobserved household characteristics that can be correlated with the outcomes. T_t is year fixed effect, however, instead of using year dummy only, we use the interaction of years and districts (year x district) to control any changes in the economic environment in each district that may affect household outcomes. Standard errors are clustered at the commune level, considering the possible autocorrelation in modelling residuals of between households within communes.

We quantify the early impact of land consolidation after two years, four years, and six years since the program started by estimating equation (3.1) using different timing windows:

Panel A: (t=2012, 2014)

whereas $Treat_{it}$ denotes household exchanged plots in 2013-2014.

Panel B: (t=2012, 2016)

whereas $Treat_{it}$ denotes households exchanging plots either in 2013-2014 or 2015-2016.

Panel C: (t=2012, 2018)

whereas $Treat_{it}$ denotes households exchanging plots either in 2013-2014, 2015-2016 or 2017-2018. The untreated group includes households that have not received treatment in both periods.

3.3.2.2. Difference-in-Differences – Propensity score matching (DID – PSM)

To check the consistency of the results from DID estimates, we employ a DID with propensity score matching (PSM) method. PSM match each treated household with one or several control households that have similar characteristics, based on the covariates as in Table 3.1. We apply Nearest neighbor matching without replacement using Stata command *psmatch2*. Table 3.A.1 reports results of the balancing test of unmatched and matched samples. After matching, the treated and control groups are similar in terms of mean of household characteristics such as number of plots, total land holdings, gender, age, education of household head, household size, total durable asset, and political connection. Moreover, there is no statistically significant difference between the treated and control groups. In sum, we are able to reduce baseline bias using the PSM method.

[Table 3.A.1]

Next, re-estimate the average treatment effect on the treated using DID as in equation (3.1) in the matched sample. By combining the matching strategy with the DID, we can mitigate the bias induced by the initial differences between treated and untreated households.

3.4. Results

We estimate the impact of the LCP on (a) land investment and technology adoption, (b) rural structural transformation, (c) agricultural productivity, (d) land property rights, and (e) social capital. The results of DID and DID-PSM are reported in four parts: Panel A, Panel B, and Panel C show the effects of LCP after two years, four years, and six years since the LCP started using two-time points (before and after the program) in 2012 and 2014, 2012 and 2016, 2012 and 2018 respectively. Panel D performs the analysis using pooled data (four waves). We control for several household characteristics, time trends by districts, and household fixed effects in all regressions.

3.4.1. Technology adoption and Land investment

We test *Hypothesis 1* by estimating the LCP impact on household spending in machine rental in the last 12 months. Hypothesis 1 suggests that the LCP would enhance technology adoption since it is expected to increase the average farm size, enabling farmers to use machines. Results from Table 3.5 are consistent with our hypothesis as we found significant program impacts on machine rental by 23 percentage points (Panel D, columns 1 and 5). Further analyses by different timing windows suggest that the significant impacts mostly occurred in 2012-2014, two years after the program implementation.

We estimate the LCP impact on household investment behavior such as new investment in soil¹³, total spending on chemical fertilizer, and organic fertilizer. The outcomes are measured in the last 12 months. All monetary values are adjusted for inflation using the 2010 price. Tables 3.5 presents the results of DID and DID-PSM estimation. Hypothesis 1 suggests that the LCP would promote land investment since the LCP may induce farmers more incentive in farming. However, the results do not support our hypothesis as we could not find any significant program's effect in land-related investment in the short, middle, and long term (columns 1-3 and 6-8).

[Tables 3.5]

3.4.2. Rural structural transformation

(a) Labor reallocation

We examine the LCP's impact on labor inputs. The outcomes are number of days spending on three main income-generating activities, namely farm, wage jobs and self-employment, in the last 12 months. *Hypothesis 2* suggests that the LCP is expected to reduce on-farm labor inputs and facilitates labor reallocation from farm to non-farm work. Table 3.6 presents the results of DID and DID-PSM estimation. First, we observe a significant reduction in agricultural labor inputs. Specifically, households reduce number of days devoted to agricultural work by approximately 18 to 32 percentage points. The results are consistent in the short, middle and long terms (column 2). The decline in on-farm labor inputs was most likely due to a reduction in commuting time to move between plots and machinery application by the LCP, which found in section 3.4.2.1. Second, we find no evidence that households reallocate labors to other income-generating activities

¹³ Land related investment refers to any investment in irrigation, soil and water conservation (i.e., rock bunds, soil bunds, grass lines, terraces, fence, irrigation investment etc...)

such as wage jobs or self-employment. However, we find that the LCP induces migration. Specifically, households increase the number of migrants for job search by 11 percentage points. The positive results were found in Panel A, C, and D and significant at 5 percent. The DID-PSM results show similar picture, confirming the negative program impact on agricultural labor inputs and positive impact on migration.

[Tables 3.6]

(b) Land transfer

We examine the LCP impact on land rental market. *Hypothesis 2* suggest that the LCP may facilitate land rental transactions. Specifically, productive farmers (supposed to be the demand side) may rent in more land, while less-productive farmers (supposed to be the supply side) release their farmland through the land rented-out market and work in other sectors.

Therefore, we estimate equation (3.1) with rental market outcomes for both rent-in and rent-out. The measures of outcomes are a dummy for rental market participation (participation) and the amount of land transacted (amount). According to the results of DID analysis in Table 3.7, land consolidation appears not to affect a household's decision to rent in land. As we do not observe a significant impact on outcomes for the land rented-in in the short, middle and long term. On the supply side, the LCP decreased the propensity to rent out by 9 percentage points, and the amount of land rented out by more than 20 percentage points from the mean. The coefficients are significant at a 10% level in 2014 and 2016. The DID-PSM results show consistent results, confirming the negative effect of the LCP on the land rented-out transactions, and no effect on the land rented-in. Together, we find no evidence that the LCP promoted land accumulation among

productive farmers, however, there is evidence that farm households retained their land, and did not release it through the land rental market.

[Table 3.7 & 3.8]

3.4.3. Agricultural productivity

We examine the LCP effect on agricultural land productivity. Land productivity is calculated by dividing annual crop output over total crop area (unit: thousands VND/hectare, in logarithm form). Results from Table 3.9 suggest that the LCP did not promote land productivity in the short, middle and long term (column 1), which is contrast with our *Hypotheses 1 and 2*. The findings suggest that there must be another important factor influencing a household's decision. *Hypothesis 3* suggests that this could be land tenure insecurity following the LCP, which may weaken the LCP impacts on household incentive in land investment and land transactions, and hence, make agricultural productivity stagnant. Therefore, we further examine the status of farmers' land property rights during the LCP in the next section.

[Table 3.9]

3.4.4. Land property rights

We investigate the impact of the LCP on land property rights. The outcome is the share of area size of plots with land use right certificate (LURC). In all cases, the results from DID estimation indicate that the LCP significantly reduces the share of LURC in the short, middle, and long term (Table 3.10). Specifically, households lost approximately 56 percentage points, and 45 percentage points of LURC share in 2014 and 2016 respectively (column 1). The size of program impact is smaller in 2018 with about 24 percentage points decrease, however, the coefficient is statistically significant at 1% level. Results from DID-PSM also show robust, negative, and significant impacts of the LCP

on household's LURC share (column 2). We re-estimate the same model for each province (Ha Tay and Nghe An) to check if the negative impact is predominant in one area. However, we found a similar picture in each province (columns 3 and 4), suggesting that the loss of formal land titling after the LCP is quite prevalent. A reduction in LURC share is mostly due to the delays of process of re-issuing LURC from administrative officials. As detailed in section 2.1.2b, insufficient funding and inconsistent guidelines from upper levels are the two major reasons contributing to delayed process.

[Table 3.10]

We check if a reduction in LURC is a contributing factor that weakens the program impacts on land investment, land transactions and land productivity. Results from Table 3.11 (columns 3 and 4) suggest that a decrease in the share of LURC leads to lower household investment in organic fertilizer and the amount of land rented in. However, we do not find the significant result on land productivity (column 6). Since the share of land with LURC is endogenous. We run the same regression as in Table 3.11, however, LURC is instrumented by Treat. We argue that Treat is an appropriate instrument variable because (i) Treat is strongly correlated with LURC share (as shown in Table 3.10), and (ii) there is no evidence that Treat directly affects the outcome of investment, land market, and crop productivity (as shown in Tables 3.5 – 3.9). Results from Table 3.12 confirms a significant effect of LURC on the outcome of organic fertilizer. Together, in this section, we find evidence that the LCP leads to a significant reduction in formal land titling, which negatively affects household land investment (i.e., organic fertilizer).

[Table 3.11 & 3.12]

3.4.5. Social capital

We examine the LCP impact on social capital. *Hypothesis 4* suggests that the LCP may decline collective action and mutual trust with people in the community. We test this hypothesis by exploiting the VARHS survey asking each household several questions related to trust behaviour:

- (1) Supposed you faced the following situation, which one would you prefer?
 - (a) Get and farm $\frac{1}{2}$ hectare of land entirely by yourself
 - (b) Get and farm $1\frac{1}{2}$ hectares of land jointly with another household in your commune.
- (2) Supposed you faced with the following alternatives, which one would you prefer?
 - (a) Get and farm $3\frac{1}{2}$ hectare of land entirely by yourself
 - (b) Get and farm $3\frac{1}{2}$ hectares of land jointly with another household in your commune.
- (3) In general, most people are basically honest and can be trusted (Agree/Disagree)
- (4) In this commune, one needs to be careful. There are people you cannot trust. (Agree/Disagree)

Questions were answered by household heads and could be vary over time due to their historical experience with farming. For example, if households experienced or witnessed a conflict of land boundaries, they may lose their trust with people in the community. Thus, they may hesitate to jointly work with others¹⁴.

We construct four dummy variables to measure social capital as follows:

¹⁴ Another source of variation in Trust variables could be due to change of respondents (household head). However, household heads have not change substantially during our observational period. Therefore, it may not be the main cause of variations in trust behavior.

