LAND RIGHTS AND ECONOMIC DEVELOPMENT: EVIDENCE FROM VIETNAM.[1]

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Abstract

This paper examines the impact of a land reform in Viet Nam which gave households the power to exchange, transfer, lease, inherit and mortgage their land-use rights. We expect this change to increase incentives as well as ability to undertake long-term investments on the part of households. Our differences-in-differences estimation strategy takes advantage of the variation across provinces in the issuance of land-use certificates needed to enforce these rights. Our results indicate that the additional land rights led to significant increases in the share of total area devoted to multi-year crops, as well as some increase in irrigation investment. These effects are stronger in areas which felt the impact of the land reform earlier.

1 Introduction

Land rights are an important issue in developing countries where land is a major asset for most people and the product of agriculture accounts for a large share of national income. There is a certain amount of consensus among economists that better land rights lead to better outcomes. However, the empirical evidence is not conclusive on which dimensions of land rights are crucial. We do not have complete answers to several questions: is ownership of land the most important, or is it the ability to transform land into working capital that matters? Is government legislation effective in providing better land rights, or is everything determined by local conditions? For instance, Besley [1995] shows, for the particular case of Ghana, that a greater degree of land rights leads to more investment on the land; however, in the specific setting he is focusing on, such institutions are determined by social custom rather than conferred by the State. Similarly, Banerjee, Gertler and Ghatak [2001] argue that increasing tenants' bargaining power increases agricultural productivity, but it is not clear whether changing other features of the structure of land rights would have the same impact. This paper therefore investigates the impact of a specific legal change to land rights in Viet Nam on agricultural investments and productivity.

Since 1986 and the "Doi Moi" policy, Viet Nam progressively moved towards a market economy. As far as land rights are concerned, the regulatory environment witnessed two major changes. In 1988, the collective system was abandoned in favor of private ownership. While land still remains the property of the State (Land Law 1993, Article 1), rights to use the land were assigned to individuals over a period of up to fifteen years. However, such rights were not tradeable. In 1993, a new land law was enacted and in addition to an increased lease term, land-use rights could now be inherited, transfered, exchanged, leased and mortgaged. The law of 1993 is therefore seen as setting the foundations of a formal market for land. This paper investigates the incremental impact of the 1993 land reform on economic outcomes. Since the law was implemented through the issuance of Land Use Certificates (LUCs), and as the issuance of LUCs was not uniform across the country, our empirical strategy relies on such heterogeneity to identify the effect of formal land rights on economic decisions and outcomes.

Although an entire section of this paper provides a deeper theoretical analysis, we briefly outline how the 1993 land law might have a positive impact on efficiency. *First*, an increased lease term together with the right to bequeath LUCs makes farmers even less liable to expropriation from the State, than they were after 1988. More generally, the 1993 land law is perceived as an additional signal from a government, that wants to commit to secure property rights. Households are therefore expected to achieve greater efficiency in their investment decisions. *Second*, the right to mortgage land rights can be expected to make access to credit easier, especially from formal sources such as State-owned banks. The impact is then twofold: on the one hand, the ability to borrow ex-ante induces agents to invest more efficiently; on the other hand, the ability to borrow ex-post

allows individuals to smooth consumption, and hence avoid costly income smoothing. *Third,* the dispositions of the law that make LUCs tradeable are likely to translate into allocative efficiency gains. This is even more relevant to the case of Viet Nam: as initial allocation was made on a fairness basis, farmers happened to receive up to twenty small plots each, often far from one another. We then expect to observe land consolidation aimed at realizing economies of scale. These three channels suggest that land rights should increase economic efficiency.

In order to assess the impact of the 1993 land law, we use pre-reform and post-reform household-level data. Although we do not have individual-level information on LUC issuance, provincial-level status of registration are available. Hence, individuals will be assigned the percentage of LUCs granted in the province they live in, thus interpreted as the likelihood they benefited from the reform. Although the differences in registration levels can be induced by factors that also affect our variables of interest, we argue that between-province heterogeneity is due to bureaucratic performance and other exogenous reasons, that are unlikely to simultaneously influence the outcomes we are interested in. A differences-in-differences estimation strategy then allows us to observe whether households more exposed to the reform are more willing and able to undertake long-term investments. We find that farmers in highly-registered provinces implement larger changes in their portfolio of activities: they invest relatively more in multi-year crops and devote more resources to irrigation. These results are consistent with our hypothesis that land-rights increase the ability and willingness to take long-term investments. However, we do not observe any significant impact of the reform on measures of agricultural productivity.

The paper is structured as follows: sections 2 describe the process of reform and land policies in Viet Nam, section 3 discusses the possible impacts of the land law and section 4 describe our data and empirical strategy. Our main results are discussed in section 5 and some further remarks are given in section 6. Section 7 concludes.

2 Land Rights in Viet Nam

The history of Viet Nam in the second half of the twentieth century is punctuated by three key dates: 1954 marked the independence of the country from the French and its division into two parts, North and South; in 1975, the so-called "Viet Nam war" ended with the reunification of North and South Viet Nam, and 1986 corresponds to the implementation of sweeping economic reforms (the "Doi Moi" policy) and a move towards a market-oriented economy, which continues to the present day.[1]

[1] This material in this section is largerly based on Boothroyd and Pham [2000], Pingali and Vo-Tong [1992], and Wiegersma [1988]

2.1 The institutional framework until 1988

Before the Geneva Accord of 1954, Viet Nam was under French control. During the Colonial period, most farmland in Viet Nam was owned either by French plantation owners or by large Vietnamese landlords: 52 percent of the land was owned by only 3 percent of the indigenous population and more than 60 percent of farmers across the country were landless in the mid-1940s.

After independence in the North, a major land reform was carried out. As a reward for their war efforts, land and ownership rights were distributed to farmers and a rapid increase in agricultural output and productivity followed. However, the policy was reversed and land began to be collectivized in the late 1950s, as Communist ideology gained strength. As a result, 86 percent of all peasant households and 68 percent of total farmland, were brought into cooperatives by 1960. Despite significant declines in output, the collectivization process continued so that 90 percent of all peasant households in the North were working in cooperatives by the mid-1960s. An illuminating stylized fact illustrates the impact of such an incentive system: while individual rural households were privately allocated 5 percent of farmland, they derived 60 to 70 percent of their earnings from this small plot.

Land institutions in the South during that same period were driven by political conflicts. At times where the government sought support from the local elites, pro-landowner policies were adopted. When the war against North Viet Nam began, the government tried to gain popular support by adopting the Land-to-the-Tiller law in 1970. Tillers of the soil were to enjoy all the benefits of their work, and this would be accomplished by providing ownership rights to cultivators and putting a retention limit on landlords as low as 20 hectares. However, the law found opposition from landlords and the lack of independence of the bureaucracy made enforcement uneven throughout South Viet Nam. Of the 1 million hectares initially aimed at being redistributed, more than 700 000 hectares were exempted from expropriation!

