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Land Acquisition and Corporate Investment – Legacy of the Historical Land Ceiling Legislations*

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Abstract: Land reforms are a way to allocate excess land over and above a maximum land ceiling to landless and also to offer security of tenure to tenants. We study the impact of historical land reform legislations, particularly those related to land ceilings, on corporate investment in India's densely populated economy where the tussle between farmers and industrialists/governments has often become a politically explosive issue. Historically, the size of the land ceiling in India varied with land fertility across the states such that states with more fertile land tend to have lower land ceilings size. We argue that the transaction costs of acquiring land are therefore higher in states with lower size of land ceilings; accordingly, land acquisition for industrialisation would require permission from a larger number of landowners since average landholding size tend to be typically smaller in the states with lower ceilings. Our identifying mechanism relies on the fact that the variation in land ceiling size across the states was dependent on land fertility and as such is beyond the control of the state. We first use the historic state-level panel data compiled from various official sources over 1960-85, a period that saw the enactment of most land ceiling legislations across the Indian states. Later we also use firm-level panel data for more recent years 1996-2012 to explore the long-term effects of the historic land ceiling legislations. Ceteris paribus, there is evidence from our analysis that corporate investment is less in states where the size (number) of the ceilings legislation was low (more). The detrimental effects of land ceiling legislations persist in the long run too. However the harmful effects of lower land ceilings size or more ceiling legislations seem to disappear for less land-intensive industries, e.g., the service sector. The paper concludes with possible policy implications.

JEL classification: O4, Q1

Keywords: Land reform legislations, Land ceiling size; Transaction costs of land acquisition; Corporate investment; More and less land-intensive sectors; India.

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Introduction

Insecurity of land tenure is a socio-political issue predominant in most land scarce and predominantly agrarian countries. Customary land rights offer access to land and security of tenure to many poor households that ensures equity in the distribution of land. It may also trigger more investment in land and thereby land productivity and efficiency. Most land reform agendas are thus driven by equity and efficiency considerations.

Access to industrial land and land acquisition for new factories and transport infrastructure has become a major economic and political issue in many densely populated developing and emerging countries striving for economic growth through industrialisation. India is surely an important case in point. It is a land scarce country with immense pressure on land to feed its growing population. Land policy has thus been a major economic issue in India ever since independence. More recently, as India strives for becoming a global superpower through liberalization and industrialization, the tussle between farmers and industrialists/governments has often become a politically explosive issue, sometimes leading to political unrest and violence.

The Tata Nano Singur has been a landmark controversy in this respect that highlights the problem of land acquisition for industrialisation. The project initiated in 2007 required takeover of 997 acres (4.03 km^2) of farmland to have Tata build its factory. This was opposed by environmental activists, unwilling farmers and opposition party in West Bengal; to a large extent, farmer's opposition was dictated by the undervaluation of multi-cropped land (Ghatak et al. 2013). Finally, Tata had to pull out and relocate to Gujarat in 2008. Tata moved to Sanand in Gujarat without further controversy. It is in this context, the present paper attempts to explain the effect of historical land reform on corporate investment in India. In particular, our analysis focuses on the effects of size of land ceiling size and also the number of ceiling legislations enacted in the India states. While size of the land ceiling size depended on the exogenously

given soil fertility of the state, number of land reform legislations including those on land ceiling were enacted by the Indian states within India's federal structure. In particular, we argue that the transaction costs of acquiring land for industrialisation are higher in states where land fertility is higher. This is because ceiling size is essentially lower in these states by law. Inherently, states with more fertile land are also the states with heavy population pressure on land, which together may explain a smaller average size of landholding in states with lower ceilings. As such land is more fragmented in these states, thus requiring permission from more landowners to acquire land for industrialisation, especially the large scale ones, thus raising the transaction costs of acquiring land in states with lower land ceiling size. Second, there are also inter-state variations in the number of ceiling legislations across the Indian states over time. A closer scrutiny of the ceiling legislations in this respect highlights that there has been some changes in the way ceiling is imposed (see further discussion in section 3). We also find that there are certain pro-poor states over this time that tends to enact more ceiling legislations. Accordingly, we argue that there is likely to be an apprehension among investors to invest in states with more land reform and ceiling legislations, as there can be further legislations in future, which may discourage corporate investment. Finally we hypothesize a heterogeneous impact of the ceiling size and ceiling legislations on more/less land-intensive sectors. Controlling for all other factors that may also affect corporate investment, it can be argued that the adverse effects of lower land ceilings are likely to be more pronounced for the firms operating in more land-intensive heavy industries that requires more land since these firms are likely to face greater transaction costs in states with lower land ceilings though these land-intensive heavy industries like Tata Motors typically generate more growth momentum.The latter may influence the pattern of industrial investment in the Indian states.

Compiling data from various official sources both at the state-level and also at the firm-level, we assess the impact of land reform legislations pertaining to land ceiling on corporate

investment. Our identifying mechanism relies on inter-state variation in land reform legislations in the Indian context. In particular, the variation in land ceiling across the states was dependent on land fertility given geographical distribution of the states which largely remained unchanged for the sixteen major states that we study over 1960-85, and as such beyond the control of the state. We consider two data-sets: first, we use the historical state-level panel data for sixteen major Indian states from 1960 to 1985 to study the impact of various land reform legislations especially focusing on land ceiling size on corporate investment, a period which saw the introduction of major legislations in this respect. Second, we also use a more recent Orbis (available from Bureau van Djik) publicly listed firm-level panel data over 1996-2014 to study the long run effects of the land reform legislation on firm level investment in the post-liberalisation years. We create a measure of ceiling size as entailed in the ceiling legislations of the sample state over time 1960-85. We also use different measures of land reforms distinguishing land ceilings from other measures: (i) no of ceiling legislations; (ii) no of all land reform legislations (a la Besley and Burgess, 2002) in a state over 1960-85. As far as corporate investment measure is concerned, we primarily consider the size of fixed capital in relation to total output (at the state-level) and total assets (at the firm-level) as we focus on the significance of land acquisition for industries. It refers to any kind of real or physical capital including property, plant and equipment that is not used up in the production of a product and as such it circulates over the lifetime of the plant with some depreciation. Second, this is the only comparable measure that we can construct at both the state and the firm-level (see further discussion in the data section), which is important for us as we compare the effects of land reform on state-level and firm-level investment.

The paper integrates different strands of the literature, namely, the traditional corporate investment literature, the industrial economics literature and also the development economics literature (see section 3 for further details). This paper, to our knowledge, is the first to examine

the effects of a land reforms legislations on land acquisition for industries and corporate investment. First, we try to identify different components of transaction costs involved in acquiring land for investment. We find that the lower (greater) the size of land ceilings (number ceiling legislations) in a state, the lower is the size of corporate investment. This not only holds for the historical state-level data (1960-1985) but also persists at the firm-level in recent years 1996-2012. We argue that these results provide support to our hypothesis that the historical land ceiling legislations enacted primarily in the 60's and the 70's made it arduous to acquire land from land owners especially in more fertile states with lower land ceilings and more ceiling legislations. In particular, we provide evidence that the average size of cultivable land per household tends to be lower in states with lower ceilings as determined by the land ceiling legislations. Second, states with more fertile land and lower ceilings also tend to face higher land prices as the pressure on land is higher. Finally, there are also legal costs and costs of delay in implementing a project if getting permission from current landowners lead to protests and court cases. We also identify evidence of the heterogeneous impact of the reform across industries classified by different degree of land intensity: whereas land reforms have had no significant effects on firms operating in less land intensive industries, it has had a significantly detrimental effect on corporate investment among more land intensive sectors. These results are robust to alternative specifications and alternative samples and has significant implications for land acquisition policies for industrialisation in India and also other populous and land scarce emerging countries.

The rest of the paper is organized as follows. Section 2 provides a brief background of the land reform policy in India. A review of the literature and hypothesis are described in section 3. Section 4 describes the data and the variables generated for the analysis. The regression model is provided in section 5. Results and tests for robustness are produced in section 6 & 7 respectively. The final section concludes.

1. Background

Land reforms aim at redistribution of excess agricultural land above a land ceiling taken from the rich landlords to the landless poor with a view to confer land rights. Land policy has been a major economic issue in India ever since independence. Unequal land distribution, expropriate tenancy contacts, Zamindari system were a common feature of the Indian economy. In a land-scarce country with a significant population below the poverty line, there was an obvious argument in favour re-distribution. While equality remains a central argument in favor of land re-distribution, one cannot also ignore the efficiency issues. According to Banerjee (1999), small farms tend to be more productive than large farms. Shaban (1987), suggest that owner- cultivated plots of land tend to be more productive than those under sharecropping tenancy. This suggests land re-distribution may promote both equality and efficiency.

In 1949 state governments were given the right to adopt and implement land reform legislations. This led to significant variation across states and over time in terms of the number and nature of the legislations enacted within India's federal structure, the level of support or otherwise from existing or new institutional arrangements, and the degree of success in implementation etc.

We consider the role of size of ceilings in this respect. By 1961-62, ceiling legislation were passed in all the States. The size of the ceiling vary from state to state, and are different for food and cash crops. The unit of application of ceiling also differs from state to state. In some states ceilings were based on 'land holder', whereas in other states ceilings were based on 'family'. In order to bring about uniformity and comparison, a new policy was evolved in 1971 based on irrigation / fertility of the land. Land ceilings were imposed on three categories of land i.e. land irrigated with two crops; land irrigated with one crop and Dry land. (http://planningcommission.nic.in/reports/articles/venka/index.php?repts=m-land.htm). The

latter made the size of ceiling as a function of land fertility in the states which are determined by the historical formation of the states and as such could be regarded as beyond the influence of the states.