Collective_action_1=1 if households chose option (1b), and 0 if otherwise

Collective_action_2=1 if households chose (2b), and 0 if otherwise

Trust_1=1 if household chose (3-Agree), and 0 if otherwise

Trust_2=1 if household chose (4-Disagree), and 0 if otherwise

We examine how LCP affects social trust by estimating equation (3.1) on the four Trust outcomes. Results from Table 3.13 suggests that LCP reduces collective action and mutual trust. Specifically, farmers prefer doing farm by themselves to jointly working with others regardless of how big farm they could receive (columns 1 and 2). In addition, more farmers disagreed with the thinking that “most people are honest and can be trusted” (column 3). Nevertheless, the significant results are found only in one short time, not consistent over period. One explanation is that the results might suffer from measurement errors since the outcomes are self-reported.

[Table 3.13]

3.5. Robustness check

3.5.1. Parallel trend assumption

The DID requires a parallel trend assumption, that is in the absence of the treatment, the average outcomes of the two groups would follow the same trend. We use the two periods ($t=2010, 2012$) when no households exchange plots before the program’s announcement to test this assumption.

$$Y_{it} = \alpha_i + T_t + \beta_1 \text{Treat}_i * T_t + \beta_2 X_{it} + \varepsilon_{it} \quad (3.2)$$

while Y_{it} is the outcomes of household i in year t ($t=2010, 2012$). Treat_i would take the value 1 if household participated in the plot exchange during 2013-2018. Other terms are similar to equation (3.1).

We check the parallel trend assumption using two pre-program data in 2010 and 2012. Results from Table 3.14 indicates that the parallel trend assumption holds for the share of LURC (column 1), land rented in (columns 2 and 3), and renting out (columns 4 and 5).

[Table 3.14]

3.5.2. DID with multiple time periods

The canonical DID can only consider two time periods. Since we have two pre-treatment periods and three post-treatment periods, we adopt the methodology recently developed by Callaway and Sant’Anna (2021). We first disaggregate the causal parameters by group-time average treatment effect, and then summarize the causal effects.

Group-time average treatment effect

The group-time average treatment effect allows us to see the heterogeneous program’s effect across groups and time, where a “group” is defined by the time period when households were first treated. In our case, 258 treated households can be categorized into three treatment groups, namely `first_treat_2014` (209 households), `first_treat_2016` (32 households), and `first_treat_2018` (17 households). The untreated group contains 504 households who never receive any treatment during 2010-2018. The group-time average treatment effect is computed as follows:

$$ATT(g,t)=E[Y_t(g)-Y_t(0)|G=g] \quad (3.3)$$

whereas $ATT(g,t)$ denotes the average treatment effect for a group of households that were first treated at period g ($g=2014, 2016, 2018$) in calendar year t ($t=2010, 2012, 2014, 2016, 2018$). $Y_t(g)$ is the potential outcome of households once they start to receive the treatment, $Y_t(0)$ is the potential outcome for households that never receive treatment.

Summarizing group-time average treatment effect

Callaway and Sant'Anna proposed several ways to aggregate the group-time average treatment effects. For easy interpretation, we chose to present the summary of causal effects in an event-study plot, where group-time ATT can be averaged by lengths of treatment exposure for e time periods ($e=t-g$ denotes the event time, that is the difference between the current period and the time when a household becomes treated).

Using Callaway and Sant'Anna methodology, we can understand: (i) how the effects of LCP vary with lengths of exposure to the treatment (dynamic treatment effect), and (ii) heterogeneous treatment effect by groups (since early-treated group may have different effects than late-treated group)¹⁵.

Table 3.15 plots the results for group-time average treatment effects (ATT) with a 95% confidence interval band. The plot includes pre-treatment estimates (black line), which can be used to test the parallel assumption, and post-treatment effects (green line)¹⁶. There are some notable findings. First, there is clear evidence that land consolidation led to a significant reduction in LURC. The group-time average treatment effects range from 28% to 64% lower share of land with LURC across three groups. Second, we found a significant negative effect on land rental market (both rent-in and rent-out) but only in one group. Particularly, the amount of land rented-in is estimated to be 32% lower in 2016 for group 2014, while the amount of land rented-out is significantly lower in 2016 and 2018 for group 2016. The ATT for the other two groups is insignificant. Third, there is no effect on soil investment, however, significant negative effects on chemical fertilizer

¹⁵ We implement this methodology by Stata command *csdid*.

¹⁶ All specifications control a basic set of household characteristics, household fixed-effect, and clustered standard errors at the commune level.

and organic fertilizer are found among group 2018 and group 2014 respectively. Parallel trend assumption hold as the ATTs in pre-treatment periods are significantly different from zero.

[Table 3.15]

Table 3.16 summarizes group-time average treatment effect by an event-study. We consider how the effect of land consolidation varies by the amount of time the program has been implemented. The horizontal line denotes the length of exposure to the treatment (i.e, length=0 when households first participate in the plot-exchange, length=2 corresponds to the first two years after the initial plot-exchange, length= -2 denotes two years before households first exchange plot).

Generally, the aggregated parameters are roughly similar to the group-time average treatment effect. For example, the share of land with LURC is estimated to reduce by 61% after two years since the program started, 51% after four years, and 30% after six years. The decreasing rent-in transaction only occurs temporarily in the second year, while the reduction in the rent-out market lasts a bit longer, from two to four years after household exchanged plots. The negative effect on investment in chemical fertilizer can only be observed in the sixth year, while the effect on organic fertilizer decreases with the length of exposure to the treatment.

[Table 3.16]

3.5. Conclusion

While attempts to reduce land fragmentation in Vietnam were successful, factors such as tenure insecurity after consolidation remain, and become the constraint for farmers to reap the potential of the consolidated land.

By analyzing the case study of two provinces in Vietnam using five-wave household panel data from 2010 to 2018, we find evidence that land consolidation led to a significant reduction in LURC and farmers' social capital within community. Consequently, we find no significant positive effect of the program on land rental transactions, land-related investment and land productivity during that period. Our results are robust by applying DID with propensity score matching and DID with multiple periods proposed by Callaway and Sant'Anna (2021).

Our findings call for the need to strengthen formal land titles for farmers after land consolidation. Providing clear information about land tenure procedures may help increase farmers' perception of the future land tenure security during the LURC transition period.

We acknowledge some limitations in our study due to data availability. For example, a small sample size prevents us from further investigating the heterogeneous program impact across provinces and generalizing our findings. Therefore, we expect future studies to conduct a large-scale and repeated survey to explore how long it would take for farmers to fully receive their formal LURC after consolidation, and how it could affect the land rental market and land investment in the long run.

Table 3.1: Summary statistics of variables by years

	2012	2014	2016	2018
Number of households	730	722	705	692
The progress of LCP				
Number of household exchange plots	0	209	44	18
Number of plots	4.57 [2.81]	3.66 [2.38]	3.36 [2.16]	3.2 [1.87]
Average plot size	585.94 [933.4]	845.94 [2125.1]	774.04 [1154.7]	841.23 [1359.4]
Agricultural productivity (,000 VND/ha)	2.68 [0.20]	2.78 [0.43]	2.37 [0.19]	2.76 [0.17]
Rental market				
Number of households rent land (%)	45.83	43.27	47.23	48.69
Number of households rent in land (%)	25.07	19.53	18.58	16.33
Number of households rent out land (%)	23.19	25.66	31.63	35.61
Number of households with farmland>1ha (%)	3.61	4.02	3.12	3.34
Share of land with LURC	0.71 [0.01]	0.56 [0.01]	0.52 [0.01]	0.57 [0.01]
Abandonment area (m2)	259.88 [29.06]	186.03 [30.52]	111.68 [20.24]	84.88 [12.29]
Cultivated land (m2)	2290 [135]	2533 [215]	2122 [139]	2176 [199]

Table 3.2: Change in outcomes by treatment status

	Pre-program (2012)		Post-program (2014)		Post-program (2016)		Post-program (2018)					
	Never-treated	Treated	Not-yet treated	Treated	Not yet treated	Treated	Never treated	Treated				
Share of land with LURC	0.66	0.82	***	0.71	0.21	***	0.65	0.25	***	0.63	0.47	***
	[0.45]	[0.35]		[0.42]	[0.3]		[0.45]	[0.38]		[0.45]	[0.45]	
Agricultural productivity	2.44	3.12		2.70	2.97		2.52	2.07		2.72	2.84	
	[3.39]	[8.42]		[13.40]	[5.77]		[6.10]	[1.88]		[4.72]	[4.12]	
Land rental market												
% Household rent in	23.5	27.9		19.5	19.6		18.9	18		15.5	17.9	
Rent-in area (m2)	355.87	314.13		288.39	208.47		302.05	180.18	**	233.19	201.17	
	[1213.32]	[671.14]		[1014.5]	[545.6]		[1117.01]	[507.42]		[920.25]	[559.62]	
% Household rent-out	23.7	22.5		27.5	21.1	*	34.7	25.3	***	37.9	31.3	*
Rent-out area (m2)	487.9	270.1		493.57	231.5	*	405.88	312.35		445.86	445.48	
	[3017.27]	[675.67]		[3009.5]	[622.9]		[1501.55]	[731.26]		[1612.9]	[904.9]	
Land investment												
Soil investment	35.23	37.55		47.8	58.1		115.38	98.59		62.95	124.04	
(,000 VND)	[330]	[379]		[371.7]	[405.1]		[775.5]	[616.3]		[348.1]	[766]	
Chemical fertilizer	1157.7	1640	***	1183.3	1404.8		996.8	1166.3		1447.9	1162.1	
(,000 VND)	[3136]	[1696]		[2206]	[1735]		[2285]	[1153.2]		[4957]	[1313.2]	
Organic fertilizer	212	392	***	290.8	310.1		94.9	124.5		354.8	362.9	
(,000 VND)	[408]	[443]		[788.3]	[624.2]		[283]	[261]		[1114.9]	[751.7]	
Number of households	472	258		513	209		459	246		434	258	

*10% significance level, **5% significance level, ***1% significance level.