In 1975, when the war ended and the country was reunified, land collectivization started in the South but was implemented with little success: as late as 1986, only 5.9 percent of farmers in the Mekong Delta and 20 percent in the Southeastern region were part of cooperatives, while this figure amounted to 85 percent in the Central Lowlands region. Under the collective system, all households were paid a share of output according to their recorded labor hours on the communal land. In 1981, the first changes were made to these arrangements: workers were now allowed to keep all of the surplus they produced over a contracted output. However, this policy was later modified and quotas were constantly renegotiated, resulting in a decline of public confidence. Agricultural yields were extremely low in this period and even as late as 1985, Viet Nam was a net importer of rice.

Faced with a worsening economic crisis, the government announced the program of "Doi Moi" (literally "change and newness") in 1986 and began a gradual movement towards a market econ-

omy. As part of a major structural adjustment program, production and consumption subsidies were eliminated from the State budget, government spending was reduced to 6 percent of Gross Domestic Product (GDP), the government work force was reduced by 15 percent, 500 000 soldiers were demobilized, interest rates on loans to State-owned firms were raised and central bank credit was no longer used to finance the budget deficit. The economy started opening up to trade, and the central bank undertook a massive devaluation of the currency to the prevailing black market rate bringing inflation rates from 400 percent in 1986-87 down to 10 percent in 1993. Financial markets were partly deregulated, foreign banks are now allowed to operate in Viet Nam and a stock exchange was opened in 2000. In the agricultural sector, Resolution 10 of 1988 granted land-use rights to individual households, while the land law of 1993 made these rights pledgeable and tradeable. These two changes are described in detail in following sections.

These reforms have had a dramatic impact on the economy. Government revenue and spending began increasing after 1991. Agricultural production increased rapidly after 1988, and Viet Nam is currently a major exporter of rice, as well as cash crops like coffee, pepper and cashew. Exports accounted for 79 percent of GDP by 1995, and the economy has experienced a growth rate of above 8 percent in the 1990's. Agriculture now accounts for only 25 percent of GDP, down from 40 percent in 1989. The benefits from growth have been fairly widespread: poverty rates are estimated to have declined from 75 percent in 1984 to 55 percent in 1993.[2]

2.2 The 1988 Land Law - Resolution 10

A reform undertaken in 1981 allowed households to keep any surplus above a quota level. Such reform was a failure partly because the government did not manage to commit not to raise quotas, always extracting more surplus from farmers. The lack of commitment from the authorities eventually destroyed individual incentives. Then came Resolution 10 of the 1988 land law, aimed at recovering credibility by further liberalizing the agricultural sector in Viet Nam. The reform consisted of transfering control and cash-flow rights from the cooperative to the individual household. Land was allocated to households with a fifteen-year security of tenure and tacit renewal, output markets were privatized and investment decisions were decentralized and left to households. Private property was virtually instituted. However, as land-use rights were given to families without the possibility to trade such rights, a proper land market did not develop despite some informal transactions.

Land allocation to individual households was conducted by the commune authorities, and encountered some difficulties across the country. In the North and in some regions of the South, land was distributed on a *fairness* basis, taking into account soil and socio-demographic characteristics of the region. Hayami [1993] reports that "a farmer (...) in Hai Hung Province complained that

[2] See Dollar and Litvack [1998]

he received too small a land allocation because his eldest son was in military service and his other children were so young that they received only one-third of an adult's allocation at a time. Thus, he expects that his unfavorable allocation will be corrected at the end of the ten-year tenure period" (p. 13). Such statement confirms the presumption that land allocation sometimes relies on arbitrary considerations, leading to favoritism and disputes. The situation in the South is by no means simpler. As we described previously, the land redistribution program undertaken in the South in the early 1970s was far from being completed in 1975. Resolution 10 furthermore stipulated that farmers should be assigned the land they owned prior to 1975 and this generated disagreement between farmers and former landlords, although a 1989 ordinance gave rights to farmers. The allocation was thus not immune to controversy and disputes were still being settled in July 2001, as land allocation was being brought to completion in rural areas.

To many Vietnamese, Resolution 10 is perceived as the major land reform undertaken since 1975 and some scholars attributed Viet Nam's agricultural output growth to such liberalization (see e.g. Pingali and Vo-Tong [1992]). There is no denying that newly assigned property rights must have unleashed farmers' incentives to invest and put effort, but much remained to be done to achieve further economic efficiency. The 1993 land law is an additional step towards this end.

2.3 The 1993 Land Law and the Issuance of Land Use Certificates

The main focus of this paper is the 1993 land law. The spirit of the law is in continuation of the reforms undertaken by the government since 1988. Despite the allocation of land and its corresponding use-rights, no transaction could yet be made officially. The 1993 land law made up for this deficiency. It granted five rights to the household: the right to transfer, exchange, inherit, rent and mortgage.[3] The implementation of the land law consisted of provision of LUCs. As the actual procedure has some interest for our empirical strategy, it is worth going into some details.

The issuance of LUCs is done as follows: individuals have first to apply for a Land Use Certificate (alternatively known as Land Tenure Certificate or the Red Book) through the commune-level People's Committee. The district Bureau of Land Administration then does the groundwork, which includes making a list of all land users, training the staff, purchasing materials, checking and updating the documents related to land such as cadastral maps, land survey records etc. In the meantime, a Land Registration Committee is set up, which includes members from the District Bureau of Land Administration, as well as officials from the commune-level, district-level and sometimes province-level People's Committees. This process takes about four or five weeks. Application forms for land registration are then given out to all the land-users in the commune,

[3] There were further modifications to the land law in 1998 and recently in July 2001. The 1998 revisions granted further rights by making it possible to sub-lease land and they moreover allowed Vietnamese entrepreneurs to use such rights as contribution in a joint venture with a foreign company. The 2001 additions simplified procedures in urban areas.

who are asked to list all the plots of land owned or allocated to them. This form has finally to be signed, not only by the land user himself, but also by all neighboring households in order to certify the absence of dispute regarding claims on the land.

The Land Registration Committee scrutinizes all these forms and then decides whether a given land-user is eligible or not. Land-users are classified as ineligible if (i) they obtain the land through an illegal land transfer i.e. without registering the transaction, without paying transfer taxes, or without a legal contract, (ii) they inherit the land from parents without a formal inheritance letter, so that old documents are still in the parents' names, (iii) they have no legal documents to prove their claim to the land, (iv) they are illegally occupying unallocated land, (v) they have not paid all their land taxes in the past, or (vi) there are disputes regarding their ownership or the boundaries of the land they claim. Within 10 days of sending these application forms, a public meeting is held where information regarding eligibility is made public. At this time, the land administration also tries to resolve these disputes. The list of land users who are eligible for receiving the LUC is then sent to the distict-level People's Committee. Unresolved disputes are referred to a special working group within the Department of Land Administration. After approval at the district-level, work begins on making the actual LUC for the land-user. This stage is estimated to take about 1500-2000 mandays per commune in urban areas, and this figure is unlikely to be much different in rural areas.