Following Besley and Burgess (2002) we also consider the number of ceiling and other legislations enacted in a state at a point of time. Besley and Burgess (2002) classified the land reform legislations into the following four major categories:

1. Tenancy reform: These include attempts to regulate tenancy contracts both via registration and stipulation of contractual terms, such as shares in share tenancy contracts, as well as attempts to abolish tenancy and transfer ownership to tenants. tenancy reform, imposed regulation that attempted to improve the contractual terms faced by tenants, including crop shares and security of tenure
2. Abolish intermediaries: large feudal landowners (zamindars) were given the rights to collect offerings from peasants in exchange for a land tax paid to the state since the British land-revenue system. This system was considered exploitative, and abolition of intermediaries was aimed at curtailing the power of these large landowners and ensuring that the cultivator of the land was in direct contact with the government, which minimized unjust extraction of surplus by the landowner.
3. Ceilings on landholdings: this refer to fixing a maximum size of land holding that an individual/family can own with a view to redistributing surplus land to the landless.
4. Consolidation of disparate landholdings: this made sure that small plots of land belonging to the same small landowner but situated at some distance from one another could be consolidated into a single holding to boost viability and productivity.

Our analysis particularly uses the number of land ceiling legislations enacted in a state at a given point of time between 1960-85. Alternatively, one can also construct an index of cumulative land reform legislations as the sum total of all four components legislations. Most

legislations were passed during 1960-85 and as such we primarily focused on land ceilings component of land reform over 1960-85 for our analysis. This is because imposition of land ceilings leads to land fragmentation, which in turn raise barriers to acquisition of land. We exploit the inter-state variation in the legislations across the Indian states over time.

The union or the state government can acquire private land for the purpose of industrialization, development of infrastructural facilities or urbanization of the private land. This is referred to as Land acquisition in India. The affected owners are in return provided compensation, rehabilitation and resettlement. Until 2013, land acquisition was governed by the Land Acquisition Act of 1894. The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (LARR) came into force from 1 January 2014. It aims to meet the twin objectives of farmer welfare; along with expeditiously meeting the strategic and developmental needs of the country. More recently, attempts were made to amend the LARR as the new BJP government at the centre attempted to introduce the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Amendment) Bill, 2015, popularly known as Land Bill. The new Bill aims at making it easier to acquire land for certain kinds of industrial activities by exempting certain investment projects from obtaining consent from land holders. However, the Bill that aims to streamline the currently cumbersome process of land acquisition was not approved following farmer protests all over India,[1] because it adversely affects the country's poorest and most vulnerable – its forest-dwelling tribes and farmers. Attempts are now being made to correct the perception of 'pro-corporate' and 'anti-farmer' land bill to satisfy the dual objectives of development and welfare. In this context, it is important and timely to study the impact of land reforms on corporate investment.

[1] According to K. Nagaraj (2008), every seventh suicide in India is a farmer suicide. While the reasons behind the suicides are usually crop failure and mounting debts, amendments in the proposed land bill – is quite unfriendly to farmers who believe they are unfairly compensated. This has undoubtedly spread fear and unrest among farmers.

The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 defines ‘consent’ clause as "land can only be acquired with approval of the 70% of the land owners for PPP projects and 80% for the private entities. Generally there are more landowners to get the consent from in states with more fragmented land caused by the ceiling legislations, thus raising the transaction costs of acquiring land. Variation in land compensation across India is another complication for investors. Land compensation depends on the market value of the land which is likely to be higher in more populous states with greater population density

The compensation for the acquired land is based on the value of the agricultural land, which ignores the price increases and as such, deprives the current owners Secondly, if the prices are left for the market to determine, the small peasants could never influence the big corporate tycoons. Also it is mostly judiciary who has awarded higher compensation then bureaucracy (Singh 2007). Public protests about unfair compensation schemes are common and adds to the costs as it further delays transactions.

2. Literature & Hypotheses

2.1. Literature review

We integrate different strands of the literature to develop our hypotheses: the first is the traditional corporate investment literature that focuses on different firm-level characteristics influencing corporate investment. The second is the industrial economics literature which explores the determinants of firm's location choice and finally, there is now an emerging development literature that examines the role of various public policy interventions including Land Reforms on output, growth and poverty.

Corporate investment Literature: Modigliani and Millier's (1958) theory of the irrelevance of financial structure and policy on real investment decisions suggest that under perfect market conditions and when all firms have equal access to the capital markets, external funds and internal capital are perfect substitutes and the structure of the firm does not affect investment decisions. Perfect market condition do not, however, exist in the real world, which in turn suggests that investment may be affected by financial factors such as availability of internal funds, access to credit market etc. Meyer and Kuh (1957) were the first among others to emphasize the significance of financial conditions of a firm on investment decisions.

This finding when applied to capital investment led to the development of several theories of investment demand including the neoclassical theory of investment demand by Dale & Jorgensen (1967); Accelerator theory of Clark (1917) and Samuelsson (1939a and b), Q-Theory of investment suggested by Brainard & Tobin (1968) and Tobin (1969); Expected Profits (Jorgensen & Siebert, 1968), and Liquidity Theory (Meyer and Kuh (1957) & Anderson (1964) amongst others. Various theories suggested different firm level variables affecting investment decisions. Jorgensen & Siebert, (1968) do a comparison of the alternative theories of corporate investment behavior.

In 1988, Fazarzi, Hubbard & Petersen introduced the theory of financial constraints. They studied the relation between corporate investment and cash flow to test for the presence and significance of financing constraints. According to them investment behavior of a company can be explained by the pecking order theory. Cost of external finance increases considerably due to information asymmetry and agency costs. Initially firms prefer to finance internally through their operating cashflow, in an attempt to minimize the cost of capital. Only when the company's internal funds are insufficient to meet its investment needs, it resorts to external financing. Therefore, the higher the investment–cashflow sensitivity, the higher the implicit costs of external financing and the higher the financial constraints. They classify firms with

low-dividend pay-outs as ‘most financially constrained’ while those with high dividend pay-outs as ‘least constrained’ firms, and then measure sensitivity by regressing investment on cash flow, controlling for investment opportunities using Tobin’s Q. Their results suggest higher investment-cash flow sensitivities as evidence of greater financing constraints.

Fazzari et al.’s way of classifying firms as more or less constrained based on dividend pay-outs was criticized by Kaplan & Zingales (1997). They argued that firm’s dividend policy is a choice variable and firms may decide to pay less dividend even though they could pay out more. Choosing to pay low dividends does not necessarily mean financially constrained. Their classification was based on qualitative and quantitative information taken from financial statements. If firms had more funds than required to finance their investment, they were classified as “never constrained” while if they do not have access to more funds than needed to finance their capital expenditure, they were classified as “likely constrained”. Their findings suggest the investments of ‘likely constrained’ firms are less sensitive to cash flows than the investments of ‘never constrained’ firms. Debate on whether investment cash-flow sensitivities to be a good measure of financing constraints or not is still going on.

As Moyen (2004) demonstrates with simulated data, it is hard to identify firms with financing constraints, and the investment cash flow sensitivity critically hinges on the classification procedure used. While some methods of financial constraint identification show low sensitivity between investments and cash flows, others show just the opposite”.

Studies have also been conducted to test for factors affecting financial constraints, LIAN and Cheng (2007), argue that companies that tend to over-invest are the ones with fewer financial constraints as they appear to have a stronger investment-cashflow sensitivity, while those who under-invest face severe financial constraints. According to them information asymmetry is the main reason for cash flow sensitivity. Wang et al. (2008) support this however

they believe asymmetric information theory cannot fully explain the relationship between financial constraints and investment–cashflow sensitivity.

More recent literature establishes a direct correspondence between investment decisions and regulatory conditions or various laws passed on in a country. La Porta et al. (1997, 2002) for instance, are the first to study how investor protection affects corporate valuation. They argue that the legal environment of a country is an important determinant of the development of its capital market. They provide evidence of higher valuation of firms in countries with better investor protection. Further Agrawal (2013) studied the impact of an investor protection law namely, "blue sky laws", on corporate behavior and value. He tries to identify the casual impact of the investor protection law on firms in the manufacturing sector, by comparing the impact of the blue sky law on firm in states which introduced this law relative to those located in control states that did not introduce the law. Results support theories that predict a significant positive impact of investor protection laws on corporate financing and investment policy.

Djankov et al. (2010), study the impact of corporate taxes on investment and entrepreneurship. "Using data on effective first-year and five-year corporate income tax rate for 85 countries, they provide evidence of a large and significant adverse effect of effective corporate tax rates on corporate investment and entrepreneurship. In other words, higher effective corporate income taxes are associated with lower investment in manufacturing but not in services, a larger unofficial economy, and greater reliance on debt as opposed to equity finance. Their results are robust after controlling for other tax rates, including personal income taxes and the VAT and sales tax, for measures of administrative burdens, tax compliance, property rights protection, regulations, economic development, openness to foreign trade, seignorage, and inflation".

Tarantino (2013), examines a link between bankruptcy law and investment decisions. He argues that the adoption of soft bankruptcy law (resembling the chapter 11 of the federal

bankruptcy law, US) encourages the choice of investments that favors the achievement of long-term results. However, soft bankruptcy can lead to the choice of investments that are biased towards the achievement of short-term outcomes. Adoption of bankruptcy code increases the renegotiation power of entrepreneurs, which can allow lenders to increase recovery rates on the one hand but also weakens the weakens the contract's ability to solve the moral hazard problem embedded in the production project.