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Table 3.3: Baseline household characteristics by treatment status

	Control (Mean/SD)	Treated (Mean/SD)	Difference	Significance (t-test)
Number of plots	3.9 [2.62]	5.91 [2.68]	-2.01	***
Total cultivated land (m2)	2322 [4353]	2234 [1753]	87.11	
Head's age	51.92 [14.27]	52.07 [12.46]	-0.15	
Male head=1	0.78 [0.40]	0.83 [0.37]	-0.04	*
Head's education	8.41 [3.60]	8.17 [3.36]	0.24	
Household size	4.05 [1.52]	4.06 [1.61]	0	
Number of adults	3.17 [1.27]	3.2 [1.18]	-0.03	
Poor household=1	0.13 [0.33]	0.1 [0.31]	0.02	
Asset value (,000 VND)	23454 [52331]	20908 34014]	2546	
Number of households	472	258		
F-test of joint significance			5.38***	
F-test of joint significance (exclude number of plots)			1.24	

*10% significance level, **5% significance level, ***1% significance level.

Table 3.4: Probability of joining the Land Consolidation Program

	Program participation=1		
	OLS	Probit	Commune FE
	(1)	(2)	(3)
Male head	0.028 (0.044)	0.103 (0.143)	0.003 (0.032)
Age of head	-0.001 (0.001)	-0.002 (0.004)	-0.001 (0.001)
Education of head	-0.006 (0.005)	-0.019 (0.016)	-0.004 (0.004)
Household size	-0.004 (0.011)	-0.019 (0.034)	0.005 (0.008)
Number of plots	0.0578** (0.007)	0.172*** (0.023)	0.015** (0.006)
Total land holdings, log	-0.057*** (0.021)	-0.181** (0.073)	0.018 (0.021)
Politic (member)	0.016 (0.094)	0.063 (0.306)	-0.024 (0.071)
Politic (relative)	0.011 (0.044)	0.017 (0.143)	0.013 (0.033)
Politic (friend)	-0.023 (0.049)	-0.092 (0.163)	-0.020 (0.039)
Constant	0.526*** (0.163)	0.194 (0.552)	-0.080 (0.211)
Observations	738	738	738
R-squared	0.095		0.693

*10% significance level, **5% significance level, ***1% significance level. Data 2012.

Politic (mem), Politic(relative), Politic(friend) are defined as dummy equals to 1 if households have family member, or relative, or friends being government officials respectively.

Table 3.5: Impacts of LCP on Land Investment and Technology adoption

	DID				DID-PSM			
	Machine rental (log)	Soil investment (log)	Chemical fertilizer (log)	Organic fertilizer (log)	Machine rental (log)	Soil investment (log)	Chemical fertilizer (log)	Organic fertilizer (log)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Short-run impacts (2012 & 2014)								
Treat x 2014	0.307** (0.150)	0.040 (0.236)	0.046 (0.098)	0.154 (0.234)	0.333** (0.156)	0.029 (0.116)	0.054 (0.101)	0.346 (0.262)
Observations	1,462	1,462	1,462	1,462	1,020	1,020	1,020	1,020
R-squared	0.102	0.054	0.63	0.309	0.118	0.054	0.112	0.277
Panel B: Middle -run impacts (2012 & 2016)								
Treat x 2016	0.139 (0.227)	0.047 (0.094)	-0.046 (0.134)	-0.117 (0.207)	0.183 (0.213)	-0.006 (0.104)	-0.045 (0.186)	-0.116 (0.247)
Observations	1,442	1,442	1,442	1,442	1,004	1,004	1,004	1,004
R-squared	0.154	0.049	0.703	0.532	0.174	0.066	0.231	0.538
Panel C: Long-run impact (2012 & 2018)								
Treat x 2018	0.146 (0.226)	-0.017 (0.167)	-0.275* (0.154)	-0.195 (0.216)	-0.051 (0.262)	-0.013 (0.090)	-0.287 (0.257)	-0.183 (0.257)
Observations	1,436	1,436	1,436	1,436	996	996	996	996
R-squared	0.213	0.082	0.721	0.392	0.213	0.093	0.262	0.353
Panel D: Pooled sample								
Treat	0.231* (0.118)	0.139 (0.159)	-0.005 (0.090)	-0.006 (0.137)	0.251* (0.134)	0.096 (0.068)	-0.036 (0.094)	0.068 (0.150)
Observations	2,866	2,866	2,866	2,866	1,988	1,988	1,988	1,988
R-squared	0.213	0.056	0.69	0.332	0.224	0.065	0.188	0.325

*10% significance level, **5% significance level, ***1% significance level. Additional control includes gender, age, education of household head, household size, total cultivated area, year x districts, household fixed effects. Clustered standard error at commune level.

Table 3.6: Impacts of LCP on Labor Reallocation

	DID					DID-PSM				
	Crop activities (days, log)	Waged job (days, log)	Self-employ (days, log)	Migrate=1	Number of migrants	Crop activities (days, log)	Waged job (days, log)	Self-employ (days, log)	Migrate=1	Number of migrants
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Short-run impacts (2012 & 2014)										
Treat x 2014	-0.206*	-0.105	0.061	0.065	0.161***	-0.185	-0.170	0.220	0.041	0.123*
	(0.116)	(0.183)	(0.156)	(0.040)	(0.055)	(0.121)	(0.201)	(0.164)	(0.041)	(0.068)
Observations	1,462	1,462	1,462	1,462	1,462	1,020	1,020	1,020	1,020	1,020
R-squared	0.545	0.131	0.07	0.187	0.123	0.24	0.135	0.079	0.233	0.143
Panel B: Middle -run impacts (2012 & 2016)										
Treat x 2016	-0.300***	-0.276	0.060	-0.042	0.046	-0.196**	-0.421	0.119	-0.076*	0.007
	(0.098)	(0.221)	(0.175)	(0.038)	(0.048)	(0.096)	(0.258)	(0.228)	(0.046)	(0.063)
Observations	1,442	1,442	1,442	1,442	1,442	1,004	1,004	1,004	1,004	1,004
R-squared	0.652	0.176	0.107	0.122	0.075	0.221	0.162	0.119	0.141	0.085
Panel C: Long-run impact (2012 & 2018)										
Treat x 2018	-0.320***	0.038	-0.238	-0.021	0.126**	-0.291**	0.092	-0.215	0.006	0.153**
	(0.119)	(0.195)	(0.163)	(0.037)	(0.055)	(0.131)	(0.205)	(0.206)	(0.046)	(0.070)
Observations	1,436	1,436	1,436	1,436	1,436	996	996	996	996	996
R-squared	0.672	0.154	0.105	0.156	0.106	0.221	0.16	0.108	0.194	0.111
Panel D: Pooled sample										
Treat	-0.187**	0.233	-0.022	0.014	0.115***	-0.168**	0.236	0.034	0.016	0.110**
	(0.072)	(0.132)	(0.101)	(0.028)	(0.037)	(0.075)	(0.139)	(0.101)	(0.034)	(0.049)
Observations	2,866	2,866	2,866	2,866	2,866	1,988	1,988	1,988	1,988	1,988
R-squared	0.639	0.139	0.091	0.12	0.091	0.178	0.133	0.099	0.151	0.109

*10% significance level, **5% significance level, ***1% significance level. Additional control includes gender, age, education of household head, household size, total cultivated area, year x districts, household fixed effects. Clustered standard error at commune level.

Table 3.7: Impact of LCP on Land rented in

	DID		DID-PSM	
	Participation=1	Amount (log)	Participation=1	Amount (log)
	(1)	(2)	(3)	(4)
Panel A: Short-run impacts (2012 & 2014)				
Treat x 2014	-0.049 (0.043)	-0.293 (0.185)	-0.030 (0.049)	-0.188 (0.214)
Observations	1,462	1,462	1,020	1,020
R-squared	0.077	0.081	0.094	0.094
Panel B: Middle -run impacts (2012 & 2016)				
Treat x 2016	-0.046 (0.041)	-0.277 (0.168)	0.003 (0.045)	-0.029 (0.191)
Observations	1,442	1,442	1,005	1,005
R-squared	0.084	0.086	0.12	0.122
Panel C: Long-run impact (2012 & 2018)				
Treat x 2018	-0.009 (0.054)	0.007 (0.242)	0.061 (0.055)	0.339 (0.261)
Observations	1,436	1,436	996	996
R-squared	0.096	0.1	0.132	0.128
Panel D: Pooled sample				
Treat	-0.022 (0.027)	-0.158 (0.110)	-0.029 (0.031)	-0.166 (0.130)
Observations	2,866	2,866	1,989	1,989
R-squared	0.077	0.077	0.098	0.097

*10% significance level, **5% significance level, ***1% significance level. Additional control includes gender, age, education of household head, household size, year x districts, household fixed effects. Clustered standard error at commune level.

Table 3.8: Impact of LCP on Land rented out

	DID		DID-PSM	
	Participation=1	Amount (log)	Participation=1	Amount (log)
	(1)	(2)	(3)	(4)
Panel A: Short-run impacts (2012 & 2014)				
Treat x 2014	-0.068 (0.044)	-0.254* (0.151)	-0.049 (0.045)	-0.257* (0.143)
Observations	1,462	1,462	1,020	1,020
R-squared	0.071	0.066	0.066	0.073
Panel B: Middle -run impacts (2012 & 2016)				
Treat x 2016	-0.097** (0.042)	-0.228* (0.137)	-0.078* (0.043)	-0.190 (0.142)
Observations	1,442	1,442	1,005	1,005
R-squared	0.117	0.112	0.12	0.123
Panel C: Long-run impact (2012 & 2018)				
Treat x 2018	0.009 (0.054)	0.156 (0.194)	0.025 (0.059)	0.166 (0.204)
Observations	1,436	1,436	996	996
R-squared	0.168	0.149	0.161	0.144
Panel D: Pooled sample				
Treat	-0.050 (0.031)	-0.223** (0.104)	-0.039 (0.032)	-0.218** (0.106)
Observations	2,866	2,866	1,989	1,989
R-squared	0.105	0.099	0.108	0.109

*10% significance level, **5% significance level, ***1% significance level. Additional control includes gender, age, education of household head, household size, year x districts, household fixed effects. Clustered standard error at commune level.