Similarly to previous land reforms, the 1993 land law was unevenly implemented throughout the country. Because province-level differences in the level of registration, i.e. the percentage of households registered, is the keystone of our empirical strategy, we investigate the sources of such heterogeneity. According to Vo [1997], district Bureaus of Land Administration have on average five members and most communes have only one land officer, which makes registration a lengthy process. Haque and Montesi [1996] also report the major reasons for this slow progress to be "a lack of adequate finances, a lack of trained cadres, a lack of interest and enthusiasm on the part of officials, a lack of proper direction and supervision and disputes among the cadres", which is consistent with the information given to us by the General Department of Land Adminstration, henceforth GDLA. As we mentioned earlier, a phenomenon which is likely to slow down the process is the number of disputes that can emerge in villages. The way allocation was made, the existence of pre-existing property rights, the personality of the head of the village are as many determinants that can cause one region to achieve faster registration than another one. An additional reason for delay may also be due to the fees related to registration and the backlog of taxes that some households may be required to pay to become eligible. However fees are not very high, below VND 20 000 (less than USD 1.50) in most areas. Besides, in an effort to increase land registration rates, the government has even made it free for people residing in remote and mountainous areas, and the payment of overdue taxes was no longer a prerequisite for the issuance of LUCs.

By the end of 1994, about 24 percent of households in a province had been issued land-use

certificates on average. In 1997, 44 percent of land users had been granted certificates, but the figure was only 3 percent in urban areas (Vo [1997]). In an interview in July 2001, the Deputy Director General of the GDLA further reports that in the first three years after the law was passed, over 40,000 cases were discovered where the law was being violated, and he concludes that "the work of land management was still being relaxed and the land law was not regularly publicized by local authorities." By 1998, certificates had been issued to 71 percent of rural households.[4] At the end of 2000, 90 percent of land users in rural areas had been granted land use certificates, and the process is expected to have been completed at the end of 2001. However, in urban areas, only 16 percent of land users have been issued certificates, and the process is not expected to be completed before 2005. Meanwhile, entrepreneurs are now allowed to use their land for collateral without a LUC, provided they have papers certifying land allocation or land rent receipts.[5]

The map in figure 1 shows the geographical distribution of registration levels in 1994 and 1998. Each province is categorized as low, middle-low, middle-high or high depending on the quartile it belongs to, quartiles being obtained from the distribution of registration levels across provinces. A quick glance at the maps does not reveal any obvious North-South pattern, in spite of the North's longer history of collectivization.[6]

3 What does the theory tell us?

What is likely to be the impact of the land law and more specifically the issuance of LUCs? Rights to transfer, exchange, lease, inherit, and mortgage LUCs are expected to improve economic efficiency through different channels. This section reviews briefly the potential impacts of each of the rights, borrowing intuition and exhaustiveness from Besley [1995].

Tradeable Land-Use Certificates: The rights to transfer, exchange, lease, and then sublease LUCs creates a formal market for land. Land transactions are now possible at a larger scale. We then expect a better allocation of land and the realization of economies of scale, which translate into higher yields. Indeed, a market for land should induce consolidation of highly fragmented ownership of land, as we saw earlier on, as well as transfers of land from less productive to more productive farmers.

Secure Land-Use Certificates: The longer lease term and the right to inherit (and thus bequeath) that came with LUCs have the impact to decrease the likelihood that an individual and her offspring will be expropriated by the State. However, with Resolution 10, though tenure was given for 10

[4] Figures from GDLA registration data.

[5] Joint circular of the State Bank, the Ministry of Justice, the Land Adminstration and the Ministry of Finance dated November 21, 2000.

[6] In 1994, provinces in the North had on average 24 percent of households registered, while provinces in the South had a registration level of 23 percent. The corresponding figures for 1998 were 74 percent and 69 percent.

years, tacit renewal and transfer within the family were the rule. In that respect, the 1993 Land Law is an incremental improvement of ownership security vis-à-vis Resolution 10, as it makes such provision formal and constitutes an additional signal sent by a government which seeks to build a reputation of enforcing private ownership. Thus, we expect the land law of 1993 to increase farmers' willingness to undertake long-term investments. Furthermore, it is worth noticing that if we only look at the potential impact of the reform on, say, annual crop yields, the effect of secure land rights on the intensive margin is ambiguous as it depends on the consequences on the extensive margin: land rights give farmers the incentive to undertake long-term investments, therefore focusing on perennial crops at the expense of annual crops.

Pledgeable Land-Use Certificates: In a world with imperfect credit markets, property rights are, as stated by De Soto [2000], a way to transform illiquid assets into money. Without collateral, no individual would be able to run a profitable project when some fixed cost exceeds their net worth. Thus, a certificate that can be pledged against a loan gives access to profitable investments. We thus expect LUC holders to be able to access credit at lower costs, using formal channels such as banks. While security of tenure increases the willingness to invest, pledgeable rights boost the ability to do so. The credit channel has moreover a second dimension. LUCs can be pledged as collateral ex-post, i.e. to smooth consumption in case of a bad shock. Individuals are now able to smooth consumption directly and hence avoid costly income smoothing strategies. Depending on risk-aversion, wealth levels and local credit market conditions, the ability to pledge rights may decrease or increase the extent to which individuals are diversifying their activities. More diversification would suggest that farmers have a higher ability to self-insure, while less diversification suggests that the ability to smooth consumption ex-post allows agents to specialize in the more productive technology available to them. The overall observed impact of pledgeable land-rights becomes an empirical issue.

4 Data and Empirical Strategy

4.1 Data

Our major source of data are the two rounds of the Viet Nam Living Standards Survey (VNLSS), conducted by the General Statistical Office (GSO) of the Government of Viet Nam and funded by the United Nations Development Program (UNDP) and the World Bank under the Living Standards Measurement Study (LSMS). The surveys follow established LSMS practices and is considered a high-quality data set. They contain detailed information on household size and composition, educational attainment, health, employment, fertility, migration, household expenditures, agricultural activities, non-farm economic activities and borrowing and lending activities. The first round of the survey was conducted in 1992-93 (henceforth VNLSS-93) and the second round was conducted

in 1997-98 (henceforth VNLSS-98). We take the former as our pre-reform baseline data and the latter as our post-reform outcomes. The surveys have a panel dimension in the sense that 4285 of the 4800 households interviewed in 1993 were re-interviewed in 1998. However, in most of our regressions, we will treat the two surveys as repeated cross-sections. There is also some attrition between the two surveys, which is around 7% in rural areas.

We have data on land registration (percentage of households who have been issued with a land-use certificate) at the province-level for 1994, 1998 and 2000. These data come from the records of the General Department of Land Administration (GDLA) in Hanoi. We also have data on province-level population, agricultural yields, local government investments etc. from the annual Statistical Yearbooks published by the General Statistical Office (GSO). We use some data from the 1994 Agricultural and Rural Census conducted by the Ministry of Agriculture and Rural Development (MARD), which has detailed information on the infrastructure facilities in rural areas in 1994.

4.2 Empirical Strategy

Ideally we would like to compare investment and productivity across two identical households who differ only in the quality of land rights possessed by them. In our setting, we take the possession of a land-use certificate as an indicator of having good land rights. However we do not have household level data on land registration, since the VNLSS does not ask this question. We therefore use province-level registration rates as a measure of the probability that a given household would have a LUC. We will thus be using the differences in the rate of issuing land use certificates across provinces to identify the impact of the Land Law.

Our major focus will be on measures of long-term agricultural investment. We will use the farmers' decision to switch crops away from food crops to more valuable cash crops to measure longer-term investments, since many of these crops (coffee, pepper, fruit trees etc.) require large initial investments and a longer time before returns are realized. We will also look at measures of irrigation (which could be either long-term or short-term investment), as well as short-term investments like fertilizer and pesticide use. We will also look at households' labor input into agriculture. However, as discussed in the theory section, the impact of the land reform on this is a little ambiguous: while greater security of tenure could lead to increased labor input into agriculture, the ability to lease out or mortgage land could lead to decreased labor hours in agriculture with a corresponding shift to other activities.