Industrial Economics Literature: This focuses on the location choice of industries. A review of the literature on industrial location and its determinants is vast and beyond the scope off the paper. The classical location theory was formulated by Webber (1929). Industrialization is argued to follow the classic "virtuous Cycle" principles i.e. firms locate where other firms are already located to realize existing benefits. Extensive reviews are provided by Henderson (2003), Head et. al (2004).

Deichmann et al. (2008) provides a survey on the important factors of industrial location in developing economies. According to them, factor prices (wage); utility service (Electricity and power); labor and regulation; market access and transport, firms in supplier industry; firms in own industry etc. are key factors affecting industrial choice. Lall and Chakravorty (2005), list out five sets of determinants namely, Land; Capital; Labor; Infrastructure; Regulation and Spatial of new investment. Using proxies for each of these determinants they show that investments are biased towards existing industrial cluster. Mukin and Nunnenkamp (2010), study the same for foreign investors. Foreign investors also prefer to locate where other foreign investors are already present. Physical infrastructure as measured by the proximity to national highways, airports, ports etc. is of prime importance to foreign investors as such they mainly invest in metropolitan cities. However none of these studies consider the access to land and the role played by exogenously given land reform legislation as ours.

Development literature: Existing studies have examined the effects of land reform policy on poverty, productivity, sustainable development etc. Besley and Burgess (2002) study the impact of various land reforms legislations on growth and poverty. Using a state-level panel of 16 major states from 1958 to 1992, they examine whether land reform legislation is associated with poverty reduction. They also provide a systematic description of these laws and their amendments that were passed in individual states over time to identify the effect of land reform on productivity and poverty. They generate a cumulative variable that aggregates the number of legislative reforms to date in any particular state. Controlling for state and year fixed effects, and a number of time varying economic and policy variables, they find that the lagged version of their cumulative land reform variable has had a negative and significant effect on poverty. Interestingly, they find that this is due primarily to the tenancy reform component of land reform. Abolition of intermediaries had a negative effect on poverty, but no effect on productivity. Imposing a ceiling on landholdings does not seem to have had much effect on either poverty or productivity, while land consolidation had a positive effect on productivity without having any effect on poverty. The authors conclude that land reforms did not have much effect on the distribution of land and seems to have operated mainly through altering the contractual relations in agriculture.

Sazama and Davis (1973) examine both theoretically and empirically, the effectiveness of a land tax as a regulatory tool for boosting agricultural output and productivity. According to them land taxation policy is not an effective device in increasing agricultural output and productivity.

We integrate these strands of the existing literature. To the best of our knowledge, ours is the first to examine the effects of land reforms policy on corporate investment, relevance of which is growing in land scarce countries. In doing so, we also control for the traditional determinants of investment including firm age, size, growth opportunities. Second, we take

account of the industrial location literature in that we argue that access to land as determined by the local legislations could be a key driver of investors' choice of industrial location. Finally, we also contribute to the development literature by studying the effects of land ceiling size and number of legislations on corporate investment that remains unexplored.

2.2. Hypotheses development

While access to land is an important determinant of industrial production, especially for land-intensive heavy industries, the effects of land (or regulations relating to) on corporate investment remains rather non-existent. Most land reform legislations were completed by 1985 shortly before India initiated its economic liberalization programme that aimed at industrialization. In this context, we examine the effect of historical land reform at the state level (1960-1985) and also its long-term effect on corporate investment at the firm level (1996-2014). It is important to assess its long-term legacy as land acquisition for industries is becoming a major socio-political issue as India strive for major industrialisation in the twenty-first century.

While land reform legislations can have different components, we particularly focus on land ceiling legislation: imposing a land ceiling creates surplus land which gets allocated to the landless, thus fragmenting land holding size. Prior to 1972, land ceilings were based on various criteria: the size of the household or family in some states while in others on the kinds of crop irrigated on the land. Since 1972, however, a new land ceiling policy has been adopted that used the quality of the soil to classify land as 1) most fertile land that is land irrigated with two crops 2) less fertile land as the land irrigated with one crop and 3) dry land or infertile land to impose ceilings. This was considered to be an effective criteria and so no further changes were made in land ceiling policy. Since the boundaries of the sixteen major states have not changed over 1960-85, we argue that higher the ceiling, the less fragmented the land is so that less

surplus land is generated for distribution in less fertile states with high land ceilings. The latter means that the average size of landholding is larger in the states with higher land ceilings (i.e., those with less fertile land) so that land remains concentrated in the hands of few owners. In other words, transaction costs of acquiring land for industrial and investment purposes tend to be lower in states with high land ceilings, thus paving the way for higher investment in these states. Accordingly we hypothesize:

H1: The higher (lower) the size of ceiling (in acres) in a state, higher (lower) is the level of corporate investment, keeping the size and fertility of land unchanged.

Ghatak and Roy (2007) find differential effects of land reform on agricultural productivity depending on the type of land reform. Overall land reform legislations have had a negative and significant effect on agricultural productivity in India. Decomposition by type of land reforms in this study suggests that land-ceilings were the main driver for this negative effect. However, in West Bengal, one of the few states where tenancy laws were implemented rigorously, the negative relationship between land reform and productivity has been absent, thus highlighting some benefits of tenancy laws. Some studies also suggest that the success or failure of the land reform policy in India also depends on the nature of its enforcement and implementation. Particular type of land reform in general can boost agricultural productivity, which may spur development of local agriculture-related small scale industries (Shaban 1987; Ghatak & Roy, 2007). Strict implementation of land ceiling legislations may, however, partition land into smaller plots and is likely to inhibit the process of acquiring land for industrialization. This is because it requires getting permission from too many landowners, thus increasing the transaction costs of acquiring land. Also greater land reform legislations in a state may also increase the apprehension of further pro-poor (including pro-labour) reforms (which can increase labor militancy) in the state, thus creating some disincentives for investment. So the

total effect of more land ceiling legislations is likely to be ambiguous. Taken together we hypothesize:

H2: The greater the number of land ceiling legislations in a state, lower is the level of corporate investment, if the costs of land ceiling outweighs its benefits.

We also argue that out of the four components of the land reform legislations, the joint effects of the ceiling and tenancy rights are likely to have more pronounced implications on industrial investment decisions. While land ceiling legislations are aimed as equitable distribution which creates a surplus when implemented, tenancy reforms are aimed at giving greater security to tenants. Long term tenancy was another way to protect the rights of tenants while such contracts are advantageous to tenants, these contracts is likely to be a troublesome for investors as they to negotiate with tenants with long term tenancy. This further adds to the cost of acquiring land from tenants. Taken together the cumulative effect of various land reform legislations, we hypothesize:

H2a: Higher the degree of cumulative land reform legislations, lower is the level of corporate investment, if the costs of land reform outweighs its benefits.

Finally, we also consider the heterogeneous effect of the ceiling legislations on more/less land intensive industrial sectors. In this respect, we distinguish manufacturing firms operating in more and less land-intensive sectors. Usually heavy industries like steel, automobiles, power plants are the examples of land-intensive sectors in relation to say utility sectors. In this respect, we argue that the firms operating in the more land-intensive sectors are more likely to face greater transaction costs of acquiring land for industrialisation in states with lower ceiling size. This is simply because they require more land. Taken together we hypothesize:

H3: The adverse effects of lower land ceiling size are likely to be more (less) pronounced for the more (less) land-intensive industries that requires more land and hence greater transaction costs.

2.3. Transaction costs of acquiring land for industries in India

Presence of transaction costs plays a key role in building our central hypotheses. Before we proceed to data analysis, let us try to identify different components of these transactions costs involved in acquiring land for industrialisation. A major issue in acquiring productive land for industrial purposes is the compensation to be paid to land owners. This is where the scuffle between land owners and acquires aggravates. While land owners believe they are unfairly compensated, big industrialists aim to reduce their costs in arriving at an agreed compensation and often they have more bargaining power over the small land owners in this respect.

The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 defines a **'consent' clause** as "land can only be acquired with approval of the 70% of the land owners for PPP projects and 80% for the private entities."

As argued before, land ceilings aim to create a surplus, which further leads to multiple ownership, especially in more fertile states with lower land ceilings. This means that there are more landowners to get the consent from in states with more fragmented land caused by the ceiling legislations. This may enhance transaction costs of negotiation especially if some of them disagree, thus raising the total transaction costs of acquiring land in the states with lower land ceilings. Using successive population Census data, Figure 2 shows the scatter plot between average cultivable land size per household and land ceiling size, which also includes the non-parametric Epanechnikov kernel fit with degree 2. In general, there is a positive relationship between ceiling size and average cultivable land size, especially up to the ceiling size of 15 acres or so. In other words, this confirms that states with lower ceiling tend to have lower average cultivable land per household, thus supporting our argument.