Table 3.9: Impact of LCP on Land productivity

	DID	DID-PSM
	Land productivity (log)	Land productivity (log)
	(1)	(2)
Panel A: Short-run impacts (2012 & 2014)		
Treat x 2014	0.107 (0.090)	0.070 (0.058)
Observations	1,462	1,020
R-squared	0.11	0.075
Panel B: Middle -run impacts (2012 & 2016)		
Treat x 2016	-0.097 (0.074)	-0.040 (0.080)
Observations	1,442	1,004
R-squared	0.081	0.166
Panel C: Long-run impact (2012 & 2018)		
Treat x 2018	0.101 (0.134)	-0.050 (0.140)
Observations	1,436	996
R-squared	0.139	0.16
Panel D: Pooled sample		
Treat	-0.001 (0.083)	-0.031 (0.073)
Observations	2,866	1,988
R-squared	0.114	0.12

*10% significance level, **5% significance level, ***1% significance level.
 Additional control includes gender, age, education of household head, household size, total cultivated area, year x districts, household fixed effects. Clustered standard error at commune level.

Table 3.10: Impact of LCP on LURC share

	Share of LURC			
	DID	DID-PSM	Ha Tay	Nghe An
	(1)	(2)	(3)	(4)
Panel A: Short-run impacts (2012 & 2014)				
Treat x 2014	-0.564*** (0.055)	-0.556*** (0.056)	-0.542*** (0.064)	-0.649*** (0.083)
Observations	1,462	1,020	1,052	400
R-squared	0.518	0.603	0.465	0.699
Panel B: Middle -run impacts (2012 & 2016)				
Treat x 2016	-0.450*** (0.053)	-0.421*** (0.057)	-0.434*** (0.070)	-0.472*** (0.063)
Observations	1,442	1,005	1,043	392
R-squared	0.389	0.47	0.308	0.643
Panel C: Long-run impact (2012 & 2018)				
Treat x 2018	-0.238*** (0.050)	-0.172*** (0.051)	-0.251*** (0.066)	-0.219*** (0.070)
Observations	1,436	996	1,031	391
R-squared	0.273	0.327	0.24	0.405
Panel D: Pooled data (2012-2018)				
Treat	-0.311*** (0.036)	-0.323*** (0.039)	-0.286*** (0.046)	-0.378*** (0.040)
Observations	2,866	1,989	2,088	778
R-squared	0.281	0.357	0.228	0.453

*10% significance level, **5% significance level, ***1% significance level. Additional control includes gender, age, education of household head, household size, total land holdings, year x districts, household fixed effects. Clustered standard error at commune level.

Table 3.11: Impacts of LURC

VARIABLES	Soil investment (log)	Chemical fertilizer (log)	Organic fertilizer (log)	Rent in area (log)	Rent out area (log)	Land productivity (log)
	(1)	(2)	(3)	(4)	(5)	(6)
LURC share	-0.039 (0.097)	0.015 (0.056)	0.253** (0.107)	0.190** (0.094)	0.056 (0.060)	0.052 (0.056)
Male head	-0.152 (0.114)	0.160 (0.103)	0.605*** (0.165)	0.263 (0.262)	0.134 (0.144)	0.123 (0.085)
Age of head	0.010** (0.005)	0.001 (0.006)	0.004 (0.008)	0.001 (0.008)	-0.004 (0.008)	-0.002 (0.006)
Education of head	0.014 (0.018)	0.02 (0.014)	0.019 (0.020)	0.005 (0.018)	0.008 (0.015)	-0.017 (0.013)
Household size	0.026 (0.027)	0.028 (0.018)	0.046 (0.037)	-0.004 (0.036)	-0.034 (0.023)	-0.000 (0.013)
Crop area (log)	0.020 (0.020)	0.653*** (0.017)	0.187*** (0.020)	0.105*** (0.020)	-0.329*** (0.022)	0.519*** (0.022)
Observations	2,866	2,866	2,866	2,866	2,866	2,866
R-squared	0.068	0.688	0.333	0.097	0.347	0.620

*10% significance level, **5% significance level, ***1% significance level. Additional controls are household fixed effect and time trend by districts

Table 3.12: Impacts of LURC (IV regression)

VARIABLES	Soil investment (log)	Chemical fertilizer (log)	Organic fertilizer (log)	Rent_in area (log)	Rent_out area (log)	Land productivity (log)
	(1)	(3)	(2)	(4)	(5)	(6)
LURC share	-0.447 (0.321)	0.596 (0.382)	0.743** (0.354)	0.460 (0.326)	0.357 (0.268)	0.345 (0.294)
Male head	-0.168 (0.176)	0.607*** (0.209)	0.199 (0.194)	0.290 (0.179)	0.070 (0.147)	0.173 (0.161)
Age of head	0.012 (0.009)	-0.001 (0.010)	-0.016* (0.009)	-0.003 (0.009)	0.004 (0.007)	-0.016** (0.008)
Education of head	0.016 (0.017)	0.015 (0.020)	0.002 (0.019)	0.001 (0.017)	0.018 (0.014)	-0.031** (0.015)
Household size	0.029 (0.028)	0.048 (0.034)	0.056* (0.031)	0.006 (0.029)	-0.081*** (0.024)	0.036 (0.026)
Crop area (log)	0.120* (0.069)	0.234*** (0.082)	0.410*** (0.077)	-0.123* (0.071)	0.346*** (0.058)	0.087 (0.064)
Observations	2834	2834	2834	2834	2834	2834
R-squared	0.056	0.301	0.133	0.075	0.103	0.099
Cragg-Donald Wald F statistic	136.247	136.247	136.247	136.247	136.247	136.247
Stock-Yogo weak test critical value 10%	16.380	16.380	16.380	16.380	16.380	16.380

*10% significance level, **5% significance level, ***1% significance level. Additional controls are household fixed effect and time trend by districts. IV: Treat.
Stata command: xtivreg2

Table 3.13: Impact of LCP on Social Trust

	Collective action		Mutual trust	
	(1)	(2)	(3)	(4)
Panel A: Short-run impacts (2012 & 2014)				
Treat x 2014	-0.082*	0.014	0.0231	0.018
	(0.050)	(0.045)	(0.060)	(0.070)
Observations	1,462	1,462	1,462	1,462
R-squared	0.083	0.136	0.144	0.287
Panel B: Middle -run impacts (2012 & 2016)				
Treat x 2016			-0.129**	-0.012
			(0.051)	(0.068)
Observations			1,442	1,442
R-squared			0.145	0.18
Panel C: Long-run impact (2012 & 2018)				
Treat x 2018	-0.009	-0.201*	-0.111	0.018
	(0.134)	(0.104)	(0.072)	(0.151)
Observations	1,436	1,436	1,436	1,436
R-squared	0.209	0.08	0.096	0.44

*10% significance level, **5% significance level, ***1% significance level. Additional control includes gender, age, education of household head, household size, total cultivated area, year x districts, household fixed effects. Clustered standard error at commune level. Columns 1-4 (Panel B) are blank due to missing variables.

Table 3.14: Check parallel trend assumption

	Share of LUR (log)	Rent_in =1	Rent_in area (log)	Rent_out =1	Rent_out area (log)
	(1)	(2)	(3)	(4)	(5)
Treat x 2012	0.074 (0.038)	-0.000 (0.037)	-0.020 (0.161)	0.043 (0.026)	0.110 (0.098)
Observations	1,334	1,334	1,334	1,334	1,334
R-squared	0.17	0.096	0.09	0.118	0.1

Table 3.15: Group-Time average treatment effects (ATT(g,t))