We will estimate the impact of the land reform using a differences-in-differences strategy, basically by comparing the difference between 1993 and 1998 (before and after reform) for the highly registered provinces as compared to the low-registered provinces. The regression equation we use is:

$$y_{ijt} = \beta_0 + \beta_1 T_t + \beta_2 R_{j,98} + \beta_3 (T_t \times R_{j,98}) + X_{it}\gamma + \epsilon_{it} \quad (1)$$

where y_{ijt} represents the outcome of household i of province j at time t (1993 or 1998), T_t represents the time dummy (equal to 0 for 1993, and 1 for 1998), $R_{j,98}$ is the proportion of households registered (registration level) in province j in 1998 and X_{it} are other household characterisitics. The coefficient β_1 represents the change between 1993 and 1998 for a province which had zero registration, while β_2 represents the difference between highly registered and low-registered provinces in 1993 (pre-existing difference). Our coefficient of interest is β_3, which tells us how much the high-registration provinces have increased investment, compared to the low-registration provinces over the period 1993-1998. We will be controlling for household characteristics like age, gender and education of the household head, total household size and ethnicity. All our regressions are for households in rural areas only, since our registration figures are for rural households. Since our main explanatory variable, the registration level, is measured at the province level, we will also cluster all our standard errors at the province level.[7]

4.3 Endogeneity

Our strategy is likely to give biased results if the province-level registration levels are correlated with other unobserved variables, which also affect our dependent variables. This could be due to both "supply" and "demand" factors for land registration. For instance, more productive farmers may be registering their land earlier (demand side effect), or a higher registration level might be indicative of a more efficient local bureaucracy, which might have a direct effect on any outcomes we examine, irrespective of the impact of the Land Law itself. As discussed in section 2, the major reasons for delays in registration were stated to be low levels of manpower in the hands of the land department and high numbers of disputes over land in certain areas. These could be correlated with both supply-side and demand-side factors.

As Figure 1 shows, there does not appear to be any obvious regional pattern in registration levels. Figure 2 graphs the province registration level against several other province characteristics. Again there is no apparent pattern and all the correlations are below 0.17 in absolute value. Table 1 formalizes this by presenting multivariate regressions of the province registration rate on several province characteristics, where we see that none of the coefficients is significant, except for per capita household expenditure which is significant in one of the specifications (at 10% level of significance). This supports the hypothesis that the variation in registration levels is mainly driven by bureaucratic factors and unpredictable incidence of disputes in different areas. This is a preliminary, though certainly not conclusive, check on the exogeneity of our main explanatory variable.

For the time being therefore, we take the registration levels in a province to be exogenously

[7] Bertrand et. al. [2001] suggest clustering as one way to obtain correct standard errors in a difference-in-differences framework.

determined. We do however run specifications where we control explicitly for province-level mean per capita household expenditure (since this was the only variable which was even marginally related to registration levels). This makes no change to any of our regression coefficients. We could also construct instrumental variables using the exogenous component of registration rates, perhaps by using data on bureaucratic manpower or some information on disputes. However, we do not have such data currently.

5 Impact of land reform on agriculture

5.1 Crop choice

As discussed earlier, the additional land rights conferred by the 1993 law might induce households to undertake more long-term investments on their land. One way of measuring this is by looking at the allocatin of land between annual crops and multi-year industrial or fruit crops, which typically require large investments up-front and yield returns only after a few years. Table 2 shows that the land reform led to a large and statistically significant increase in the proportion of total cultivated area devoted to multi-year crops: a household who received a LUC would increase this proportion by 7.5 percentage points over the period 1993-98, compared to an unregistered household. This is quite large given that multi-year crops accounted for only 9 percent of total cultivated area in 1993. This increase comes at the expense of annual crops, which show a decrease of 6.5 percentage points in their share of total cultivated area. We control for household characteristics like age, education, gender, household size and ethnicity while obtaining these estimates. The coefficients are robust to the addition of region fixed effects, to adding the household controls interacted with the time dummy, and to adding province-level mean per-capita income as an additional regressor (last two specifications not shown in the table).

When we divide our sample according to whether or not the province was highly registered in 1994 itself,[8] we find that the results are much stronger for areas which were highly registered early on.[9] This is consistent with the idea that the additional rights encourage long-term investment, so that areas which got these rights earlier would be expected to show a greater response to the land reform.

[8] We define areas with registration levels above the median as "High 94" and those below the median as "Low 94". The median registration level in 1994 was 19%.

[9] Provinces which are highly registered in 1994 continue to be highly registered in 1998, which is not surprising since registration levels do not decrease over time; however a number of provinces which had very low registration in 1994 achieve high registration in 1998. The correlation between 1994 and 1998 registration levels is 0.37.

5.2 Agricultural inputs

Table 3 shows that households in highly registered provinces increase their proportion of irrigated area by about 20 percentage points as compared to those in low-registered areas. While this figure is not statistically significant, we should note that it is not small: the mean level of registration in 1998 was 0.71, so registration accounts for an increase of $0.71 \times 20 = 14.2$ percentage points in irrigated proportion, which is about 35 percent of the total increase in irrigated proportion (from 0.17 in 1993 to 0.61 in 1998). Again, we note that the increase in irrigation is much larger for areas which were highly registered in 1994 itself. Further, Table 4 shows that the increase in the proportion of annual crop land which is irrigated is much smaller than the increase in the proportion of *total* area which is irrigated. This seems to indicate that more of the increase in irrigation is coming from area devoted to multi-year crops,[10] again consistent with the idea of households being more motivated in taking up long-term investments.

We also observe that there is no significant difference between highly registered and low registered areas with respect to the total amount of fertilizer used or in total agricultural expenses, both normalized by the total area cultivated (Table 5); in fact highly registered areas show a slight decrease compared to low-registered areas. However, most of these data pertain to annual expenses of agriculture and may not capture the high initial startup costs of switching to perennial crops. Turning to labor input, we find that the average number of weeks spent on agriculture per working member has increased by about 4.5 weeks. This figure is not statistically significant, but is quite large compared to the mean of 32 weeks worked in 1993.[11]

5.3 Output and productivity

We consider two measures of agricultural productivity: the first is simply the yield of rice, and the second is the total value of agricultural output divided by the total cultivated area, which takes into account all the different crops grown by the household. Table 6 shows that while there has been considerable productivity growth between 1993 and 1998 on the whole, areas with high registration levels do not have any significant advantage in this regard. As discussed before, the impact on rice yield on the intensive margin is *a priori* ambiguous, while it could also be that the total gains from investing more in long-term crops is yet to materialize by the end of our sample period.

[10] We cannot get this directly, since the survey only asks about total irrigated area and irrigated annual crop area.

[11] We are unable to say whether total weeks of work by households has gone up overall, because of a reporting problem: several households report far greater than 52 weeks of work for each household member, this is probably due to non-exclusivity of replies i.e. weeks which were spent partly as wage labor and partly on own farm were probably counted twice in both categories. Data on hours worked is missing for too many households to make this a reliable figure.