Further, price of land varies across the Indian states and generally one can expect that the price per unit of land holding is higher in more populous states. While the land market

across India is not very active, Chakrabarty (2013) shows that urban land prices are significantly higher than the comparable incomes. Further there are striking inter-city differences: price per square foot of land is the highest in Mumbai, closely followed by Bangalore in the south and the capital city Delhi in the north of the country though the ranking in terms of per square feet price changes when we consider land price per acre. Singh (2016) then computes the fundamental value of land for urban homes as the opportunity cost of land that could have been used in agriculture. Accordingly, he shows that the maximum fundamental value of land is much smaller than the market value of land as shown by Chakrabarty (see Appendix Table A1) which is arguably consistent with the fact that fact that by and large farmers have low incomes primarily derived from production of crops on land. Singh went on to argue that the fundamental value of land would then vary with agricultural productivity that determines the amount of crops produced on land, other things remaining unchanged. As such we argue that the price per acre of agricultural land would vary with the land fertility.

The compensation for the acquired land is based on the value of the agricultural land, which ignores the price increases and deprives the current owners. Secondly, if the prices are left for the market to determine, the small peasants could never influence the big corporate tycoons. Also it is mostly judiciary who has awarded higher compensation than bureaucracy (Singh 2013). Public protests about unfair compensation schemes are common that further add to the costs as these protests also tend to delay transactions and start of production.

3. Data

3.1. State-Level Data

We have compiled and processed the data from a variety of sources. The data is collected for 16 major Indian states for a period of 25 years starting from 1960 to 1985. This gives us a state-

year panel data with 400 state-year observations. Following is a list variables used in our analysis along with the sources they have been taken

1. Dependent variable: We use fixed capital formation as a proxy to corporate investment at the state-level which refers to any fixed assets including property, plant and equipment which are not used up in the production (e.g., see Blomstrom et. al. (1993)). In particular, we calculate fixed investment as a ratio of fixed capital to value added. The main source of data is the Indian Annual Survey of Industries (ASI).

(a) Key explanatory variable: It relates to different measures of land reform legislations as explained below. Size of Ceiling: it is the maximum area (in acres) of land that an individual can hold in a state. Data is collected from the Department of Land Resource, Government of India. It was made available in the Agriculture Statistics. At a Glance 2014 (see table A3 in appendix). Size of the ceiling varies with the land fertility in a state at a given point of time. In this respect, we distinguish between ceiling size for more/less fertile land and also infertile land. In general, we find that the size of the ceiling is higher in states with more infertile land.

(b) Number of Ceiling legislations: Cumulative measure of stock of land ceiling legislations passed in a state s by year t. Our primary data source here is Besley and Burgess (2000).

(c) Land Reform: Cumulative measure of all four land reform legislation passed in state s by year is a sum of all different legislations passed in a state s in a given year over 1960-85. Again we collect it from Besley and Burgess (2000) for land reforms.

3.2. Firm-Level Data

We obtain firm-level panel data from Orbis from Bureau van Djik from 1996 to 2012. We obtain ownership information for the same firms from Prowess database available from CMIE.

We then extract the location of firms from the addressed of their headquarters. We obtain ownership information for the same firms from Prowess database available from CMIE. To this we add/merge data on state-level land reform measures available from Besley and Burgess (2000). .

1. Corporate investment measures: In order to make our state-level results to be comparable to the firm-level ones, we consider fixed capital as a ratio of total assets as a measure of investment. Fixed capital includes any investment within the measurement period in physical assets, such as real estate, infrastructure, machinery, etc. While working capital of a firm may vary from year to year, fixed capital investment is a good measure of steady long-term investment of a firm. Since this outcome variable is comparable to the state-level outcome, we can compare the effects of various land reform variables on both state-level and firm-level outcomes.
2. Land reform measures: As explained above, we consider three land reform measures: (i) size of ceilings for most fertile, less fertile and least fertile land; (ii) number of ceiling legislations; (iii) index of cumulative land reform legislations. .

We also include a number of control variables in both state- and firm-level analysis as we attempt to minimise the omitted variable bias. This is discussed in section 4 where we explain the empirical methodology.

3.3. Data description

We start by plotting sample firms' location across the Indian states. The green dots in Figure 1 show the distribution of sample firms across Indian states. Evidently, there is a clustering of these firms in the western states of Gujarat, Maharashtra, and also in and around Delhi/Haryana/Punjab. We want to examine if the firm location and also the size of the fixed capital investment is linked to the historical land reform legislations enacted between 1960-85

in most states.

Panels a and b of Figure 3 plot the Epanechnikov kernel fits of corporate fixed investment with local polynomial (of degree 2) smoothing against number of land ceiling legislations (panel a) and land ceiling size (panel b). These plots seem to provide preliminary support to our key hypotheses within a bivariate set-up: (i) Size of fixed investment share declines as the number of ceiling legislations increase (see panel a), thus supporting hypothesis H2. (ii) Size of fixed investment does not vary much when ceiling size is low, but it starts increasing as ceiling size increases beyond 3.2 acre of so (see panel b), thus supporting hypothesis H1. These are however simple non-parametric bivariate relationships. We shall now proceed to conduct multiple regression exercise to see the validity of these hypotheses, after controlling for all other factors that may also influence investment.

5. Empirical strategy

5.1 State-level analysis:

Our simple baseline regression for the s-th state in t-th year is of the following form:

$$Y_{st} = \alpha_0 + \alpha_1(SizeOfCeilings_{st}) + \alpha_2 X_{st} + \tau_t + \epsilon_{st} \qquad (1)$$

Where Y_{st} some measure of investment in state s at time t, *SizeofCeilings* is the variable indicating the size (in acres) of the land ceilings legislation imposed across various state since 1972 till date. The size of the Ceilings is was imposed according to the number of crops produced on the land which in turn reflects the soil quality/ fertility: i) most fertile land which was irrigated with two crops; ii) less fertile land which was irrigated with one crop and ; iii) dry or infertile land. X_{st} is the set of various state level controls that may also affect investment decision, and τ_t captures the unobserved year-specific factors (i.e., political changes, policy

changes etc.) that may also influence investment. We include a set of control variables with a view to minimise the omitted variable bias of our estimates, if any. These are listed as follows:

(a) Log (state output): log of (Net State Domestic Product) available from the World Bank. This allows us to control for state-level prosperity

(b) Population density: The population estimates are constructed using Population Census data (Census of India, Registrar General and Census Commissioner, Government of India). We construct population density as the ratio of total state-level population to geographic size of the state. This controls for the population pressure on land.

(c) Percentage share of SC/ST Population: Scheduled caste (SC) and scheduled tribe (ST) are constitutionally regarded as the backward castes in India who tend to be over-represented among the Indian poor. Traditionally they are less educated too. So the states with more SC/ST population shares could be major beneficiaries of the land redistribution programme while their predominance in a state may also indicate lower human capital status of the state which may discourage corporate investment.

(d) Percentage share of Urban to Rural population: In general more urbanised states are more industrialised and more developed with better human and physical infrastructure, thus may be better placed for attracting more corporate investment.

(e) Literacy rate: Total Literate/ total population *100. State-level literacy rate reflects the human capital of the state which is a major determinant of industrial productivity.

(f) Soil fertility : ratio of net sown area land area: we also control for this measure of soil fertility in a state s at time t as the land ceiling size was based on soil

fertility to some extent though it did not change continuously. So we wanted to assess the pure effect of land ceiling size, after controlling for soil fertility.

(g) Labor Militancy: Log (Total Man days lost in industrial Disputes): In an alternative specification, we also control for labour militancy to rule out the possibility that our ceiling estimates are reflecting the labour militancy as there may be a correlation between pro-poor land legislations and labour militancy in India.

Further, we use a similar regression to empirically test the validity if H2, i.e., the number of ceiling legislations in operation in the s-th state in t-th year:

$$Y_{st} = \alpha_0 + \alpha_1(NumberOfCeilings_{st}) + \alpha_2 X_{st} + \tau_t + \epsilon_{st} \quad (2)$$

NumberofCeilings is a cumulative sum of all the ceilings legislations that have been passed in a state "s" at time "t". All other controls remain as above.

Finally, we use the following regression equation to empirically test the effect of the composite land reform measure too:

$$Y_{st} = \alpha_0 + \alpha_1(LandReform_{st}) + \alpha_2 X_{st} + \tau_t + \epsilon_{st} \quad (3)$$

LandReform is the cumulative sum of all four categories of land reform legislations passed in a state in a given year. In order to overcome omitted variable bias we also control for firm level characteristics which are accepted in the literature to have effects on firm level investment.

5.2 Firm-level analysis

To study the long run effects of the historical land reform legislations, we next carry out the firm-level analysis for the period 1996-2012. We only consider the impact of cumulative land reform legislation on fixed investment to make the firm-level analysis comparable to the

state-level ones described in section 5.1. For firm-level analysis the following regression model is used:

$$Y_{ist} = \beta_0 + \beta_1(SizeOfCeilings_{st}) + \beta_2 Z_{ist} + S_j + \tau_t + \epsilon_{ist} \quad (4)$$

Where Y_{ist} is a measure of corporate investment for firm *i*, in state *s* at time *t*. *Z*'s are the various firm level controls which also affects investment decision (such as size, age etc.). S refers to the industrial sector dummies and τ captures the unobserved year-specific factors that may also influence investment. Among the set of control variables Z, we include the following:

i) Firm size: natural logarithm of total assets which eliminates the possibility that the ceiling effect is not reflecting the effect of firm size.

ii) Age: Age of the firm in years from the date of incorporation;

iii) Population Density which is the ratio of total state population to demographical size of the state (in sq. kms.)

iv)

v)City dummies to control for the variation in local physical infrastructure including access to railways, road etc. which may also influence the size of corporate investment

After controlling for all these factors, the key coefficient of interest to us is β_1 – we use the data at our disposal to see if the estimated β_1 is negative or not.