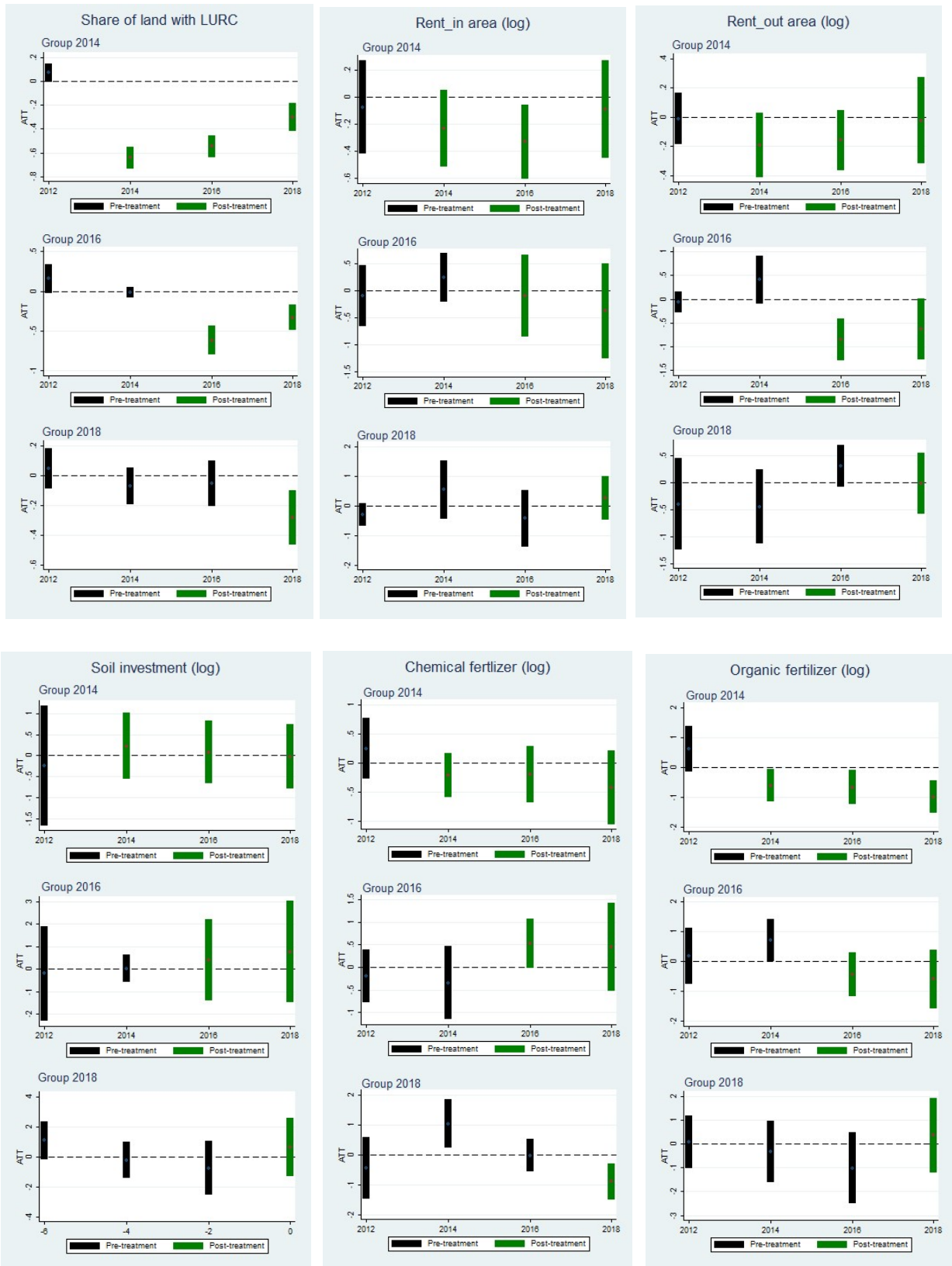


Table 3.16: Summarize Group-Time ATT(g,t) (Event-study: Dynamic effects)

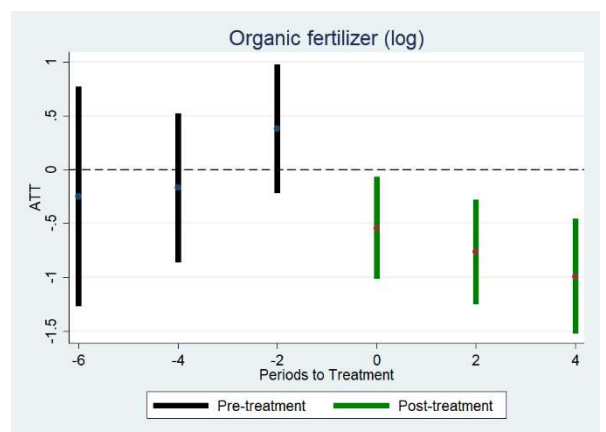
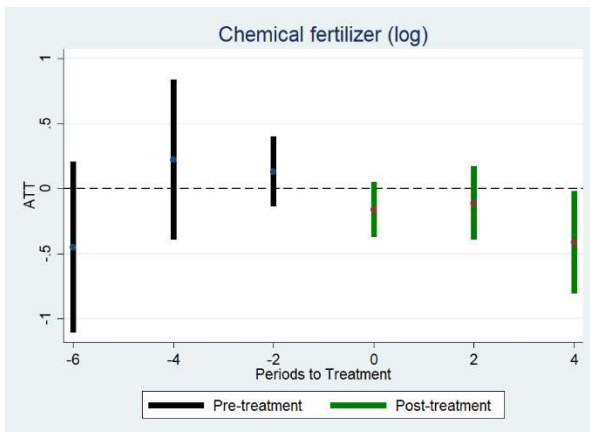
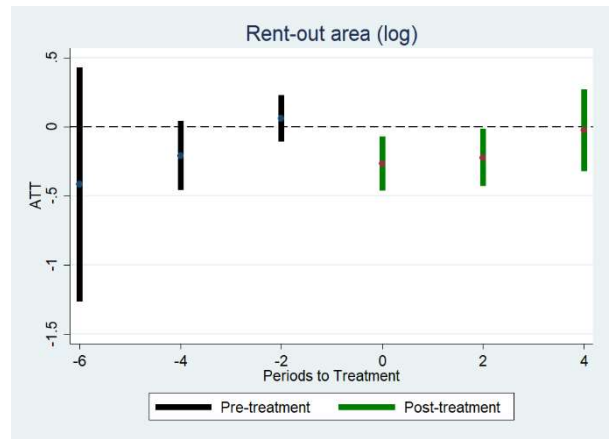
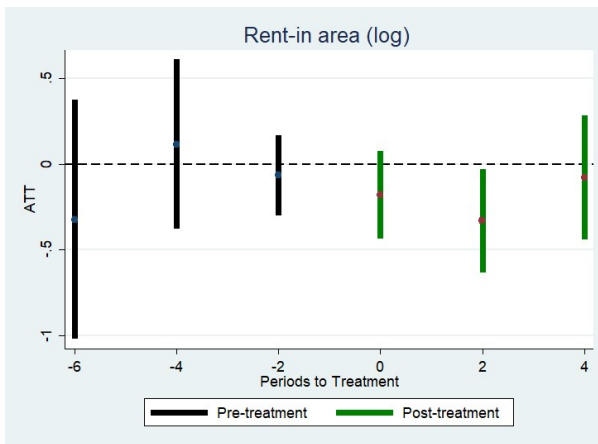
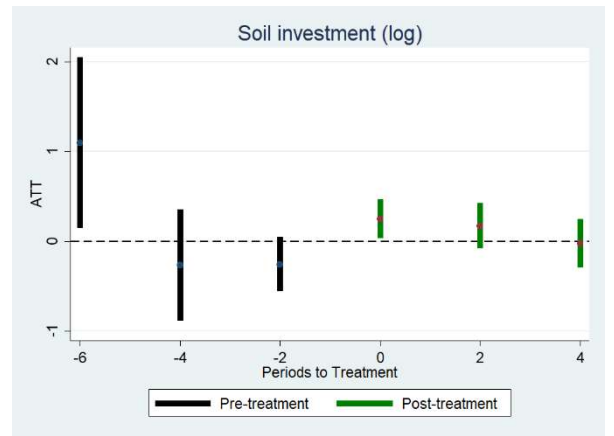
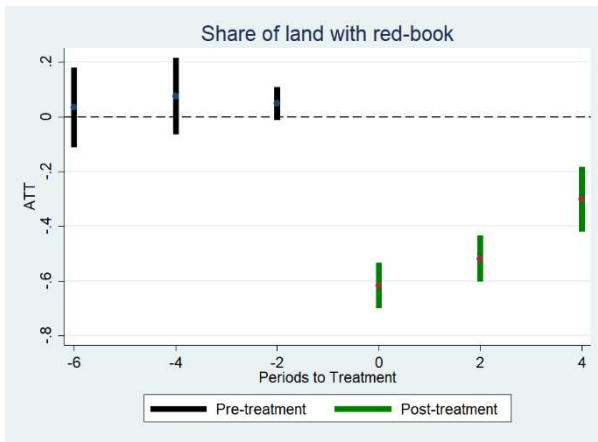


Table 3.A.1: Balancing test

	Unmatched				Matched			
	Mean		%bias	p-value	Mean		%bias	p-value
	Treated	Control			Treated	Control		
Number of plots	5.918	3.850	78.1	***	5.924	5.956	-1.2	
Total land holdings	2296.800	2478.900	-5.2		2318.700	2365.600	-1.3	
Male head=1	0.837	0.785	13.2	*	0.846	0.862	-4	
Age of head	52.074	51.923	1.1		51.739	53.380	-12.3	
Education of head	8.174	8.329	-4.4		8.241	8.011	6.5	
Household size	4.065	4.043	1.4		4.102	4.146	-2.8	
Total durable asset	20908	23037	-4.9		20908	20404	1.2	
Political connection=1	0.027	0.033	-3.6		0.028	0.040	-6.9	

*10% significance level, **5% significance level, ***1% significance level.

Chapter Four

A Government-dominated pattern of Land Consolidation.

Do Political Connections matter?

4.1. Introduction

Political connections have often been defined as the kinships or friendships between household members and government officials or politicians. Political connections have significant implications for having better access to scarce resources especially in developing countries since politicians often control such resources (Vincent et al., 2022). Existing studies have documented numerous advantages of having political connections in household livelihood. For example, if household members have relatives or friends with politicians or government officials, they have easier access to micro-credit (Linyang et al, 2020; Markussen and Ngo, 2019; Markussen and Tarp, 2015), receive more public transfer (Malik and Malviaka, 2019), and have better chances to be involved in governmental welfare programs (Caeyers and Dercon, 2012; Hanna et al., 2013).

Political connections are critical in Vietnam, a network-oriented economy (Pham and Talavera, 2018), as documented in the old sayings “one mandarin benefits the whole clan”. Several studies provide evidence of the linkage between officials’ favoritism and welfare of rural households in the Vietnamese context such as Markussen and Tarp (2014) and Christina and Carol (2015). They showed that households having a relative working as an executive public officer have better access to credit than those without. Consequently, such households tend to invest more in their land and have a higher likelihood of establishing an enterprise. Similarly, Markussen and Ngo (2019) found the

benefits of being a member of the Vietnamese communist party in increasing farm, nonfarm income and subjective well-being.