5.4 Further robustness checks

Our results on long-term investments could perhaps be driven by direct government incentives for investing in such crops rather than by the land reform itself. Or it could also be that local governments which do more to implement the land law also do more to help farmers in general. We perform a preliminary check for this by considering the proportion of fertilizer and pesticide expenditures which goes towards buying from government sources. This is a crude measure of how important the government sources are for agricultural inputs in general. Table 7 shows no significant difference in these measures across areas with different registration levels. It is however interesting to note that the importance of the government has declined a little over the period 1993-98 (which is consistent with the general trend towards a market economy), and that the government is relatively more important in the North (which is probably because of the longer history of Communist rule and collectivized agriculture here).

6 Impact on credit and land markets

In this section, we check whether our results on long-term investments arise because of the impact of the land law on credit markets. We consider two measures of households' borrowing behaviour which might be affected by having greater land rights: the proportion of borrowing which comes from formal sources (like banks and credit cooperatives) and the proportion of borrowing with collateral (since the land law allows land to be mortgaged). Table 8 however does not reveal any significant differences by registration levels on these measures, though the point estimates are all positive. We should however keep in mind that the decision to borrow may depend on various characteristics of the household and on the policy environment; here we are looking at the composition of the borrowing, taking the decision to borrow and the amount borrowed as given.

We would also like to investigate whether the land law facilitated land transfers, thereby making the land market more efficient. Unfortunately, evidence on land market transactions is hard to come by because of substantial underreporting by respondents. This is mainly because of the high tax imposed on land transactions. Nevertheless, there seems to be an increase in land market transactions between 1993 and 1998: the proportion of households who report receiving land increases ten-fold from 2.5 percent in 1993 to 25 percent in 1998, a similar ten-fold increase is seen for households reporting sales of land (from 1 percent to 10 percent). This could however simply reflect less under-reporting after the law was passed. The increase does not seem to be very different across highly registered vs. low registered provinces (regressions not shown).

7 Conclusion and further research

We show that a land reform which makes land rights pledgeable and tradeable has a noticeable impact on the decisions of households to undertake long-term investments. However, we do not find any significant impact on the intensive margin on measures of agricultural productivity. We should note that these results are subject to caveats about possible endogeneity of our main explanatory variable, though we do not find any robust evidence of such endogeneity.

In further research, we would like to explore these outcomes in greater detail, possibly with the help of an instrumental variables strategy as well. Further, the response of households to take advantage of the rights conferred by the law are likely to depend on their access to sources of credit and other institutional factors. We would thus like to examine whether the impact of the law differs across areas with different institutional characteristics.

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TABLE 1: WHAT DETERMINES REGISTRATION LEVELS ?

Sample: Provinces
Dependent variable: proportion of rural households holding Land Use Certificate in 1998

	Province chars.	Income, yield	Household chars	Infrastructure	All
	(1)	(2)	(3)	(4)	(5)
Population density	-0.027				-0.041
	(0.020)				(0.029)
Total area of province ('000 sq km)	-0.093	0.044			0.062
	(0.128)	(0.090)			(0.105)
Proportion urban	0.516				0.516
	(0.330)				(0.373)
Proportion of agricultural land	0.232	-0.170			0.391
	(0.215)	(0.155)			(0.338)
Proportion sown with rice	0.159	0.078			0.276
	(0.195)	(0.203)			(0.235)
Dummy for North	0.048	0.015	0.061	0.010	0.126
	(0.085)	(0.093)	(0.123)	(0.073)	(0.169)
Per capita HH expenditure (log)		0.246	0.318*		0.207
		(0.154)	(0.172)		(0.208)
Rice yield 1993 (log)		0.192	0.100		
		(0.148)	(0.124)		
Proportion of majority ethnic group			-0.104		-0.188
			(0.108)		(0.167)
Mean years of education			-0.005		0.219
			(0.026)		(0.235)
Prop. Communes having market				0.200	0.143
				(0.198)	(0.256)
Prop. Communes having highway				-0.174	0.211
				(0.143)	(0.428)
Prop. Communes having clinic				0.329	0.023
				(0.376)	(0.041)
Observations	59	56	56	59	56
R-squared	0.09	0.12	0.11	0.08	0.16

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
All regressions are at province level. Rice yield and population density are very highly correlated (correlation =0.83) hence are not put together into any regressions.
All regressions exclude Hanoi and Ho Chi Minh City, which are clear outliers in terms of population density and urbanization rates.

TABLE 2 : IMPACT OF LAND REFORM ON CROP CHOICE

Sample: Rural households

Dependent variable	Proportion of total cultivated area devoted to									
	Perennial industrial crops + fruit crops					All annual crops				
Mean (s.d.) in 1993	0.0938 (0.2049)					0.8846 (0.2238)				
Mean (s.d.) in 1998	0.1185 (0.2565)					0.8508 (0.2752)				
	No controls	HH chars.	Region FE	High 94	Low 94	No controls	HH chars.	Region FE	High 94	Low 94
Registration rate 1998*Year=1998	0.080***	0.076***	0.075***	0.114***	0.028	-0.073***	-0.068***	-0.065**	-0.089**	-0.025
	(0.025)	(0.024)	(0.025)	(0.037)	(0.027)	(0.026)	(0.025)	(0.026)	(0.043)	(0.031)
Year=1998	-0.033	-0.033*	-0.032*	-0.050*	-0.008	0.018	0.023	0.022	0.025	0.004
	(0.020)	(0.017)	(0.017)	(0.026)	(0.015)	(0.020)	(0.018)	(0.018)	(0.034)	(0.019)
Registration 1998	0.038	-0.012	-0.011	-0.023	0.003	-0.011	0.027	0.032	0.044	0.018
	(0.047)	(0.038)	(0.027)	(0.050)	(0.024)	(0.053)	(0.042)	(0.032)	(0.059)	(0.028)
Age of household head		0.001***	0.002***	0.002***	0.001**		-0.002***	-0.002***	-0.002***	-0.001***
		(0.000)	(0.000)	(0.001)	(0.000)		(0.000)	(0.000)	(0.001)	(0.000)
Male household head		-0.019*	-0.020**	-0.029	-0.007		0.022*	0.022**	0.028	0.013
		(0.011)	(0.010)	(0.018)	(0.009)		(0.011)	(0.010)	(0.018)	(0.010)
Years of education of head		0.008***	0.008***	0.009***	0.006***		-0.009***	-0.010***	-0.010***	-0.007***
		(0.002)	(0.002)	(0.003)	(0.002)		(0.002)	(0.002)	(0.003)	(0.002)
Household size		-0.001	-0.003	-0.002	-0.004		0.002	0.004	0.004	0.006*
		(0.003)	(0.002)	(0.003)	(0.004)		(0.003)	(0.003)	(0.003)	(0.003)
Majority ethnic group dummy		-0.007	0.002	0.033	-0.035		0.052	0.035	-0.005	0.078*
		(0.029)	(0.030)	(0.027)	(0.037)		(0.032)	(0.032)	(0.031)	(0.038)
Dummy for north		-0.194***	-0.242***	-0.268***	-0.105***		0.177***	0.191**	0.266***	0.081***
		(0.039)	(0.080)	(0.040)	(0.016)		(0.041)	(0.086)	(0.033)	(0.022)
Total area cultivated ($*10^{-5}$)		-0.151	-0.210**	-0.331***	0.002		0.010	0.080	0.219	-0.000
		(0.093)	(0.094)	(0.103)	(0.099)		(0.111)	(0.110)	(0.132)	(0.118)
Region fixed effects	no	no	yes	yes	yes	no	no	yes	yes	yes
No. of observations	7469	7469	7469	7469	7469	7469	7469	7469	7469	7469
No. of provinces	59	59	59	59	59	59	59	59	59	59
R-squared	0.01	0.15	0.22	0.20	0.35	0.01	0.12	0.18	0.13	0.33

Standard errors in parentheses, corrected for province-level clustering.* significant at 10%; ** significant at 5%; *** significant at 1%

All regressions weighted by sampling weights

Regressions with controls interacted with time were tried: the interactions were not jointly significant, hence these are not reported

High 94 refers to areas where registration levels were higher than the median (0.19) in 1994.