As before, we estimate the counterparts of equations (2) and (3) using the firm-level data replacing ceiling size by the number of ceiling legislations and also composite land reform measures respectively.

5.3. Heterogeneous impact

Finally, we consider the distribution of land intensity as defined by the land held as a share of total assets of all sample firms and classify the firms into two categories depending on whether

they are above/below the median land intensity in our sample. Firms above the median land intensity are called more land-intensive firms and vice versa for the firms below the median land intensity. We then rerun regression (4) for more and less land intensive firms to see if there is any heterogeneous impact of the ceiling legislations on these two groups of firms with a view to test hypothesis H3. Naturally, we can only do this for the firm-level data and we do so by including an interaction term between the industry average land intensity and the particular land reform variable (please see further discussion in section 6.2.

Table 1 reports the summary statistics of key regression variables both for the state and the firm-level data.

6. Results

This section reports and analyses the estimates of our regression equations. Sub-section 6.1 discusses the regression estimates of fixed capital investment of state level analysis while sub-section 6.2 discusses the long run effects of land reform legislation is any. Section 6.2.1 checks for any heterogeneous effect of the land reform legislation based on industrial land requirement.

6.1 State-level Results

In this section we analyse the results with a view to test our hypotheses, using the historical state-level data. Tables 2-4 report the ceiling size effects on estimates of state level investment using alternative definitions of ceiling size linked to land fertility, namely, ceiling for most fertile land, less fertile land and infertile land. Column (1) to (5) show investment estimates for various specifications using regression equation (1). Note that the estimated coefficient of the each ceiling size variable is positive and statistically significant, irrespective of the quality if the land for most specifications. Column (5) in each of these tables is our most preferred

specification as it controls for most variables thus helping to minimise the omitted variable bias. This suggests that higher size of the land ceiling significantly boosts corporate investment. This is because higher (lower) the size of the ceiling reflects less (more) fragmented land which in turn lowers (increases) the transaction costs of acquiring land irrespective of the quality of the land, thus providing support to H1.

In order to test hypothesis H2, we consider the cumulative sum of the *number of ceiling* legislations that have been passed in a state "s" and time "t". Regression results capturing the effect of number of ceilings on investment in a state are reported in table 5, using regression equation (2). Column (1) to (6) are various specification for the same regression equation (2). As we hypothesized, the estimated coefficient for all specifications (1) through (6) is negative and significant though specification (6) remains our preferred specification as this is the most complete model that minimise the omitted variable bias, if any.

Finally we test for the effects of cumulative land reform legislations on investment. Table 6 reports regression results. Here, we estimate regression equation (3) to test for hypothesis H2a. Once again, the estimated coefficients of investment are negative and significant, which confirms that together the land reform legislation have had an adverse effect on investment.

6.2 Firm-Level Results

As explained in section 5, we also consider the effects of these historical land reforms in the long run using firm-level data for 1996-2012. These estimates are shown in Tables 7-9 using three measures of land reforms, namely, ceiling size, number of ceiling legislations and the composite land reform legislations corresponding to hypothesis H1, H2 and H2a respectively. These tables show estimates of fixed capital share using specifications (1)-(4). Clearly the estimated coefficient of ceiling size declines as we include more and more controls.

Specification (4) is the most complete specification with most control variables and as such is our preferred specification.

These firm-level results are very similar to the state-level results, irrespective of the choice of the land reform measures used. First, Table 7 shows that higher the ceiling size, higher is the level of investment ratio, controlling for all other factors. Second, as before, number of ceiling legislations is associated with significantly lower investment as shown in Table 8. Finally, column (4) of Table 9 shows that states with greater composite land reform legislations tend to have significantly lower corporate investment in the long run, after controlling for other factors that may also influence corporate investment. Taken together, these firm-level results too provide support to our hypotheses H1 and H2.

6.3. Eliminating competing explanations

First, we try to rule out that our ceiling results are not reflecting the effect of any confounding factor. To this end we consider the role labour militancy which can distract investors from a state. To test that this is not the case, we control for annual number of man-days lost because of strike activities in a state. We get this data from Besley and Burgess (2002) who study the effect of labor regulations on investment, employment, productivity and output in the manufacturing sector. They suggest that pro-worker amendments in the Industrial Disputes Act are associated with lower investment, employment, productivity and output in registered manufacturing. Results shown in Table 10 shows that the ceiling results persists even after we control for labour militancy, thus ruling out the possibility that our results are capturing this possible confounding event.

Second, we want to rule out that these ceiling results are not arising because of some outliers, e.g., presence of most land reform intensive states namely, West Bengal and Kerala.

Hence we next drop these two states from the sample of states and rerun our regressions. We do this for both state level. We carry out the analysis to test the effects of cumulative land reform policy on investment only i.e. we test for robustness after dropping two most land reform intensive states for regression equation (3). Table 6 and 9 reports the regression estimates of fixed capital formation of cumulative land reforms on investment for the state - level (1960-85) and firm- level analysis (1996-2012) respectively. As observed in term of the sign (negative) and the significance we get similar results when we compare table 11 (Panel A) with table 6 and table 11 (Panel B) with table 9, for state level analysis and firm level analysis respectively. The only difference after dropping West Bengal and Kerala is the change in the absolute size of the of the effect which has gone up from 0.237 [in table 6 column (6)] to 0.361 [in table 11 Panel A] for state level analysis. Similarly, we observe a change only in absolute size of the effect which has gone up from 0.1665 [in table 9 column (4)] to 0.189 [in table 11 panel B] for firm-level analysis.

Finally, we control for infrastructural facilities in our firm level analysis. It is a well-established fact in the industrial location literature that firm's location choice is significantly affected by infrastructural facilities in a prospective location. Metropolitan cities usually observed to form industrial clusters this justifies controlling for infrastructure. We create a city dummy to proxy for infrastructural facilities to rule out the fact that the adverse ceiling effects are not due to lack of infrastructural facilities. Once again we get similar results with a negative and significant effect of land reform legislations on fixed capital formation as reported in Table 12.

6.4. Heterogeneous impact of the reform

Finally, we test H3 to see if there is any heterogeneous effect of land reform for industries

classified by land intensity. In doing so, we not only include the ceiling size and industry average land intensity but also their interaction. The coefficient of interest for us is the interaction term here. Table 13 summarises these estimates with various specifications, but we couch our discussion in terms of the most complete specification (6) that not only includes the key explanatory variables, but also other controls. Evidently the estimated coefficient of the interaction term is negative and statistically significant, thus indicating that the effect of larger ceiling size is negative only for more land-intensive industries. However the non-interacted land intensity variable on its own is positive and statistically significant, thus suggesting that land intensity by itself may increase investment in a state only when there is no ceiling legislation. The significance of the interaction term thus provides support to H3 that it is the firms in the land-intensive sector only that gets affected by the land ceiling legislations.

7. Concluding comments

In this paper we examine the impact of historical land reform legislations on corporate investment, particularly focusing on land ceiling legislation. Using a state-level panel data for sixteen major Indian states we examine the effects of varied land ceiling legislations imposed by different states on their industrial development. We find that the variation in corporate investment, especially fixed investment, could be attributed to the land ceiling legislations implemented by the state. Since 1971 ceiling size has been based on land fertility across the states which is beyond the control of the states. Results using state-level panel data suggest that states with greater land ceiling size tend to have more investment while those with more land ceiling legislations tend to have lower investment. Further analysis using firm-level panel data during 1996-2012 highlights that the legacy of historical land ceiling legislations tend to persist in the long run as well: firms located in states with lower land ceiling size or more ceiling legislations seem to have lower corporate investment. Results are robust to alternative

specifications. Further analysis shows some sectoral differences in investment results for firms in more or less land intensive sectors; there is evidence that the adverse effect of land-reform legislations is primarily driven by the firms in more land-intensive sectors. We argue that the adverse effects of land ceiling legislations on corporate investment can be attributed to the higher transaction costs of acquiring land for industries in states with lower ceiling size and also those with more ceiling legislations.

While one cannot reverse the adverse effects of historical land reform in a land scarce economy with growing population to feed, options for future policy development surely requires a closer scrutiny. Possible options include: scope for industrial development by encouraging less land-intensive service sector development in more land reform intensive states. One can also encourage the development and effective enforcement of pro-business policies including building land bank, offering land at subsidized prices, tax exemption to promote balanced industrialisation and growth across the Indian states.

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Tables

Table 1: Summary Statistics

Variable	Observation	Mean	Std. Dev.
State-Level Data			
Dependant Variable : Fixed Capital share	416	1.773029	.8924956
Independent Variables			
Size Of Ceilings (in acres)			
Land irrigated with two crops i.e. Most fertile Land	224	15.1875	2.726818
Land irrigated with one crop i.e. Less fertile land	224	22.25	6.233858
Dry Land	224	44.5	23.56862
No. of Ceilings	416	.7019231	.739649
Land Reform composite	416	2.283654	2.47227
Controls			
Log(state Output)	416	12.32932	1.080591
State size	416	162401.9	102284.6
Population density	411	265.8527	175.5333
State output	296	25434.36	15506.14
Literacy rate	372	62.16591	8.002582
% Share (ST/SC) pop.	411	.2146579	.0817068
% Share (Rural/Urban) Pop.	410	.2005501	.0733171
Log (Labor Militancy)	405	12.7444	1.9909
Firm-Level Data			
Dependant Variable : Fixed Capital Share	7.109	62.8222	4406.095
Independent variable			
Ceilings	12,053	1.125529	.7415345
Land Reform composite	56,372	3.568456	3.690951
Controls			
Log (Total. Assets)	45,905	6.238249	1.983545
Age of the firm	56,338	22.00181	17.9924
Population Density	49,419	427.5381	230.1478

Table 2: Impact of ceiling size (most fertile land) on state level investment using state-level data.