Political connections seem to affect various aspects of the livelihood of rural households in Vietnam. However, do political connections matter in the land consolidation process? Anecdotal evidence show that political connections may matter as farmers reported the incidences of “good lands” were reallocated towards relatives of local government officials. The situations seem widespread in many provinces in Vietnam (see, appendix). Despite the spate of media reports, virtually no empirical study has examined the influence of political connections on the land consolidation program (LCP), although the program has the potential to change farmers’ livelihoods to a large extent. Thus, it is worth exploring how political connections would affect the LCP in this chapter. We focus on the following aspects of political connections with the LCP:

- (i) Do political connections play a role in the program selection process?
- (ii) Do political connections bring any benefits to the program participants?
- (iii) Do the program participants with political connections perform better in agricultural production than those without?

We employ four waves household panel data from the Vietnam Access to Rural Household survey (VARHS) in 2012, 2014, 2016 and 2018 in two provinces Ha Tay and Nghe An. Following the previous studies such as Markussen and Tarp (2014), Christina and Carol (2015), and Kim and Todo (2019), we define political connections as an indicator if households have a *relative* who is working as government official with political power. The reason to focus on political connections through relative (extended families) rather than through family members or friends is to mitigate a self-selection bias since political connection status is not randomly assigned. Take an example, members of

households participating in the LCP may be actively seek a job as local officials or make friends with officials if they expect to gain some benefits from these connections. However, a relative living outside the households who happens to be public official is kind of random event to the households.

Empirical results suggest that political connections do not affect the program selection process nor the progress of LURC issuance despite our expectations. The households participating in the LCP reduced their share of lands with LURC regardless of their political connection status to a similar extent (approximately 40 percentage points). Similarly, we find no evidence that connected households achieved higher agricultural productivity than unconnected one.

This chapter sheds light in understanding the role of political connections and land consolidation in a developing country context. Specifically, we do not observe the presence of favoritism of local government officials towards their relatives in term of program participation, and the progress of obtaining LURC after land consolidation. In addition, households with political connections do not perform better in agricultural production than those without.

The chapter is organized as follows. Section 4.2 proposes several Hypotheses. Section 4.3 presents Empirical model. Section 4.4 analyzes the Results, and Section 4.5 concludes.

4.2. Hypotheses

What are the potential impacts of political connections in the land consolidation program?

First, since the local governments played a dominant role in the land consolidation process including design, implementation, monitoring, and funding, we expect

H1: Having connections with government officials could be more likely to extract considerable benefits from the LCP such as (1) exchange plots with better quality; and (2) improving tenure security for the newly exchanged plots by speeding up the process of issuing land use right certificates (LURC) and, hence, reducing the risk of land expropriation.

The benefit (1) is guided by anecdotes¹⁷, which suggested that households having relatives or acquaintances with government officials could receive “good lands” from the LCP. “Good lands” can be referred to various dimensions such as soil quality, position of plots relative to roads, water access, and value of the crops planted on the land. We hypothesize that politically connected households could have better access to such resources.

The benefit (2) is hypothesized by the facts that government officials are in charge of issuing LURC. Thus, having connections with them may help to smooth the LURC issuance process. In addition, local governments have the right to confiscate the land for socio-economic development and public interest (Land Law 2003, Article 5.2 and 22.1). Therefore, we also expect being connected with officials could help reduce the risk of lands being confiscated.

Second, given such advantages that political connections could bring, we would expect that

H2: Connected households perform better in agricultural production (i.e., higher agricultural productivity) than unconnected ones.

¹⁷ Anecdotes were listed in Appendix (Chapter 2). Specifically, farmers reported that “good lands” were reallocated towards the relatives and acquaintance of local government officials. The situation seems widespread in many provinces in the North of Vietnam.

4.3. Empirical model

We examine the joint effects of land consolidation and political connections by estimating the following equation:

$$Y_{it} = \alpha_1 \text{Treat}_{it} + \alpha_2 \text{Politic}_{it} + \alpha_3 (\text{Treat}_{it} \times \text{Politic}_{it}) + \beta X_{it} + \Omega_i + T_t + \varepsilon_{it} \quad (4.1)$$

while Y_{it} is the outcomes of household i in year t . Treat_{it} takes the value 1 if household i participate in land consolidation program in year t . Politic_{it} is dummy variable equals 1 if household i have a relative who is public official in year t . However, instead of defining Treat_{it} and Politic_{it} at each point in time, we employ a *staggered adoption design* in DID settings proposed by Athey and Imbens (2022). Specifically, once Treat_{it} and Politic_{it} take value 1, they will remain value 1 in the following periods. Thus, the DID estimator is a weighted average of different types of effects (i.e., the effects of changing from never treated to treated in the first period, or changing from never treated to being treated later) (Athey and Imbens, 2022).

$(\text{Treat}_{it} \times \text{Politic}_{it})$ is the interaction effect of land consolidation program and household's political connection. α_1 captures the effect of the land consolidation program for households without political connections ($\text{Politic}=0$), $\alpha_1 + \alpha_3$ captures the effect of land consolidation for households with political connections ($\text{Politic}=1$), α_3 measures the differential effects of the LCP on politically-connected households relative to unconnected households.

Ω_i is household fixed effect. X_{it} is a set of household characteristics (i.e., age, gender, education of household head, household size). T_t is year fixed effect. Standard errors are clustered at the commune level, allowing autocorrelation within communes.

4.4. Results

4.4.1. Summary statistics

Figure 4.1 depicts the detailed profile of a relative who is public official. Approximately 24% households reported that their relatives are public officials. The majority of relatives are cousin (18.34%), sister/ brother in-laws (3.21%), son/daughter in-laws (2.14%), father/mother in-laws (0.65%). Regarding their working position, relatives are district leaders (1.24%), district officials (3.96%), commune leaders (5.24%), commune officials (9.45%), leaders of mass organization (2.96%) and other (1.31%).

[Figure 4.1]

Table 4.1 shows that on average, 37.9% of households reported being connected with government officials either through household members (3.9%), relatives (22.5%), or friends (26.2%). The share of politically connected households varies over time, mostly occurring in 2012-2014. Specifically, the percentage of households whose relatives work as officials raised from 16.1% in 2012 to 26.0% in 2014. Similarly, those reported their friends are officials increased from 13.6% in 2012 to 34.8% in 2014. Such variations are most likely due to the LCP started from late 2012 in the two provinces, which more local officials were recruited to facilitate the land consolidation project.

[Table 4.1]

Table 4.2 compares some baseline household characteristics by treatment status (columns 1 and 2) and political connection status (columns 3 and 4). Household characteristics consist of household head's age, household head's education (schooling years), gender of household head (dummy), household size (number of people living in

the households), household's poverty status¹⁸, having a nonfarm job (dummy), total land holdings (m²), and total of durable asset value (thousands Vietnam Dong). Results show no systematic differences in predetermined characteristics between the two groups by treatment status (columns 1 and 2). In addition, there are no significant differences in the number of households with political connection between the control and the treated groups, 17% and 19% respectively. Columns 3 and 4 present the initial household characteristics of the two groups by political connection status. In general, politically connected households are less likely to be poor, and more likely to be male-headed with higher education. However, the program participation rates do not differ between households with and without political connections, 33% and 30% respectively.

[Table 4.2]

Table 4.2 also compares some outcome variables by treatment status (columns 1 and 2) and political connection status (columns 3 and 4). Outcome variables include agricultural land productivity, which was calculated by dividing the total value of all crops by total crop area (unit: thousands/ m²), share of plot area with LURC, a dummy if households access to a reliable irrigation system, and the probability of being land confiscated by the government. Results show no systematic differences in agricultural productivity between the two groups by treatment status (columns 1 and 2), however, treated households tend to have more farmland with LURC and irrigation access. They also have higher probability of being land expropriated. Regarding groups by political connection status, there is no significant differences in all outcome variables.

[Table 4.2]

¹⁸ Households were certified as poor by the Ministry of Labor, Invalids and Social Affairs

4.4.2. Regression results

4.4.2.1. Political connections and Program benefits

We investigate if households with political connections gain any benefits from the land consolidation program. Hypothesis 1 suggested that politically connected households may receive exchanged plots with better quality and secured land tenure. Therefore, we estimate equation (4.1) with various household outcomes such as (i) irrigation access, (iii) share of farmland area with land use right certificate (LURC), and (iv) probability of land being confiscated during the last two years¹⁹. The variable *political connection* is defined as a dummy taking value 1 if households have any relative being government officials, and 0 if otherwise.

Table 4.3 reports the estimated results. We pay attention on the two lines at the bottom of the table. First, the marginal program's effect on households without political connection is captured by the coefficient of *Treat*. Second, the marginal program's effect on those with political connection is given by the sum of this coefficient with the coefficient of $(Treat \times Politic)$, which its significance is ultimately checked by F-test.

We find that the LCP has positive effect on irrigation access of households with and without political connections by 13.2% and 8.9% respectively. The effects are significant at 1% level (column 1). Regarding the outcome of land share with LURC, we found that LCP reduced LURC share of households with and without political connections by 41.2% and 38.1% respectively. The impacts are significant at 1% level (column 2).

¹⁹ Ideally, we want to check outcomes of soil quality and position of plots. However, data unavailability prevents us to do so.

While having LURC is important, it cannot protect land from being seized by the State. In the Vietnamese context, where all land belongs to the State, agricultural land can be confiscated for the purpose of economic development and public interest regardless of having LURC (Land law 2003, article 5.2 and 22.1). Therefore, we examine another measurement of land tenure security, land expropriation. We re-estimate the same model with the outcome of having any plots confiscated by the State during the last two years. Column 3 shows that no significant impact was found for LCP households with and without political connections on the probability of land being expelled.

In sum, although the anecdotal evidence suggests political connections matter in the land consolidation process, the estimation results do not show a remarkably differential effects of the LCP on households with and without political connections. In fact, we only observe a slightly differential program effects on the outcomes of irrigation access and LURC share by 3-4 percentage points. We conclude that having political connections does not bring much benefits from the land consolidation program to the connected households.