TABLE 3 : IMPACT OF LAND REFORM ON PROPORTION OF TOTAL LAND IRRIGATED

Sample: Rural households in 1993 and 1998
Dependent variable= Proportion of total land irrigated; Mean (s.d.) = 0.170 (0.314) in 1993; = 0.606 (0.383) in 1998

	No controls	HH characteristics	Controls interacted with time[a]	Weather controls	Region fixed effects	High 94	Low 94
Registration 1998*Year=1998	0.200	0.194	0.161	0.218	0.218	0.496***	0.120
	(0.184)	(0.180)	(0.159)	(0.172)	(0.172)	(0.147)	(0.222)
Year=1998	0.292**	0.305**	0.235	0.283*	0.283*	0.101	0.398**
	(0.142)	(0.139)	(0.152)	(0.143)	(0.143)	(0.119)	(0.171)
Registration 1998	0.072	0.018	0.034	-0.006	-0.006	-0.068	-0.035
	(0.088)	(0.083)	(0.081)	(0.092)	(0.092)	(0.094)	(0.108)
Age of household head		-0.001	0.000	0.000	0.000	0.001	0.000
		(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)
Male household head		0.023	0.041*	0.022	0.022	0.023**	0.006
		(0.014)	(0.020)	(0.013)	(0.013)	(0.010)	(0.013)
Years of education of head		-0.006***	-0.006**	-0.003*	-0.003*	0.001	-0.001
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Household size		0.001	0.003	0.003	0.003	-0.001	0.006*
		(0.003)	(0.004)	(0.003)	(0.003)	(0.002)	(0.003)
Majority ethnic group dummy		0.176***	0.042	0.118***	0.118***	0.032	0.117*
		(0.040)	(0.044)	(0.037)	(0.037)	(0.029)	(0.067)
Dummy for north		-0.128**	-0.156***	-0.349***	-0.349***	-0.145	0.102
		(0.049)	(0.058)	(0.084)	(0.084)	(0.091)	(0.113)
Rainfall				-0.022	-0.022	-0.033	-0.043
				(0.027)	(0.027)	(0.031)	(0.055)
Sunshine hours				-0.222*	-0.222*	-0.021	-0.203
				(0.115)	(0.115)	(0.114)	(0.192)
% annual crop land				0.399***	0.399***	0.497***	0.405***
				(0.046)	(0.046)	(0.047)	(0.051)
Region dummies	no	no	no	no	yes	yes	yes
No. of observations	7438	7438	7438	7438	7438	3606	3832
No.of provinces	59	59	59	59	59	59	59
R-squared	0.30	0.35	0.37	0.46	0.53	0.58	0.53

Standard errors in parentheses, corrected for province-level clustering. All regressions weighted by sampling weights.
* significant at 10%; ** significant at 5%; *** significant at 1%
High 94 refers to areas where registration levels were higher than the median (0.19) in 1994.
[a]Coefficients on household characteristics and time dummy interactions not shown due to lack of space.

TABLE 4 : IMPACT OF LAND REFORM ON PROPORTION OF ANNUAL LAND IRRIGATED

Sample: Rural households

Dependent variable= Proportion of annual land irrigated; Mean (s.d.) = 0.255 (0.397) in 1993; = 0.683 (0.416) in 1998

	No controls	HH characteristics	HH chars interacted with time[a]	Weather controls	Region fixed effects	High 94	Low 94
Registration 1998*Year=1998	0.124	0.121	0.180	0.107	0.123	0.445	0.027
	(0.223)	(0.220)	(0.174)	(0.223)	(0.215)	(0.291)	(0.257)
Year=1998	0.339**	0.349**	0.058	0.273	0.318*	-0.019	0.491**
	(0.168)	(0.165)	(0.184)	(0.172)	(0.167)	(0.227)	(0.181)
Registration 1998	0.058	0.009	-0.017	0.012	0.001	-0.037	-0.058
	(0.131)	(0.112)	(0.112)	(0.113)	(0.105)	(0.129)	(0.132)
Age of household head		-0.000	0.001	-0.000	0.000	-0.000	0.001
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Male household head		0.025	0.026	0.028	0.023	0.032*	0.003
		(0.018)	(0.025)	(0.017)	(0.014)	(0.017)	(0.017)
Years of education of head		-0.005*	-0.004	-0.006**	-0.004	-0.005	0.001
		(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
Household size		0.006*	0.009*	0.007**	0.008***	0.006**	0.009**
		(0.003)	(0.005)	(0.003)	(0.002)	(0.003)	(0.004)
Majority ethnic group dummy		0.144**	0.041	0.145***	0.117**	0.072	0.101
		(0.055)	(0.062)	(0.051)	(0.053)	(0.055)	(0.089)
Dummy for north		-0.120**	-0.319***	-0.336***	-0.063	-0.130	0.251**
		(0.049)	(0.074)	(0.091)	(0.151)	(0.138)	(0.112)
Rainfall				-0.006	-0.033	-0.021	0.030
				(0.027)	(0.029)	(0.039)	(0.056)
Sunshine hours				-0.325***	-0.167	-0.171	0.048
				(0.121)	(0.109)	(0.136)	(0.138)
Region fixed effects	no	no	no	no	yes	yes	yes
No. of observations	7438	7438	7438	7438	7438	3606	3832
No. of provinces							
R-squared	0.22	0.26	0.31	0.27	0.35	0.34	0.41

Standard errors in parentheses, corrected for province-level clustering. * significant at 10%; ** significant at 5%; *** significant at 1%.

All regressions weighted by sampling weights

High 94 refers to areas where registration levels were higher than the median (0.19) in 1994.

[a]Coefficients on household characteristics and time dummy interactions not shown due to lack of space.