The following table shows the effects of land ceilings on fixed capital formation. In this case size of the ceilings (in acres) are imposed on the basis of the land quality i.e. most fertile land. Investment is measured as the log of share of fixed capital to total value added and the land reform variable is the log of size of ceilings on most fertile land.

VARIABLES	Log (Fixed capital/ Value Added)					
	(1)	(2)	(3)	(4)	(5)	(6)
Log (Size of ceiling on most fertile land)	0.313**	0.301*	0.326**	0.339**	0.375**	0.785***
	(0.150)	(0.157)	(0.145)	(0.150)	(0.149)	(0.173)
State output	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pop. Density		-0.000	-0.000**	-0.000*	-0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
% Share (ST/SC) pop.			-1.839***	-1.716***	-1.471***	-0.869**
			(0.350)	(0.394)	(0.360)	(0.349)
% Share (Rural/Urban) Pop.				0.466	0.527	1.764***
				(0.470)	(0.560)	(0.560)
Literacy rate					0.005	0.004
					(0.006)	(0.005)
Soil fertility						-4.530***
						(1.062)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.271	-0.189	0.169	0.039	-0.408	-1.350**
	(0.421)	(0.446)	(0.403)	(0.482)	(0.516)	(0.534)
Observation	416	411	411	410	372	372
R-Squared	0.112	0.116	0.183	0.187	0.188	0.239

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Impact of ceiling size (less fertile land) on state level investment using state-level data.

The following table shows the effects of land ceilings on fixed capital formation. In this case size of the ceilings (in acres) are imposed on the basis of the land quality i.e. ceilings imposed on less fertile land. Investment is measured as the log of share of fixed capital to total value added and the land reform variable is the log of size of ceilings on less fertile land.

	Log (Fixed capital/ Value Added)					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Log (Size of ceiling on less fertile land)	0.039	0.002	0.090	0.071	0.112	0.236**
	(0.072)	(0.081)	(0.084)	(0.089)	(0.087)	(0.098)
State Output	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pop. Density		-0.000	-0.000**	-0.000*	-0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
% Share (ST/SC) pop.			-1.874***	-1.813***	-1.582***	-1.284***
			(0.364)	(0.419)	(0.398)	(0.395)
% Share (Rural/Urban) Pop.				0.235	0.298	0.900
				(0.474)	(0.593)	(0.551)
Literacy rate					0.005	0.005
					(0.006)	(0.005)
Soil fertility						-3.074***
						(0.985)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.454*	0.611**	0.775***	0.800***	0.286	0.028
	(0.248)	(0.286)	(0.288)	(0.297)	(0.438)	(0.430)
Observation	416	411	411	410	372	372
R-Squared	0.101	0.107	0.174	0.176	0.177	0.205

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Impact of ceiling size (infertile land) on state level investment using state-level data

The following table shows the effects of land ceilings on fixed capital formation. In this case size of the ceilings (in acres) are imposed on the basis of the land quality i.e. ceilings imposed on dry / infertile land. Investment is measured as the log of share of fixed capital to total value added and the land reform variable log is theof size of ceilings on dry land.

	Log(Fixed capital/ Value Added)					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Log (Size of ceiling on dry/ infertile land)	0.012	0.042	0.076	0.066*	0.136**	0.189***
	(0.037)	(0.047)	(0.052)	(0.061)	(0.064)	(0.066)
State Output	-0.000	0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pop. Density		-0.000*	-0.000	-0.000	-0.000	0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
% Share (ST/SC) pop.			-1.975***	-1.925***	-1.747***	-1.485***
			(0.379)	(0.460)	(0.434)	(0.428)
% Share (Rural/Urban) Pop.				0.171	0.159	0.784
				(0.512)	(0.622)	(0.572)
Literacy rate					0.007	0.007
					(0.006)	(0.005)
Soil fertility						-2.874***
						(0.934)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.527**	0.780***	0.780***	0.802***	0.010	-0.108
	(0.190)	(0.227)	(0.236)	(0.239)	(0.462)	(0.442)
Observation	416	411	411	410	372	372
R-Squared	0.101	0.108	0.176	0.177	0.183	0.208

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Impact number of Ceiling legislations on state-level investment, using state-level data.

Investment is measured as the log of share of fixed capital to total value added and the land reform variable log of number of ceilings.

VARIABLES	Log (Fixed Capital / Value Added)					
	(1)	(2)	(3)	(4)	(5)	(6)
Log (Number Of Ceiling legislations)	-0.646***	-0.662***	-0.572***	-0.564***	-0.644***	-0.618***
	(0.185)	(0.182)	(0.172)	(0.167)	(0.208)	(0.207)
Log (state Output)	-0.000	-0.000	-0.000*	-0.000**	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pop Density		0.000	-0.000	0.000	0.000	0.001*
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
% Share (ST/SC) pop.			-1.636***	-0.682	-1.590**	0.357
			(0.353)	(0.417)	(0.705)	(1.019)
% Share (Rural/Urban) Pop.				1.569***	1.757**	2.593***
				(0.440)	(0.774)	(0.828)
Literacy rate					-0.019**	-0.020**
					(0.009)	(0.009)
Soil Fertility						25.006***
						(8.751)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.712***	0.685***	1.202***	0.646***	2.377**	0.775
	(0.104)	(0.112)	(0.133)	(0.183)	(0.968)	(1.132)
Observations	236	236	236	236	222	222
R-squared	0.242	0.245	0.292	0.313	0.327	0.348

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6: Impact of no. of all land reform legislations on fixed capital investment, using state-level data.

Investment is measured as the log of share of fixed capital to value added and the land reform variable log of composite land reform. The composite land reform index is the sum total of all four land reform legislations.

VARIBLES	Ln(Fixed Capital / Value Added)					
	(1)	(2)	(3)	(4)	(5)	(6)
Ln(Composite land reform)	-0.145***	-0.152**	-0.129**	-0.163***	-0.168***	-0.278***
	(0.046)	(0.061)	(0.056)	(0.061)	(0.062)	(0.068)
Log (state Output)	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pop Density		0.000	-0.000	0.000	0.000	0.001***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
% Share (ST/SC) pop.			-1.462***	-0.998***	-0.870**	0.018
			(0.343)	(0.363)	(0.360)	(0.412)
% Share (Rural/Urban) Pop.				1.192**	1.876***	3.027***
				(0.474)	(0.563)	(0.685)
Literacy rate					-0.005	-0.001
					(0.006)	(0.006)
Soil Fertility						-4.891***
						(1.721)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.669***	0.660***	1.049***	0.744***	0.758**	0.281
	(0.105)	(0.114)	(0.160)	(0.192)	(0.372)	(0.404)
Observations	322	322	322	322	298	298
R-squared	0.166	0.166	0.215	0.232	0.249	0.274

Robust standard errors in parentheses;
*** p<0.01, ** p<0.05, * p<0.1.

Table 7: Long term Effects of ceiling size: Investment estimates using firm level data, 1996 to 2012.

Investment is measured as the log of share of fixed assets to total assets and the land reform variable log of size of ceilings on most fertile land.

VARIABLES	Ln(fixed assets/total assets)			
	(1)	(2)	(3)	(4)
Ln(ceiling for most fertile land)	9.866**	9.844**	10.268**	16.8**
	(4.377)	(4.375)	(4.527)	(6.17)
Log (total assets)	0.020	0.021*	0.030**	0.129***
	(0.012)	(0.012)	(0.013)	(0.0490)
Age of the firm		-0.001	-0.000	-0.00653**
		(0.001)	(0.001)	(0.00261)
Pop. Density				0.00435
				(0.00420)
Intangibility				0.407
				(0.615)
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
State*Year Dummy	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Constant	21.843	21.720	16.744	-3,609***
	(60.792)	(60.777)	(62.880)	(1,219)
Observations	7,127	7,127	6,409	4,186
R-squared	0.227	0.227	0.239	0.564

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Long term Effects of number of ceiling legislations: Investment estimates using firm level data, 1996 to 2012.

Investment is measured as the log of share of fixed assets to total assets and the land reform variable log of number of ceilings.

VARIABLES	Ln(fixed assets/total assets)			
	(1)	(2)	(3)	(4)
Ln(no. of Ceiling laws)	-0.568***	-0.610***	-0.558***	-0.419***
	(0.141)	(0.146)	(0.149)	(0.198)
Log (total assets)	0.111***	0.105***	0.099**	0.230
	(0.038)	(0.039)	(0.041)	(0.318)
Age of the firm		0.003*	0.004*	0.008
		(0.002)	(0.002)	(0.028)
Pop. density			0.001	0.009
			(0.003)	(0.010)
Intangibility				-0.511
				(2.082)
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
State*Year Dummy	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Constant	46.917	53.721	42.707	48.050
	(103.247)	(103.421)	(108.771)	(108.765)
Observations	1,374	1,374	1,305	1,052
R-squared	0.352	0.354	0.332	0.778

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Long term Effects of composite land reform legislations: Investment estimates using firm level data, 1996 to 2012.

Investment is measured as the log of share of fixed assets to total assets and the land reform variable log of composite land reform. The composite land reform index is the sum total of all four land reform legislations.

	Ln(fixed assets/total assets)			
VARIABLES	(1)	(2)	(3)	(4)
Ln(composite land reform)	-0.173**	-0.193**	-0.173**	-1.665***
	(0.081)	(0.082)	(0.083)	(0.477)
Log (total assets)	0.078**	0.073**	0.067**	0.081
	(0.031)	(0.031)	(0.032)	(0.293)
Age of the firm		0.003*	0.004*	0.017*
		(0.002)	(0.002)	(0.023)
Pop. density			-0.001	0.001
			(0.003)	(0.004)
Intangibility				-1.387
				(2.131)
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
State*Year Dummy	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Constant	68.344	78.051*	76.638*	87.924*
	(46.003)	(46.135)	(46.246)	(47.469)
Observations	1,562	1,562	1,493	1,097
R-squared	0.331	0.333	0.314	0.799

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Robustness 1: Fixed capital share estimates using state-level data, after controlling for labor militancy

Investment is measured as the log of share of fixed assets to value added and the land reform variable is log of size of ceilings on the most fertile land (panel A) ; log of number of ceilings (panel B) and composite land reform i.e. the sum total of all four land reform legislations (panel C). Labour militancy is measured by the number of man-days lost because of strike actions taken by the labour unions.

Panel A		Panel B		Panel C	
Variables	Fixed capital /Value added	Variables	Fixed capital /Value added	Variables	Fixed capital /Value added
Size of Ceiling (most fertile land)	0.060**	Number Of Ceilings law	-0.228***	Composite Land Reform laws	-0.079***
	(0.024)		(0.069)		(0.026)
Log (state output)	0.199	Log (state output)	0.393***	Log (state output)	0.226
	(0.144)		(0.131)		(0.138)
Pop. Density	-0.001**	Pop. Density	-0.001**	Pop. Density	-0.000
	(0.000)		(0.000)		(0.000)
% Share (ST/SC) pop.	-2.159***	% Share (ST/SC) pop.	-2.153***	% Share (ST/SC) pop.	-1.641**
	(0.648)		(0.652)		(0.685)
% Share (Rural/Urban) Pop.	-0.310	% Share (Rural/Urban) Pop.	-1.236	% Share (Rural/Urban) Pop.	-0.134
	(0.953)		(0.911)		(0.968)
Literacy rate	0.002	Literacy rate	0.007	Literacy rate	0.010
	(0.009)		(0.009)		(0.009)
Log (Labor Militancy)	0.012	Log (Labor Militancy)	-0.019	Log (Labor Militancy)	0.002
	(0.064)		(0.060)		(0.062)
Year Fixed Effects	Yes	Year Fixed Effects	Yes	Year Fixed Effects	Yes
Constant	1.889***	Constant	-2.292	Constant	-0.994
	(0.680)		(1.599)		(1.591)
Observations	386	Observations	368	Observations	368
R-squared	0.197	R-squared	0.208	R-squared	0.205

Robust standard errors in parentheses;
*** p<0.01, ** p<0.05, * p<0.1.

Table 11: Robustness 2: Estimates of fixed capital using firm-level data, after dropping West –Bengal and Kerala i.e. two most land reform intensive states.

The composite land reform index is the sum total of all four land reform legislations.

Panel A: State- level Results

Variable	Ln(Fixed capital/ Value Added)
Ln(Composite land reform)	-0.361***
	(0.0765)
Log (state Output)	-4.91e-07**
	(2.09e-07)
Pop Density	0.00109***
	(0.000391)
% Share (ST/SC) pop.	-0.0637
	(0.440)
% Share (Rural/Urban) Pop.	2.793***
	(0.724)
Literacy rate	0.0117
	(0.00902)
Soil Fertility	-5.716***
	(1.828)
Year Fixed Effects	Yes
Constant	-0.271
	(0.541)
Observations	257
R-squared	0.333

Robust standard errors in parentheses;
*** p<0.01, ** p<0.05, * p<0.1.

Panel B: Firm-level results

Variable	Ln(fixed assets/total assets)
Ln(composite land reform)	-0.189**
	(0.0751)
Log (total assets)	0.0513**
	(0.0245)
Age of the firm	0.00421***
	(0.00147)
pop_density	0.00753
	(0.00700)
Year FE	Yes
State FE	Yes
State*Year Dummy	Yes
Constant	106.5***
	(38.58)
Observations	1,347
R-squared	0.087

Robust standard errors in parentheses;
*** p<0.01, ** p<0.05, * p<0.1.

Table 12: Robustness 3: Estimates of fixed capital using firm-level data, after controlling for the city dummy.

Investment is measured as the log of share of fixed assets to total assets and the land reform variable is composite land reform i.e. the sum total of all four land reform legislations.

Variable	Share Fixed Capital			
	(1)	(2)	(3)	(4)
Composite land reform	-0.147***	-0.147***	-0.103**	-0.232**
	(0.051)	(0.050)	(0.051)	(0.092)
Log (total assets)		-0.034	0.002	0.064
		(0.482)	(0.483)	(0.536)
Age of the firm			-0.065***	-0.060***
			(0.015)	(0.016)
Pop. Density				0.002
				(0.002)
Industry Fixed Effects	Yes	Yes	Yes	Yes
City Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Constant	9.871***	9.978***	10.537***	8.918***
	(1.812)	(2.321)	(2.321)	(2.262)
Observations	1,628	1,628	1,628	1,541
R-squared	0.151	0.151	0.156	0.152

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 13: Heterogeneous effects of ceiling size: Investment estimates using firm level data, 1996 to 2012

Investment is measured as the log of share of fixed assets to total assets and the land reform variable is the log of size of ceilings on most fertile land. Land intensity is based on land held as a share of total assets of all sample firms. Firms are classified as more land intensive if they are above the median land intensity and less land intensive if they are below the median land intensity. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

VARIABLES	Log(Fixed assets/Total assets)					
	(1)	(2)	(3)	(4)	(5)	(6)
Ln(size of ceilings)	-0.555***	-0.559***	-0.562***	-0.559***	-0.584***	-0.333***
	(0.074)	(0.074)	(0.074)	(0.077)	(0.087)	(0.096)
Log(total assets)		0.050***	0.047***	0.045***	0.031**	0.034***
		(0.011)	(0.011)	(0.012)	(0.013)	(0.013)
Age of the firm			0.002**	0.002**	0.003***	0.003***
			(0.001)	(0.001)	(0.001)	(0.001)
Pop. density				-0.000	0.000	0.000
				(0.000)	(0.000)	(0.000)
Industry meanland intensity					0.000***	0.001***
					(0.000)	(0.000)
LandReform*Meanland						-0.000***
						(0.000)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Constant	4.435***	3.929***	3.917***	3.943***	3.507***	2.812***
	(0.194)	(0.227)	(0.226)	(0.233)	(0.277)	(0.296)
Observations	6,444	6,444	6,444	6,392	5,372	5,372
R-squared	0.019	0.026	0.027	0.026	0.031	0.035

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 1. Location of sample firms across Indian states

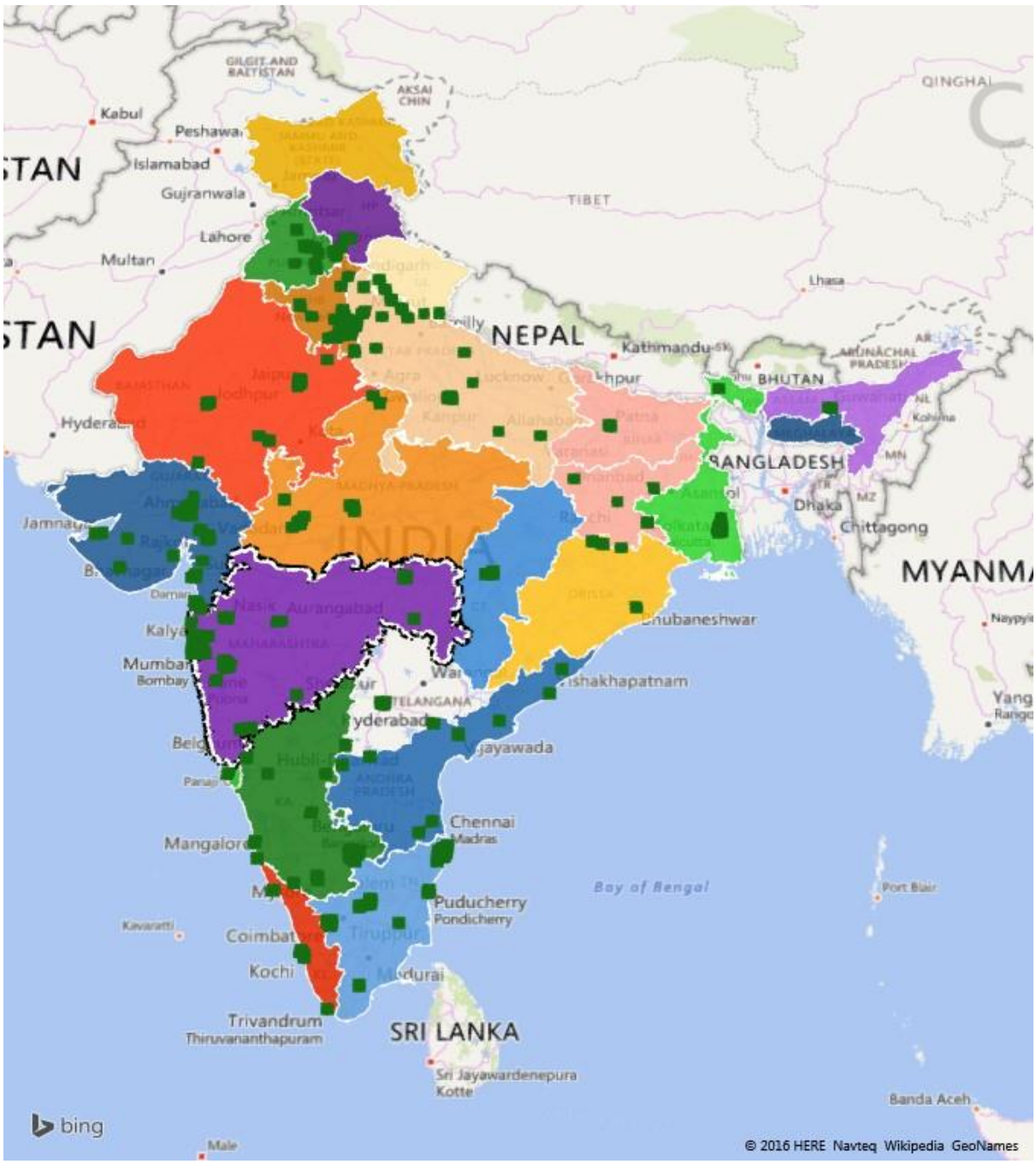


Figure 2. Local polynomial kernel fit: Relation between size of cultivable land and ceiling size

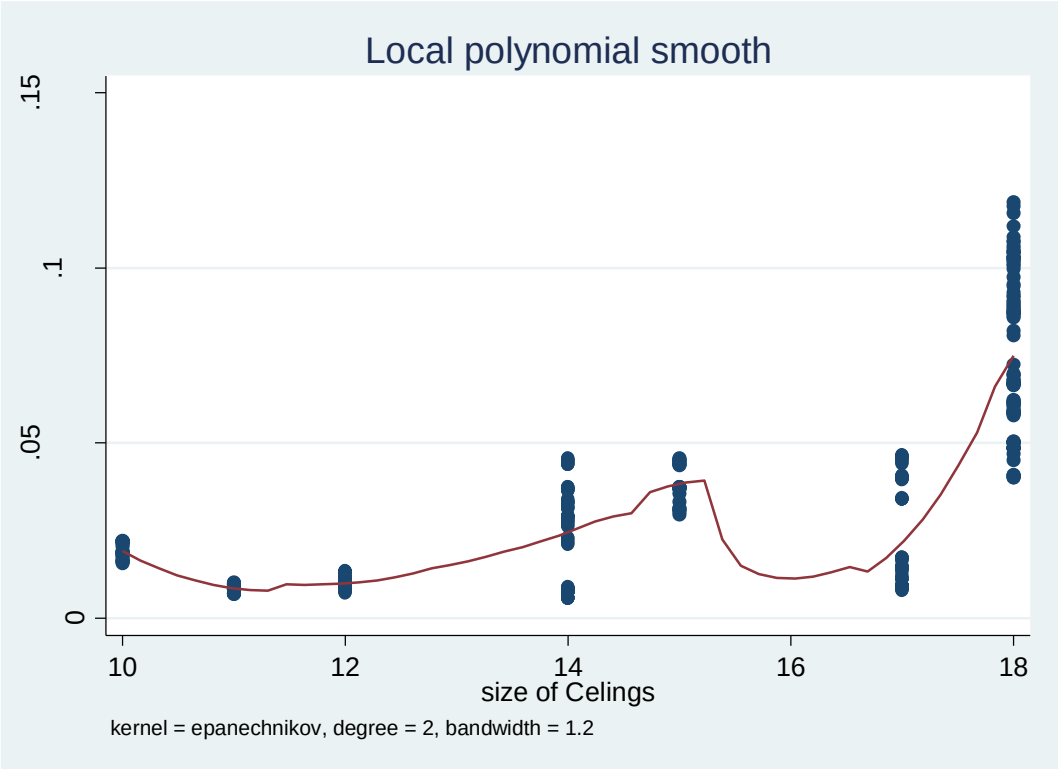
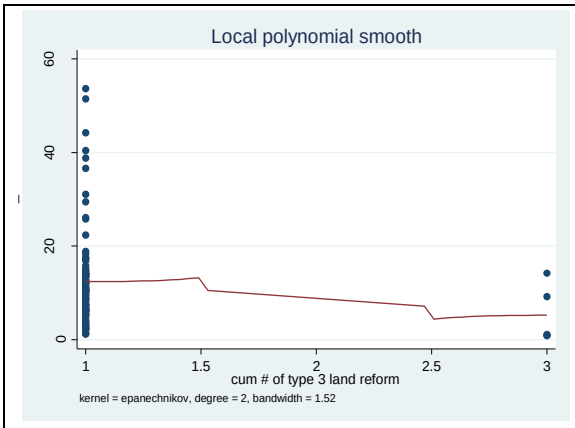
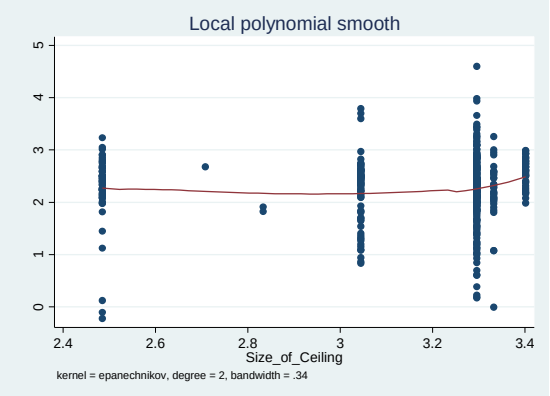


Figure 3: Local polynomial kernel fit: Relation between fixed investment and land (size and number of legislations)



Panel a: Fixed investment and ceiling legislations



Panel b: Fixed investment and ceiling size

Appendix Table A1. Property Prices in Urban India

Table 1: Price of Property and Land in Urban Areas (2001-11)

City	Price Per Square Foot, Average 2007-10			Possible Price of Land in Rs Crore/Acre		Citywide Price Index	
	Average	Lowest Zone	Highest Zone	Lowest Zone	Highest Zone	In 2007 (2001 = 100)	In 2011, Quarter 4 (2007 = 100)
Mumbai	7,319	2,576	39,702	10.3	252.9	268	193
Bangalore	5,826	5,671	10,140	30.6	59.8	313	100
Delhi	5,405	3,709	12,289	17.7	73.8	298	167
Chennai	3,728	2,591	4,744	10.4	24.5		296
Kochi	3,345	2,249	7,262	8.2	40.9		82
Pune	3,122	2,981	3,254	13.0	14.8		184
Hyderabad	2,949	2,312	3,435	8.6	15.9		79
Faridabad	2,915	2,081	4,007	7.1	19.7		218
Kolkata	2,471	1,747	4,235	4.9	21.2	237	190
Ahmedabad	2,460	1,235	2,851	1.6	12.1		167
Jaipur	2,442	1,215	3,904	1.4	19.0		64
Patna	2,169	2,016	2,715	6.7	11.2		140
Bhopal	2,146	1,534	5,964	3.5	32.5	260	211
Lucknow	2,006	1,641	2,407	4.2	9.2		165
Surat	1,911	1,661	2,411	4.4	9.3		152

"Possible price of land" calculated using the following assumptions: FSI of 1.5, construction cost of Rs 1,000 per sq ft in 2007-10, and land cost = finished price – construction price.
Source: Calculated from detailed RESIDEX data provided by Government of India officers. The summary indexed data are publicly available at www.nhb.org.in/Residex/Data&Graphs.php

Table A2: Size of ceilings (in Acres) as levied by different Indian states based on the quality/fertility of the land.

Table 17.1 Ceilings on Landholdings

(In Acres)

State	Irrigated Land with Two Crops	Irrigated Land with One Crop	Dry Land
(1)	(2)	(3)	(4)
As recommended in 1972 National Guidelines	10-18	27	54
Proposed in Agenda Notes 1985 of Regional Minister's Conference	12	18	30
Andhra Pradesh	10 to 18	15 to 27	35 to 54
Assam	17	17	17
Bihar	15 to 18	25	30 to 45
Gujarat	10 to 18	15 to 27	20 to 54
Haryana	18	27	54
Himachal Pradesh	10	15	30 to 70
Jammu & Kashmir	9 to 12.5	9 to 12.5	15 to 23 (in Ladakh 19)
Karnataka	10 to 20	25 to 30	54
Kerala*	12 to 15	12 to 15	12 to 15
Madhya Pradesh	18	27	54
Maharashtra	18	27	54
Manipur	12	12	15
Mizoram	nil	nil	nil
Odisha	10	15	30 to 45
Punjab	17	27	51
Rajasthan	18	27	54 to 175
Tamil Nadu	12	30	60
Sikkim	12.5	12.5	50
Tripura	10	10	30
Uttarakhand	18	27	45
Uttar Pradesh	18	27	45
West Bengal	12	12	17
Andaman & Nicobar Islands	nil	nil	nil

Source: Department of Land Resources, New Delhi.

Note: 1. The actual limits for lands in Karnataka and Uttar Pradesh are higher due to classification of land.

2. The actual ceiling limits in Himachal Pradesh and Rajasthan are higher due to hilly terrain and desert lands.

3. 1 Acre = 0.404686 Hectare.