[Table 4.3]

4.4.2.2. Political connections and Agricultural productivity

Table 4.4 presents the heterogeneous effects of the LCP on agricultural land productivity between households with and without political connections. We construct land productivity for all crops (column 1) and rice crop (column 2). Land productivity for all crops were calculated by dividing the annual crop output by total crop area (unit: thousands VND/ha). Agricultural productivity for rice crop (rice yield) was constructed by dividing the annual rice output over total rice area (unit: kg/ha). We transformed both outcomes to natural logarithm form. Hypothesis 3 suggests that households with political

connections achieve better agricultural productivity than those without. However, our results do not support this hypothesis since we find no differential program impact on land productivity for all crops (column 1) and rice crop (column 2) across households with and without political connections. The negligible program impact could be explained by the small margin for further increase (Tran et al., 2022). Also, it could be due to a reduction in LURC for both households with and without political connections, which may weaken farmer's incentive in farming during the land transition period.

[Table 4.4]

In the main regressions (Table 4.3 & 4.4), we defined political connections as the family ties between households and government officials through *relative*. However, other types of political connections (i.e; through family members or friends) may also induce some impacts. For instance, having officials within the household may have more influential effects. Therefore, we re-estimate equation (4.1) with different definitions of political connections. The results are shown in Table 4.5 & 4.6. Specifically, in Table 4.5, we classify households with political connections if having any types of political connections through family member/relative/friend. In table 4.6, we simultaneously added two categories of political connections (through family member, and relative) in the regressions. The estimation results are consistent with our main regressions, confirming the minimal differential program effects on irrigation access and LURC share between households with and without political connections.

[Table 4.5 & 4.6]

4.5. Conclusion

In recent years, Vietnam has implemented land consolidation program in many provinces in the North of Vietnam. The program is expected to reduce the land fragmentation, accelerate technology adoption and improve agricultural productivity. However, numerous media reports that political connections may play a role in the land consolidation process. For example, households having personal relationship with local government officials could receive land with good quality and several benefits from the program. Thus, the main purpose of this chapter is to explore the issues relating to political connections and land consolidation in rural Vietnam.

We employ four-wave household-level panel data from VARHS 2012-2018 in the empirical analysis. We adopt the measurement of political connection through relatives to mitigate a self-selection bias in political connection status. We find that political connections did not affect the program selection process nor the progress of issuing formal land use certificates (LURC) after land consolidation. Specifically, households with and without political connections reduced share of land with LURC in a similar magnitude, approximately 40 percentage points. In contrast to our expectation, we do not observe a heterogeneous program effect on agricultural productivity between households with and without political connections.

Figure 4.1: Profile of Relatives who work as public officials

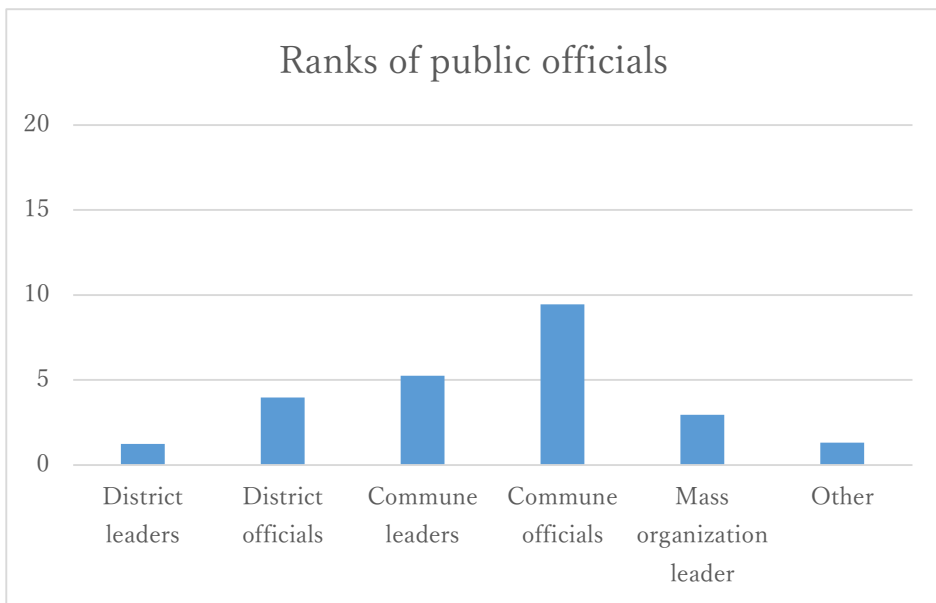
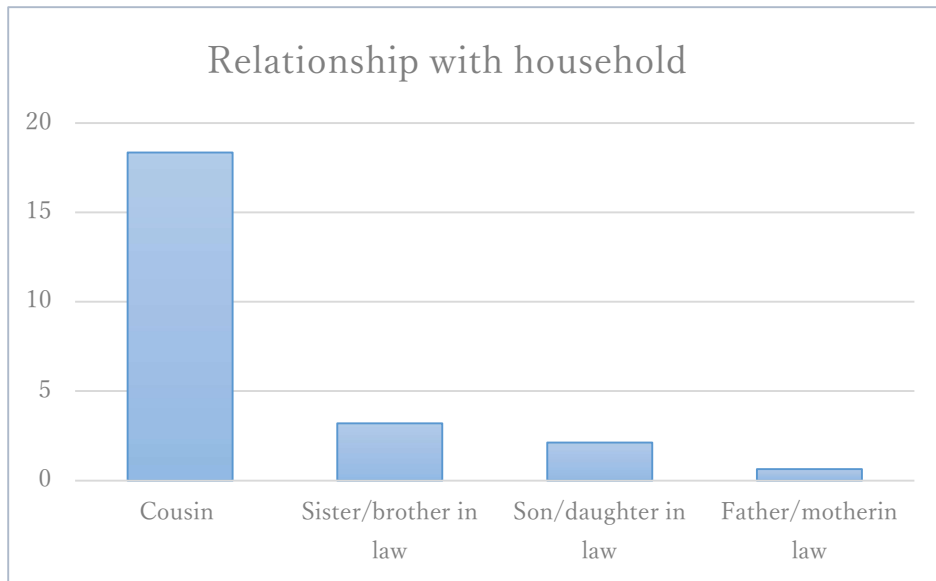


Table 4.1: Changes in Political Connection over time

	2012	2014	2016	2018	Average
Household member (%)	3.26	4.5	4.65	3.41	3.96
Relative (%)	16.12	26.05	21.24	26.51	22.48
Friend (%)	13.64	34.88	21.4	35.19	26.28
Number of households	645	645	645	645	

*Balanced panel data

Table 4.2: Baseline household characteristics

	By treatment status			By political connection status		
	Control	Treated	Diff	Without connection	With connection	Diff
	(Mean/SD)	(Mean/SD)	(t-test)	(Mean/SD)	(Mean/SD)	(t-test)
	(1)	(2)	(1)-(2)	(3)	(4)	(3)-(4)
Political connection=1	0.174 [0.38]	0.194 [0.396]				
Program participation=1				0.305 [0.461]	0.333 [0.474]	
Household characteristics						
Male head	0.785 [0.412]	0.823 [0.383]		0.778 [0.416]	0.880 [0.327]	***
Age of head	51.814 [14.315]	51.952 [12.58]		52.061 [13.612]	50.926 [14.6]	
Education of head	8.039 [3.444]	7.817 [3.299]		7.774 [3.43]	8.861 [3.113]	***
Household size	4.005 [1.517]	4.016 [1.596]		4.033 [1.57]	3.898 [1.401]	
Poor household=1	0.148 [0.356]	0.130 [0.337]		0.160 [0.367]	0.065 [0.247]	***
Having nonfarm job=1	0.358 [0.48]	0.323 [0.469]		0.340 [0.474]	0.380 [0.488]	
Total land holdings (m2)	2435 [4364]	2161 [1484]		2224 [3086]	2922 [5765]	
Total asset value (,000 VND)	23475 [55773]	19466 [36358]		22719 [54946]	20024 [21919]	

Outcome variables

Agricultural productivity (,000 VND/ m2)	3.088 [3.898]	2.960 [7.461]		3.054 [5.857]	2.970 [3.136]
Share of LURC	0.659 [0.456]	0.827 [0.353]	***	0.719 [0.429]	0.709 [0.437]
Irrigation=1	0.659 [0.475]	0.890 [0.313]	***	0.749 [0.434]	0.684 [0.467]
Land expropriation=1	0.017 [0.13]	0.016 [0.127]	**	0.015 [0.122]	0.026 [0.159]
Number of households	413	186		491	108

*10% significance level, **5% significance level, ***1% significance level.

Table 4.3: Political connections and Program benefits

VARIABLES	Irrigation=1	Share of LURC	Land expropriation =1
	(1)	(2)	(3)
Treat x Politic	0.043 (0.032)	0.031 (0.049)	0.006 (0.021)
Treat	0.089** (0.036)	-0.412*** (0.060)	0.004 (0.031)
Politic	0.035 (0.031)	-0.008 (0.030)	0.003 (0.014)
Male head	-0.022 (0.039)	-0.014 (0.048)	-0.006 (0.020)
Age of head	-0.003 (0.003)	0.003 (0.002)	0.000 (0.001)
Education of head	0.001 (0.004)	0.002 (0.005)	-0.003* (0.002)
Household size	0.010 (0.006)	0.012 (0.008)	-0.00644* (0.004)
Constant	0.853*** (0.146)	0.486*** (0.139)	0.093* (0.055)
Year x District	Y	Y	Y
Household FE	Y	Y	Y
Observations	2,866	2,866	2,866
R-squared	0.906	0.3	0.135
Unconnected HHs	0.089**	-0.412***	0.004
Connected HHs	0.132***	-0.381***	0.010

*10% significance level, **5% significance level, ***1% significance level.