TABLE 5 : LAND REFORM AND AGRICULTURAL INPUTS

Sample: Rural households

Dependent variable	Fertilizer usage (kg used/ sq m cultivated)				Labor input (weeks)			
	No contro	HH chars.	HH chars inter-acted with time[a]	Region fixed effects	No controls	HH chars.	HH chars inter-acted with time[a]	Region fixed effects
Mean (s.d.) in 1993	0.033 (0.026)				31.58 (12.53)			
Mean (s.d.) in 1998	0.048 (0.033)				37.46 (11.89)			
Registration rate 1998*Year=1998	-0.003	-0.004	-0.002	-0.003	4.638	4.736	3.696	4.578
	(0.005)	(0.006)	(0.006)	(0.006)	(3.025)	(3.023)	(3.039)	(2.969)
Year=1998	0.017***	0.018***	0.011**	0.018***	2.549	2.477	1.860	2.434
	(0.004)	(0.004)	(0.005)	(0.005)	(2.312)	(2.336)	(2.742)	(2.287)
Registration 1998	0.009	0.006	0.005	0.011***	-3.940	-1.543	-1.054	-2.107
	(0.007)	(0.005)	(0.005)	(0.004)	(4.004)	(3.777)	(3.717)	(2.640)
Age of household head		0.000	0.000	0.000		-0.046***	-0.049**	-0.047***
		(0.000)	(0.000)	(0.000)		(0.016)	(0.022)	(0.016)
Male household head		0.001	0.000	0.001		1.408**	1.935**	1.457***
		(0.001)	(0.001)	(0.001)		(0.613)	(0.750)	(0.536)
Years of education of head/10		0.004**	0.004**	0.004**		-0.960	-2.07**	-1.18
		(0.002)	(0.002)	(0.001)		(0.770)	(0.890)	(0.710)
Household size		-0.001***	-0.001*	-0.000**		-0.232	-0.024	-0.332***
		(0.000)	(0.000)	(0.000)		(0.147)	(0.177)	(0.121)
Majority ethnic group dummy		0.021***	0.021***	0.019***		-4.949***	-6.968***	-2.831**
		(0.003)	(0.003)	(0.002)		(1.303)	(1.593)	(1.199)
Dummy for north		0.006**	0.001	0.008		5.535***	5.463***	3.216
		(0.003)	(0.003)	(0.008)		(1.378)	(1.608)	(2.175)
Region fixed effects	no	no	no	yes	no	no	no	yes
No. of observations	6568	6568	6568	6568	7350	7350	7350	7350
No. of provinces	59	59	59	59	59	59	59	59
R-squared	0.07	0.18	0.19	0.23	0.06	0.13	0.14	0.19

Standard errors in parentheses, corrected for province-level clustering. All regressions weighted by sampling weights.

* significant at 10%; ** significant at 5%; *** significant at 1%

Fertilizer usage is obtained as the amount of fertilizer (kg) by a household divided by total cultivated area.

Labor input is the weeks worked in agriculture in the preceding year by the whole household divided by the number of working members.

[a]Coefficients on household characteristics and time dummy interactions not shown due to lack of space.

TABLE 6 : LAND REFORM AND AGRICULTURAL OUTPUT

Sample: Rural households

Dependent variable	Log rice yields				Log (Value of agr. output / cultivated area)			
	No controls	HH chars.	HH chars inter-acted with time[a]	Region fixed effects	No controls	HH chars.	HH chars inter-acted with time[a]	Region fixed effects
Mean (s.d.) in 1993	3.35 (0.505)				-0.599 (0.701)			
Mean (s.d.) in 1998	3.56 (0.411)				-0.262 (1.095)			
Registration rate 1998*Year=1998	-0.019	-0.028	-0.014	0.002	-0.070	-0.048	-0.019	-0.022
	(0.103)	(0.102)	(0.088)	(0.096)	(0.143)	(0.128)	(0.113)	(0.147)
Year=1998	0.229***	0.233***	0.445***	0.218***	0.387***	0.380***	0.627***	0.368***
	(0.084)	(0.084)	(0.128)	(0.079)	(0.107)	(0.098)	(0.218)	(0.113)
Registration 1998	0.221	0.167	0.160	0.264**	0.289	0.198	0.182	0.284***
	(0.192)	(0.146)	(0.140)	(0.130)	(0.221)	(0.133)	(0.127)	(0.082)
Age of household head		0.001	0.001	0.001		0.006***	0.006***	0.006***
		(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Male household head		-0.014	-0.026	-0.009		0.003	-0.018	0.002
		(0.016)	(0.022)	(0.012)		(0.031)	(0.028)	(0.029)
Years of education of head		0.015***	0.018***	0.013***		0.028***	0.029***	0.029***
		(0.004)	(0.006)	(0.003)		(0.004)	(0.006)	(0.004)
Household size		-0.002	0.002	0.006		0.014*	0.021***	0.018***
		(0.006)	(0.006)	(0.005)		(0.008)	(0.008)	(0.006)
Majority ethnic group dummy		0.322***	0.370***	0.275***		0.395***	0.467***	0.393***
		(0.068)	(0.079)	(0.058)		(0.071)	(0.086)	(0.061)
Dummy for north		0.074	0.096	-0.025		0.167**	0.173**	0.087
		(0.051)	(0.060)	(0.271)		(0.079)	(0.079)	(0.085)
Total area cultivated ($*10^{-5}$)		-0.150	-0.191	-0.140		-1.71***	-1.67***	-1.80***
		(0.130)	(0.179)	(0.117)		(0.273)	(0.396)	(0.201)
Region fixed effects	no	no	no	yes	no	no	no	yes
No. of observations	6547	6547	6547	6547	7443	7443	7443	7443
No. of provinces	59	59	59	59	59	59	59	59
R-squared	0.06	0.17	0.17	0.24	0.04	0.16	0.16	0.18

Standard errors in parentheses, corrected for village-year clustering. All regressions weighted by sampling weights.
* significant at 10%; ** significant at 5%; *** significant at 1%

[a]Coefficients on household characteristics and time dummy interactions not shown due to lack of space.

TABLE 7 : DO GOVERNMENTS HELP AGRICULTURE DIRECTLY?

Sample: Rural households

Dependent variable	Proportion of fertilizer obtained from govt. sources				Proportion of pesticide obtained from govt. sources			
	No controls	HH chars.	HH chars interacted with time[a]	Region fixed effects	No controls	HH chars.	HH chars interacted with time[a]	Region fixed effects
Mean (s.d.) in 1993	0.069 (0.251)				0.139 (0.345)			
Mean (s.d.) in 1998	0.066 (0.247)				0.092 (0.288)			
Registration rate 1998*Year=1998	0.031	0.043	0.065	0.042	0.008	0.013	0.030	-0.001
	(0.063)	(0.062)	(0.063)	(0.064)	(0.129)	(0.127)	(0.125)	(0.125)
Year=1998	-0.027	-0.038	0.043	-0.038	-0.053	-0.068	0.171	-0.066
	(0.053)	(0.051)	(0.067)	(0.052)	(0.097)	(0.094)	(0.115)	(0.094)
Registration 1998	-0.120	-0.085	-0.094	-0.096	-0.076	-0.029	-0.036	-0.067
	(0.094)	(0.087)	(0.089)	(0.084)	(0.127)	(0.119)	(0.122)	(0.110)
Age of household head		-0.000	-0.000	-0.000		0.000	0.001	0.000
		(0.001)	(0.001)	(0.001)		(0.000)	(0.001)	(0.000)
Male household head		-0.007	-0.008	-0.007		0.001	-0.009	0.001
		(0.014)	(0.016)	(0.014)		(0.010)	(0.018)	(0.010)
Years of education of head		-0.002	-0.002	-0.002		0.001	0.002	0.001
		(0.004)	(0.004)	(0.004)		(0.003)	(0.003)	(0.002)
Household size		0.003	0.002	0.002		0.004	0.006	0.000
		(0.002)	(0.003)	(0.002)		(0.003)	(0.004)	(0.003)
Majority ethnic group dummy		-0.144**	-0.086	-0.130**		-0.098*	0.012	-0.075*
		(0.060)	(0.065)	(0.052)		(0.055)	(0.063)	(0.044)
Dummy for north		0.074***	0.065**	0.067		0.140***	0.170***	0.215***
		(0.022)	(0.025)	(0.131)		(0.024)	(0.039)	(0.034)
Region fixed effects	no	no	no	yes	no	no	no	yes
No. of observations	6347	6347	6347	6347	5601	5601	5601	5601
No. of provinces	59	59	59	59	59	59	59	59
R-squared	0.01	0.08	0.09	0.09	0.01	0.07	0.08	0.09

Standard errors in parentheses, corrected for province-level clustering. All regressions weighted by sampling weights.