Table 4.4: Political connections and Agricultural productivity

	Crop productivity (log)	Rice productivity (log)
	(1)	(2)
Treat x Politic	-0.143 (0.115)	-0.095 (0.101)
Treat	0.030 (0.085)	0.070 (0.068)
Politic	-0.003 (0.038)	-0.026 (0.040)
Male head	0.005 (0.064)	-0.040 (0.087)
Age of head	0.000 (0.006)	-0.005 (0.004)
Education of head	0.015 (0.011)	-0.007 (0.010)
Household size	0.035*** (0.013)	-0.028* (0.017)
Crop area, log	-0.282*** (0.070)	
Paddy area, log		1.006*** (0.046)
Constant	2.844*** (0.618)	-8.388*** (0.394)
Year x District	Y	Y
Household FE	Y	Y
Observations	2,866	1,616
R-squared	0.24	0.671
Unconnected HHs	0.030	0.070
Connected HHs	-0.114	-0.025

*10% significance level, **5% significance level, ***1% significance level.
 In column (2), we restrict the sample to rice households, therefore, there is a reduction in the number of observations in column (2).

Table 4.5: Other measurement of political connections (1)

VARIABLES	Irrigation =1	Share of LURC	Land expropriation =1	Crop productivity (log)
	(1)	(2)	(3)	(4)
Treat x Politic	0.020 (0.029)	0.046 (0.054)	-0.015 (0.026)	0.834 (1.292)
Treat	0.097** (0.040)	-0.429*** (0.069)	0.016 (0.030)	-0.445 (0.917)
Politic	0.019 (0.025)	-0.027 (0.026)	0.004 (0.011)	-4.632 (4.167)
Constant	0.760*** (0.185)	0.339 (0.215)	0.138 (0.117)	21.750 (25.300)
Year x District	Y	Y	Y	Y
Household FE	Y	Y	Y	Y
Observations	2,866	2,866	2,866	2,308
R-squared	0.765	0.297	0.133	0.05
Unconnected HHs	0.097**	-0.429***	0.016	-0.445
Connected HHs	0.117***	-0.383***	0.001	0.389

*10% significance level, **5% significance level, ***1% significance level. Additional controls are household head, gender and education, household size.
 Politic=1 if household members/relatives/friends are government officials, and 0 if otherwise.

Table 4.6: Other measurement of political connections (2)

VARIABLES	Irrigation=1 (1)	Share of LURC (2)	Land expropriation =1 (3)	Crop productivity (log) (4)
Treat x Politic(relative)	0.039 (0.032)	0.027 (0.049)	0.004 (0.021)	1.913 (1.318)
Treat x Politic(member)	0.037 (0.079)	0.093 (0.080)	0.036 (0.036)	-5.471 (4.190)
Treat	0.088** (0.035)	-0.416*** (0.061)	0.003 (0.031)	-0.398 (0.960)
Politic (relative)	0.034 (0.031)	-0.007 (0.030)	0.005 (0.013)	-4.725 (4.600)
Politic(member)	0.014 (0.067)	-0.025 (0.055)	-0.032 (0.039)	1.743 (1.954)
Constant	0.756*** (0.185)	0.334 (0.215)	0.138 (0.118)	22.550 (26.230)
Year x District	Y	Y	Y	Y
Household FE	Y	Y	Y	Y
Observations	2,866	2,866	2,866	2,308
R-squared	0.765	0.297	0.134	0.050
Unconnected HHs	0.088**	-0.416***	0.003	-0.398
Connected HHs (relative)	0.127***	-0.389***	0.007	1.515
Connected HHs (member)	0.125***	-0.323***	0.039	5.073

*10% significance level, **5% significance level, ***1% significance level. Additional controls are household head, gender and education, household size.

Politic(relative)=1 if household has a relative being government official, and 0 if otherwise.

Politic(member)=1 if household has a family member being government official, and 0 if otherwise

Chapter Five

Conclusion

5.1. Summary

This dissertation investigates the impacts of a government-led land consolidation program in Vietnam on agricultural productivity and several household outcomes, and explores if political connections play any role in this land consolidation program. In this chapter, we summarize the findings of two main chapters (Chapter Three and Chapter Four), and discuss the policy implications, limitations, and some suggestions for the future work.

The first main chapter (Chapter Three) examines the economic and social impacts of the land consolidation program (LCP). Specifically, we investigate how the LCP affected several household outcomes such as agricultural productivity, technology adoption, land investment, labor reallocation, land transfer, land tenure security and social capital. We use a case study of two provinces, Ha Tay and Nghe An, where the land consolidation took place in 2012. We employ the five latest rounds of the Vietnam Access to Rural Household Survey in 2010, 2012, 2014, 2016 and 2018, and apply a Different-in-Differences approach. We exploit the de facto compulsory participation of the program, in which many households exchange plots following a top-down plan, to mitigate a self-selection bias of a household's program participation. We examine the short term (2012-2014), middle term (2012-2016), and long term (2012-2018) effects of the LCP on the aforementioned household outcomes. Empirical results suggest that the LCP promoted technology adoption, reduced on-farm labor inputs and increased migration. However, there is no program impact on land investment, land transfer and land productivity. In addition, the program led to a significant reduction in land use right certificates (LURC) from 2012 to 2018. Specifically, households lowered

approximately 50% LURC share in the first four years, and about 25% in the sixth year since the program started. Moreover, the regression results suggest that households reduced collective action in farming and mutual trust with people within community. The decline in land tenure security and social capital may have some implications for the program impacts. The results are robust using alternative approaches such as DID with propensity score matching, and DID with multiple time periods, which was developed by Callaway and Sant'Anna (2021).

The second study (Chapter Four) is an extension of the first study, which explores whether having political connections matter in this consolidation program. To be specific, we examine the heterogeneous program effect on agricultural land productivity, land tenure security and irrigation access between households with and without political connections. We define a household with political connections if having any relative outside the household working as an executive official. The results show that political connections did not affect the probability of participating in the land consolidation program, nor the progress of LURC issuance after land consolidation. Households with and without political connections lowered LURC share in the same magnitude, approximately 40 percentage points. In addition, we find no heterogeneous program impact on agricultural productivity for households with and without political connections.

5.2. Policy Implications

In chapter Three, find evidence that land consolidation led to a significant reduction in formal land titles (LURC) and farmers' social capital within community. The reduction in LURC was mainly due to the slow speed of issuing LURC at the local administrative level, which raises farmers' concerns about confiscation of the land without LURC and conflicts related to land boundaries with neighboring farmers. It may also affect household's thinking

and behaviors, at least in the short run, until the farmers get new LURCs. Therefore, it is important to pay attention to the status of land tenure security accompanied with land consolidation process. The decline in social capital (i.e., farmers' belief, perceptions, view and opinions) is critical as well because it may affect people's actions and behaviors. To be specific, we find evidence that households reduced collective action in farming and mutual trust with people within community. In addition, we find no program effect on land rental transactions, land-related investment and land productivity during that period. Therefore, the study suggests the importance of strengthening land property rights for farmers after land consolidation. Policymakers should speed up the process of issuing land use right certificates so as to facilitate the rental transactions and enhance land use efficiency. In addition, providing clear information about land tenure procedures may help increase farmers' perception of the future land tenure security during the LURC transition period.

In chapter Four, although the anecdotal evidence suggests that political connections may play a role in the land consolidation process. For example, households having personal relationship with local government officials could receive land with good quality and several benefits from the program. However, the estimation results do not show that there is a significant effect of the land consolidation program on the probability of household's participation in the program, the share of farmland area with LURC, and agricultural land productivity. Therefore, the study suggests the transparency of program participation, at least within the scope of our survey. Nevertheless, to increase farmers' perceptions of land tenure security in the absence of temporary formal land titles, it is necessary to provide sufficient information related to government policy change and a clear land administration procedure for farmers.

5.3. Limitations and Future Research

We acknowledge some limitations in our study.

First, in this study, we examine the impact of land consolidation on land productivity, whereas land productivity is measured by dividing the value of all crops over total crop area (unit thousands VND/ha). However, there might have been an impact of increased crop income or profits since the impact of mechanization can lead to a reduction in the home labor costs. However, such costs are not available in our data, which preventing us from the precise calculation of the total production costs, and then crop income or profits. Future research should pay more attention on collecting the data of home labor inputs when examining the impacts of land consolidation on productivity.

Second, due to data availability, we could not capture the long-term program's impacts. Instead, we focus on the short-term effects after two years, four years, and six years since the program started. Repetition of the survey might be a solution to this matter.

Third, since there were severe land fragmentation and remarkable plot-exchange in the two provinces, our results provide credible impact evaluation of the land consolidation in the two provinces. However, land consolidation is often context-based analysis. There might be heterogeneous impacts across provinces due to some province-specific factors or differential program process. Therefore, we should be cautious to generalize the findings to other areas. We expect future studies to conduct a large-scale and a repetition of the survey to explore how long it would take for farmers to fully receive their formal land use right certificates, and how it could affect land productivity, land rental market and land investment in the long run.

APPENDIX 1

Variables	Definitions
Key variables	
Treated households	Households exchanged plots with the local government
Political connections	Households having a relative working as a government official with political power
Outcome variables	
Agricultural productivity	Proportion of total annual crop output and total crop area (thousands VND/m ²)
Technology adoption	Total household spending on machine rental in the last twelve months
Land investment	Total household spending on soil investment, and fertilizer
Labor allocation	Number of days household spent on three main income-generating activities (farm, waged job, and self-employ)
Migration	A dummy if any family member migrates for job search Number of migrants in a household
Land rental market (rent-in and rent-out)	A dummy if households participate in land rental market The amount of land transacted
Social capital	Trust variable: 1- In general, most people are basically honest and can be trust - Agree 2- In this commune, there are people you cannot trust - Disagree Collective action: 1- Prefer jointly work to self-work if get 1/2 hectare of land 2- Prefer jointly work to self-work if get 3½ hectare of land
LURC share	Share of farm size with land use right certificates
Land expropriation	A dummy if households had any plot confiscated by the State in the last 2 years

APPENDIX 2

Some anecdotal evidence about political connection and land consolidation
in Vietnamese journals

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