* significant at 10%; ** significant at 5%; *** significant at 1%

[a]Coefficients on household characteristics and time dummy interactions not shown due to lack of space.

TABLE 8 : IMPACT OF LAND REFORM ON NATURE OF CREDIT

Sample: Rural households

Dependent variable	Proportion of credit obtained from formal sources				Proportion of credit taken with collateral			
	No controls	HH chars.	HH chars interacted with time[a]	Region fixed effects	No controls	HH chars.	HH chars interacted with time[a]	Region fixed effects
Mean (s.d.) in 1993	0.3175 (0.4295)				0.1326 (0.3154)			
Mean (s.d.) in 1998	0.5867 (0.4528)				0.3759 (0.4562)			
Registration rate 1998*Year=1998	0.060	0.066	0.050	0.062	0.103	0.107	0.085	0.107
	(0.089)	(0.089)	(0.083)	(0.089)	(0.088)	(0.085)	(0.086)	(0.086)
Year=1998	0.226***	0.213***	0.430***	0.210***	0.169**	0.162**	0.077	0.153**
	(0.065)	(0.065)	(0.117)	(0.065)	(0.064)	(0.061)	(0.106)	(0.061)
Registration 1998	-0.052	-0.072	-0.058	-0.122**	-0.050	-0.089**	-0.077*	-0.108**
	(0.073)	(0.074)	(0.073)	(0.057)	(0.046)	(0.042)	(0.040)	(0.041)
Age of household head		0.002***	0.002***	0.002***		0.001**	0.001	0.001**
		(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Male household head		0.024	0.038	0.017		0.044**	0.063***	0.037**
		(0.019)	(0.024)	(0.019)		(0.017)	(0.017)	(0.017)
Years of education of head		0.008**	0.007*	0.009***		0.009***	0.007**	0.011***
		(0.003)	(0.004)	(0.003)		(0.003)	(0.003)	(0.002)
Household size		0.008**	0.005	0.005		0.014***	0.008**	0.011***
		(0.004)	(0.004)	(0.004)		(0.003)	(0.003)	(0.003)
Majority ethnic group dummy		-0.019	0.082	0.014		0.025	0.019	0.047
		(0.049)	(0.050)	(0.047)		(0.036)	(0.028)	(0.042)
Dummy for north		-0.054**	0.021	0.169**		-0.118***	-0.084***	0.161
		(0.026)	(0.034)	(0.067)		(0.029)	(0.027)	(0.138)
Region fixed effects	no	no	no	yes	no	no	no	yes
No. of observations	4319	4319	4319	4319	4319	4319	4319	4319
No. of provinces	59	59	59	59	59	59	59	59
R-squared	0.09	0.10	0.11	0.11	0.09	0.12	0.12	0.14

Standard errors in parentheses, corrected for province-level clustering. All regressions weighted by sampling weights.

* significant at 10%; ** significant at 5%; *** significant at 1%

[a]Coefficients on household characteristics and time dummy interactions not shown due to lack of space.

1998
1994
Geographical Distribution of Registration Levels (1994 - 1998)
1ST QUARTILE (0% - 6%)
2ND QUARTILE (6% - 19%)
3RD QUARTILE (19% - 39%)
4TH QUARTILE (39% - 91%)
1ST QUARTILE (11% - 50%)
2ND QUARTILE (50% - 80%)
3RD QUARTILE (80% - 91%)
4TH QUARTILE (91% - 100%)

Figure 1:

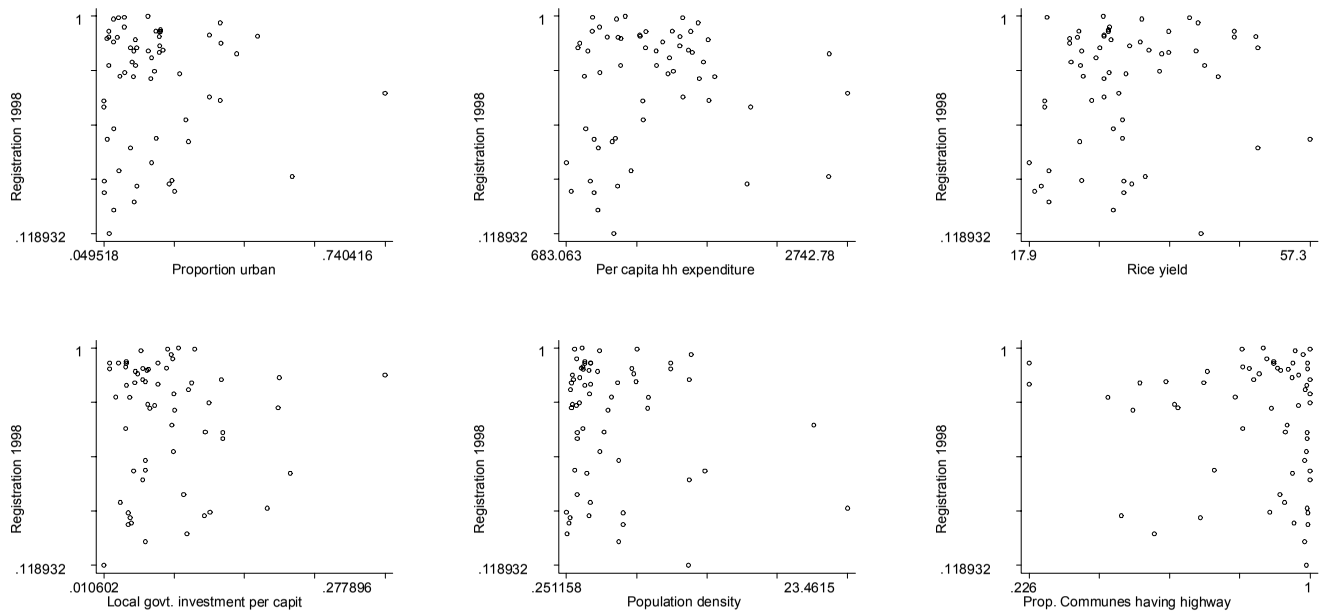
Registration 1998
1
.118932
.049518
.740416
Proportion urban
683.063
2742.78
Per capita hh expenditure
17.9
57.3
Rice yield
.010602
.277896
Local govt. investment per capit
.251158
23.4615
Population density
.226
Prop. Communes having highway

Figure 2: