An Unintended Consequence of Historical Land Ceiling Legislations: Impact on Land Acquisition and Corporate Investment in India

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Motivation

- Corporate investment is key for economic growth and development.
- The standard development economics literature identifies a number of constraints for investment and industrialisation:
  - **Supply bottlenecks**: lack of access to credit, marketing, infrastructure, educated labor force or technological support structure
  - **Demand bottlenecks**: Low savings, weak domestic demand or export prospects
  - Excessive **government controls** and coordination failures.
- More recently, 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 countries
- In this context, we aim to assess the impact of the historical land ceiling legislations on corporate investment in India.

Case study of India

- Land policy has been a major economic issue in India ever since independence.

- More recently, as India strives for economic growth through liberalisation and industrialisation, access to land for industrialisation becomes a key issue:

  ◦ The tussle between farmers and industrialists/governments has often become a politically explosive issue, sometimes leading to political unrest and violence.

  ◦ **Tata Nano Singur Controversy:** The project initiated in 2007 required takeover of 997 acres (4.03 km2) of farmland to have Tata build its factory. This was apposed by environmental activists, farmers and opposition party in West Bengal. Finally, Tata had to pull out and recolate to Gujarat in 2008.
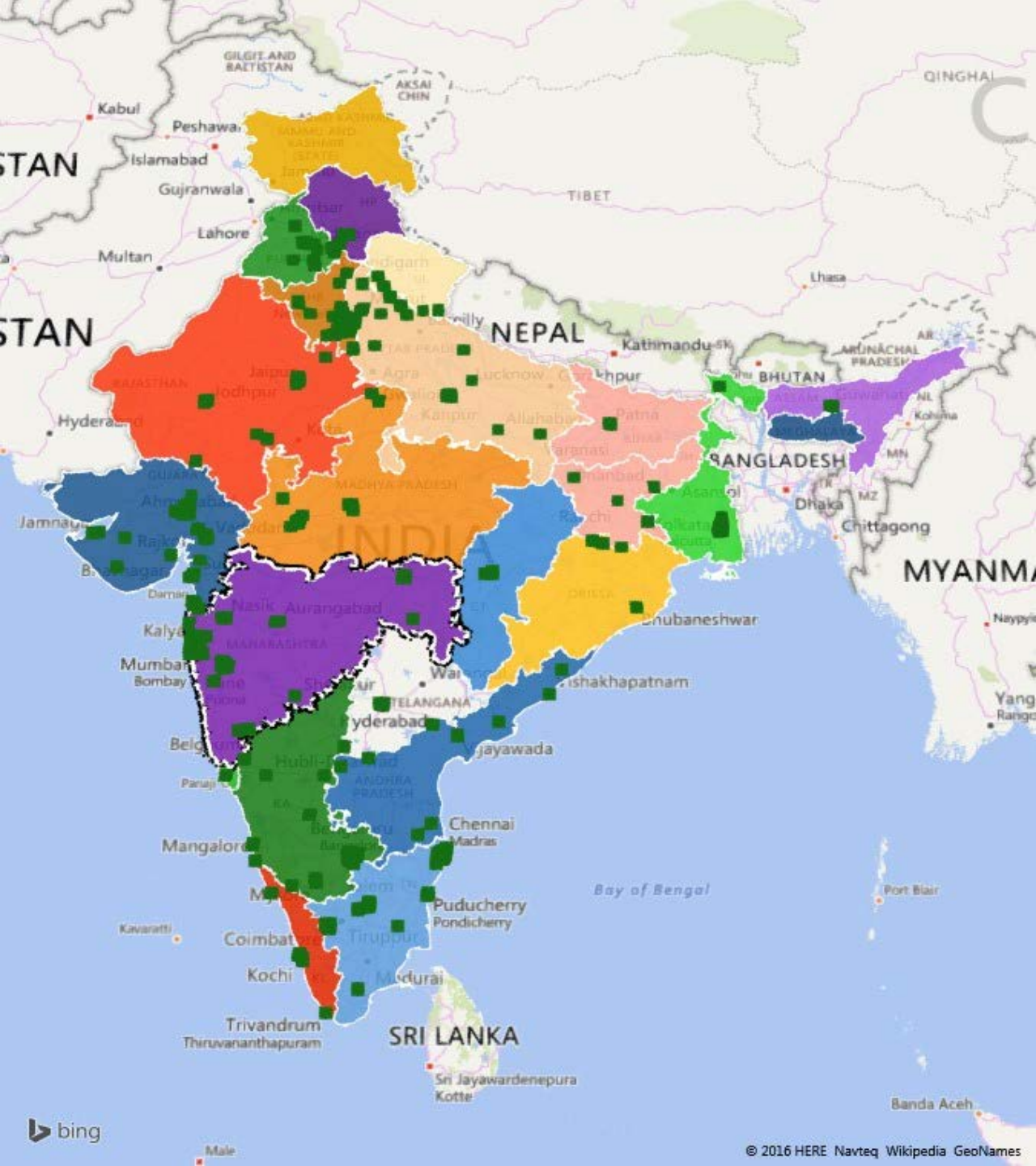
The Green dots represent the location of a firm in a state. Clearly, there is a lot of clustering in the western states of Gujarat, Maharashtra, and also in and around Delhi/Haryana/Punjab.

We want to examine if this is linked to the historical land ceiling legislations enacted between 1960-85 across the states

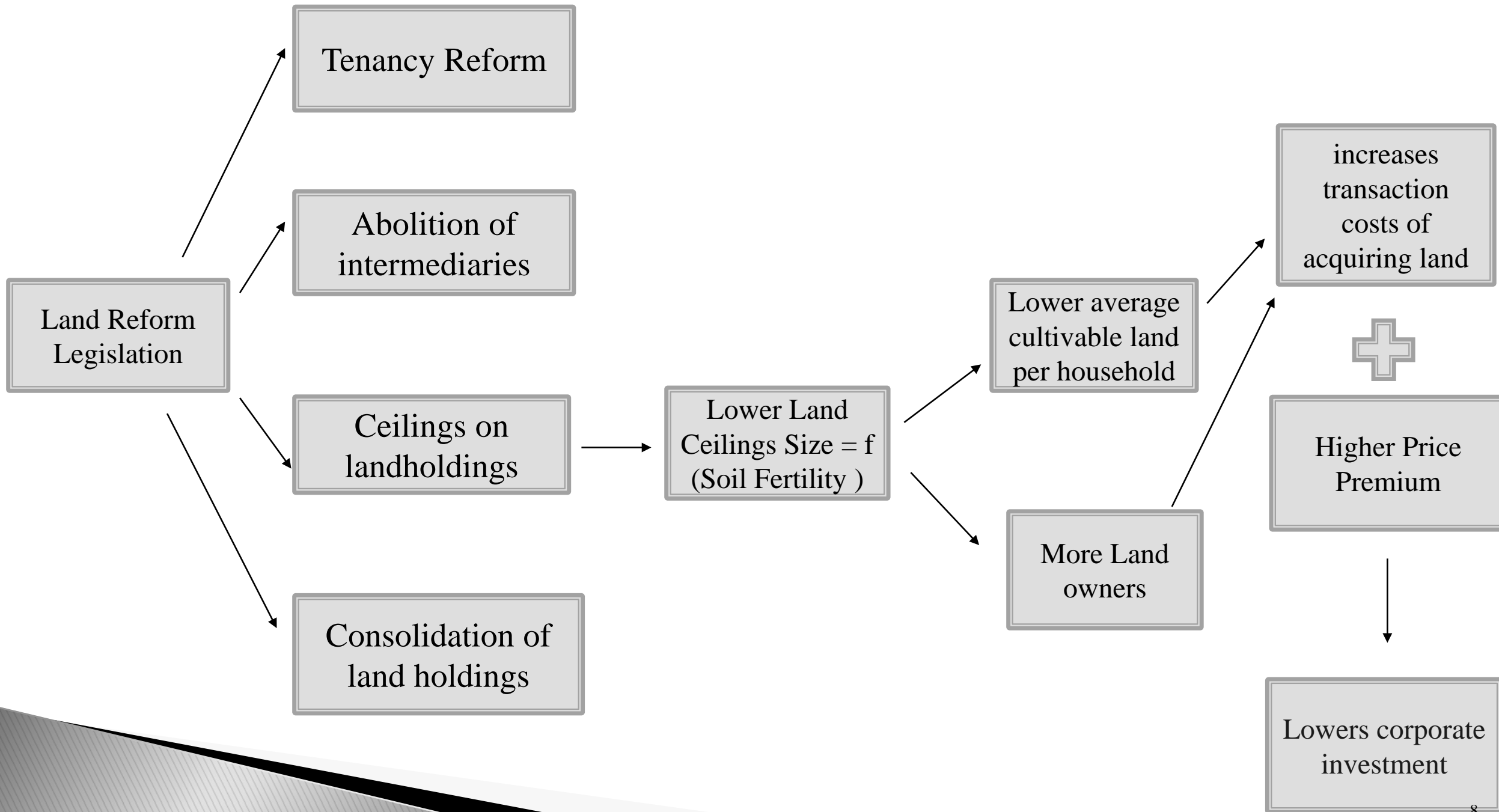| State	Cumulative land legislations	State_Rank
West Bengal	15	9
Kerala	9	8
Karnataka	8	7
Tamil Nadu	7	6
Uttar Pradesh, Haryana	5	5
Gujarat	4	4
Madhya Pradesh	3	3
Maharashtra	2	2
Rajasthan, Punjab	1	1

Land reform in India : A background

- At the time of independence, Zamindari system (System of Land taxes), unequal land distribution and expropriation of tenants were a common phenomena.
  - In a land-scarce country with a significant population below the poverty line, there was an obvious argument in favour re-distribution.
  - Two important economic arguments in favour of land re-distribution : **Equality** (Banerjee, 1999) and **efficiency** (Shaban, 1987)

- In 1949 state governments were given the right to adopt and implement land reform legislations: ceiling on land holding and redistribution of excess land, abolition of intermediaries, tenancy reform.
  - This led to variation in the implementation of these reforms across states and over time.
  - Most legislations were passed during 1960-85

- 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.

Indian Land reform legislations

- Besley & Burgess (2000) classified land reform legislations into following components:
  - 1. Tenancy Reform: giving longer tenure rights to tenants
  - 2. Abolition of intermediaries : abolishing the system of collecting taxes
  - 3.Ceilings on landholdings: fixing maximum size of land holding that an individual/family can own and giving the surplus away.
  - 4. Consolidation of land holdings: it is a planned readjustment and rearrangement of land parcels and their ownership.
- Our analysis particularly focuses on land ceilings component 3 which causes land fragmentation and in turn raises barriers for acquisition of land.
- We exploit the inter-state exogenous variation in land ceiling size across the Indian states and explore its possible impact on land acquisition for industries and infrastructure and the resultant effect on corporate investment.

Land ceiling legislations

- Our analysis particularly focuses on land ceiling legislations that aimed at redistributing surplus land to the landless.

- Land ceilings were imposed by state governments depending on various criteria such as family size, number of crops cultivated that indirectly depends on land fertility.

- In 1972, to bring out uniformity land ceilings were based on the quality of the soil and land was categorised as:

1. Most fertile land (land cultivated with two crops)
2. Less fertile land (land cultivated with one crops) and
3. Dry land

- We exploit the exogenous variation in soil fertility across the Indian states for identification as this was the basis of the land ceiling legislations.

- Our identification mechanism relies on the fact that the ceiling size is beyond the control of the state authority. This is because, by and large, land ceilings were determined by the share of food crops before 1971 and by the quality of the soil from 1971onwards. Neither characteristic can be changed by the state government since the choice of crops grown on a plot is a decision of the land user, and soil quality is determined by the nature and historical state boundaries. As such land ceiling sizes can be considered exogenous.

Tenancy Reform

Abolition of intermediaries

Land Reform Legislation

Ceilings on landholdings → Lower Land Ceilings Size = f (Soil Fertility) → Lower average cultivable land per household → increases transaction costs of acquiring land

More Land owners

Higher Price Premium

Consolidation of land holdings

Lowers corporate investment

Transaction costs of land acquisition

▸ **Consents from multiple landowners:**
more landowners to get the consents from in states with more lower land ceiling size (and hence more fragmented land caused by the lower ceiling size). This may enhance the 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.

▸ **Price Premium:** Once a firm acquires a substantial number of parcels of the plot it wants to buy, the landowners of the remaining parcels, knowing that it is costly for the firm to engage in multiple new transactions for a different plot, may refuse to sell or demand a premium – a rent – above the market price of their land.

▸ **Unfair Land compensation** depends on the **market value of the land, which is likely to be higher if soil fertility is higher** (Singh 2016). The land price may rocket if there is more population pressure on the fertile (as opposed to the infertile) land.

▸ **Public protests** about unfair compensation schemes are common which not only delays the project, but also add to the costs.
  - The compensation for the acquired land is based on the value of the agricultural land, which ignores the price increases, thus depriving the current owners.

Hypotheses

▸ 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.

▸ Since the boundaries of the sixteen major states have not changed over 1960-85, we argue that lower the ceiling, the more fragmented the land is so that more surplus land is generated for distribution in more fertile state.

▸ The latter means that the average size of landholding is lower in the states with lower land ceilings (i.e., those with more fertile land) so that land gets distributed in the hands of many owners. In other words, transaction costs of acquiring land for industrial and investment purposes tend to be higher in states with low land ceilings, thus obstructing investment in these states. Accordingly we hypothesize:

Taken together we hypothesize:

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

Preview of Results:

▸ Results provide support to our central hypothesis: states with lower land ceiling size have significantly lower share of fixed and total capital

▸ We shows that the implementation of the land ceiling legislations had increased the transaction costs of buying land and also the price premium firms pay when acquiring land, thus inducing firms to invest less in fixed and total capital.

▸ The detrimental ceiling effect is more pronounced when the ceiling size is more restrictive as for the most fertile land and for the firms operating in more land-intensive heavy industries that requires more land.

▸ These results hold for the state-level (1960-85) and persists in the long run for firm-level (1996-2012) analysis.

▸ We thus identify an unintended consequence of land ceilings for economic growth in the Indian states.

Data

- State-level data for the period 1960-1985 have been compiled from various sources. We get land reforms variables from Besley & Burgess (2002).
- We obtain investment data from Indian Annual Survey of Industries (ASI).
- Other historical state-level characteristics are obtained from the World Bank
- Firm-level data for listed firms is obtained from Orbis (Bureau van Djik)
  - We have a panel of 1903 firms observed for the period 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. To this we add/merge data on state-level land reform measures available from Besley and Burgess (2002).

Measures of investment

➤ We use two measures of investment.

➤ First, we use fixed capital output ratio as a proxy for investment in fixed capital at the state-level. Fixed capital 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)) and we calculate fixed capital as a share of total value added.

➤ Second, we also consider share total capital as a ratio of total value added and consider this to be a proxy for investment in total capital; note that total capital is the sum of fixed and working capital.

➤ We consider fixed capital as a ratio of total assets and total capital as a ratio of total assets as measures of investment, in order to make our state-level results comparable to the firm-level ones.

➤ 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.

Measures of land-reform

- In order to test our hypotheses, we construct the following measures:
  - First, **Size of ceiling** on most fertile land : Since we aim to assess the adverse effect of low ceilings on corporate investment and the lowest possible ceilings are on the most fertile land.
  - Second, **average ceilings size** which is the simple mean of ceiling size of a state at a given time on all kinds of land i.e. most fertile land; less fertile land and dry /infertile land.
  - Data is collected from the Department of Land Resource, Government of India. It was made available in the Agriculture Statistics.
- These independent variables remain same for the two analysis (State-level and Firm- Level Analysis)

Baseline Regression: State-level analysis

▸ Our simple baseline regression for the s-th state in t-th year (1960-1985) is of the following form:

▸ $Y_{st} = \alpha_0 + \alpha_1(Most\ fertile\ Ceiling_{st}) + \alpha_2 X_{st} + \sum \tau_t + \epsilon_{st}$

▸ Where Y_{st} is a measure of investment in fixed and total capital shares state s at time t, *Most fertile ceilings* is the key explanatory variable indicating the size (in acres) of the administrative ceiling imposed on most fertile land.

▸ Xst is the set of various state level controls that may also affect capital investment decision, and

▸ τt captures the unobserved years specific factors (i.e., political changes, policy changes over time) that may also influence investment with a view to minimise the omitted variable bias of our estimates, if any.

▸ In an alternative specification, we replace the ceiling size for the most fertile land with the average ceiling size in operation in the s-th state in t-th year

Baseline Regression: firm-level analysis

‣ Our simple baseline regression for the i-th firm, s-th state in t-th year (1996-2012) is of the following form:

$$H1: Y_{ist} = \beta_0 + \beta_1(Most\ fertile\ Ceilings_{st}) + \beta_2 Z_{ist} + \sum S_j + \sum \tau_t + \epsilon_{ist}$$

‣ Where Y_{ist} is a measure of corporate investment in fixed and total capital for firm i, in state s at time t.

‣ As with the statelevel analysis, we consider the share of fixed and total capital investment in the firm as the two possible outcome variables. While share of fixed capital is proxied by gross fixed assets as a share of total assets, total capital is the sum of fixed and working capital (measured by the current liability provisions).

‣ Z represents the a set of firm-level controls such as firm size (log of total assets), age of the firm in year since the date of incorporation and also the identity of the controlling owner (private or state controlled) of the firm. τ the unobserved year-specific factors (capturing e.g., government turnover or policy changes) and S the unobserved state-specific factors (capturing e.g., soil fertility, population density and other possible state-level factors) that may also influence investment.

Table 3: Impact of ceiling size (most fertile land) on state level share fixed capital using state-level data.

The table shows the effects of land ceiling size on fixed capital formation. In this case we consider the ceiling size (in acres) imposed on the most fertile land. Investment is measured as the share of fixed capital to total value added at the state level.

VARIABLES	Share of Fixed Capital						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ceiling size: Most fertile land	0.026*	0.029**	0.027*	0.031**	0.035**	0.039***	0.077***
	(0.014)	(0.014)	(0.015)	(0.014)	(0.014)	(0.014)	(0.017)
Net state domestic product		-0.001	-0.000	-0.000	-0.002	-0.002	-0.006**
		(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Population 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				-1.793***	-1.419***	-1.299**	-0.538
				(0.454)	(0.541)	(0.540)	(0.572)
Urban pop share					1.356*	1.362	3.033***
					(0.742)	(0.840)	(0.878)
Literacy rate						0.002	-0.000
						(0.008)	(0.008)
Soil fertility							-5.929***
							(1.587)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.573***	1.548***	1.634***	1.993***	1.627***	1.620**	1.236*
	(0.289)	(0.289)	(0.310)	(0.316)	(0.388)	(0.681)	(0.669)
Observations	416	416	411	411	410	372	372
R-squared	0.123	0.123	0.127	0.153	0.162	0.164	0.198

Robust standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The table shows the effects of ceiling size on most fertile land on investment in fixed capital (as share of total value added).

Table 4: Impact of ceiling size (most fertile land) on share total capital at the state-level

VARIABLES	Share of total capital						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Most fertile ceilings	0.007	0.013	0.016	0.022	0.022	0.020	0.059***
	(0.016)	(0.016)	(0.017)	(0.015)	(0.015)	(0.015)	(0.016)
Net state domestic product		-0.003	-0.003*	-0.003	-0.003	-0.005*	-0.008***
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Population 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				-2.545***	-2.506***	-2.921***	-2.164***
				(0.465)	(0.558)	(0.602)	(0.626)
Urban pop share					0.258	0.601	2.266**
					(0.776)	(0.844)	(0.881)
Literacy rate						-0.010	-0.012
						(0.008)	(0.007)
Soil fertility							-5.910***
							(1.577)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	3.150***	3.083***	2.996***	3.506***	3.493***	4.627***	4.244***
	(0.329)	(0.332)	(0.348)	(0.349)	(0.446)	(0.710)	(0.717)
Observations	416	416	411	411	410	372	372
R-squared	0.114	0.119	0.125	0.172	0.174	0.203	0.234

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The table shows the effects of ceiling size on most fertile land on investment in total capital (as share of total value added).

Table 5: Impact of average ceiling size on fixed capital share using state-level data.

| VARIABLES | Share of fixed capital | | | | | | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Average Ceilings Size	0.007*	0.007*	0.005	0.010**	0.009*	0.011**	0.014***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
Net state domestic product		-0.001	-0.000	-0.000	-0.001	-0.001	-0.003
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Population 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				-2.036***	-1.778***	-1.609***	-1.243**
				(0.469)	(0.604)	(0.606)	(0.616)
Urban pop share					0.803	0.836	1.661*
					(0.823)	(0.924)	(0.916)
Literacy rate						0.004	0.002
						(0.008)	(0.008)
Soil fertility							-3.579***
							(1.371)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.789***	1.787***	1.882***	2.202***	2.081***	1.831***	1.875***
	(0.224)	(0.225)	(0.254)	(0.258)	(0.288)	(0.651)	(0.647)
Observations	416	416	411	411	410	372	372
R-squared	0.122	0.122	0.123	0.154	0.158	0.162	0.178

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The table shows the effects of average land ceilings on fixed capital investment. In this case size of the ceilings (in acres) is an average of ceilings imposed on all kinds of land. Investment is measured as the share of fixed capital to total value added.

Table 6: Impact of average ceiling size on total capital share using state-level data.

VARIABLES	Share of total capital						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Average Ceilings Size	-0.008**	-0.007*	-0.006	0.001	0.000	-0.000	0.003
	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Net state domestic product		-0.002	-0.002	-0.002	-0.002	-0.004*	-0.006**
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Population Density			0.000	0.000	0.000	0.000	0.001**
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SC/ST pop. share				-2.512***	-2.512***	-2.929***	-2.546***
				(0.482)	(0.604)	(0.642)	(0.647)
Urban pop share					0.102	0.544	1.407
					(0.825)	(0.913)	(0.916)
Literacy rate						-0.011	-0.013*
						(0.008)	(0.008)
Soil fertility							-3.747**
							(1.468)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	3.478***	3.471***	3.413***	3.808***	3.855***	4.974***	5.020***
	(0.250)	(0.251)	(0.282)	(0.292)	(0.343)	(0.703)	(0.705)
Observations	416	416	411	411	410	372	372
R-squared	0.120	0.123	0.126	0.169	0.170	0.200	0.216

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The table shows the effects of average land ceilings on total capital share. In this case size of the ceilings (in acres) is an average of ceilings imposed on all kinds of land. Investment is measured as the share of fixed capital to total value added.

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

VARIABLES	(1) Fixed capital/ta	(2) Total capital/ta	(3) Fixed capital/ta	(4) Total capital/ta
Most fertile ceilings	-0.00384**	0.0196***		
	(0.00186)	(0.00388)		
Average Ceilings Size			0.00139*	0.00927***
			(0.000842)	(0.00180)
Log(total assets)	-0.0859***	-0.153***	-0.0853***	-0.153***
	(0.00644)	(0.0162)	(0.00646)	(0.0162)
Age	-0.000521	0.0117***	-0.000588	0.0116***
	(0.000470)	(0.00180)	(0.000468)	(0.00181)
Private ownership	-0.0471**	0.222*	-0.0401*	0.194*
	(0.0227)	(0.121)	(0.0228)	(0.117)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Constant	2.139***	2.695***	2.041***	2.728***
	(0.114)	(0.246)	(0.114)	(0.247)
Observations	4,835	1,116	4,835	1,116
R-squared	0.481	0.675	0.481	0.674

Robust standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Investment is measured by the share of fixed and total capital to total assets respectively.

Table 8: Robustness 1: Fixed and total capital shares estimates using state-level data, after controlling for labour militancy.

VARIABLES	(1) Fixed capital	(2) Total Capital	(3) Fixed capital	(4) Total Capital
Most Fertile Ceilings	0.066***	0.060***		
	(0.019)	(0.018)		
Average ceilings			0.009*	0.001
			(0.005)	(0.005)
Net state domestic product	-0.006**	-0.008***	-0.004	-0.007***
	(0.003)	(0.002)	(0.003)	(0.002)
Population density	-0.000	0.001*	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Share ST/SC Pop	-1.270*	-2.144***	-1.952***	-2.768***
	(0.746)	(0.807)	(0.710)	(0.767)
Urban pop share	2.155*	2.186*	0.892	1.042
	(1.163)	(1.220)	(1.077)	(1.140)
Literacy rate	-0.006	-0.012	-0.006	-0.016*
	(0.009)	(0.009)	(0.008)	(0.009)
Soil fertility	-5.326***	-5.850***	-3.158**	-3.496**
	(1.678)	(1.690)	(1.419)	(1.534)
Log (man days lost)	0.063	0.012	0.076*	0.039
	(0.044)	(0.048)	(0.041)	(0.045)
	(0.663)	(0.667)	(0.676)	(0.675)
Year FE	Yes	Yes	Yes	Yes
Constant	1.546**	4.134***	2.199***	5.011***
	(0.682)	(0.740)	(0.654)	(0.727)
Observations	368	368	368	368
R-squared	0.206	0.229	0.189	0.211

Robust standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Investment is measured respectively by the share of fixed capital to value added and total capital to value added. Labour militancy is measured by the number of man-days lost because of strike actions taken by the labour unions per year. Columns (1) and (2) show the estimates using ceiling size for most fertile land while columns (3) and (4) show those using average ceilings in the sample states.

Table 9: Robustness 2: Fixed and total capital share estimates using firm-level data, after controlling for the city dummies

VARIABLES	(1) Fixed capital share	(2) Total capital share	(3) Fixed capital share	(4) Total capital share
Most fertile land ceiling	0.00422** (0.00189)	0.0201*** (0.00397)		
Average Ceilings Size			0.00114 (0.000866)	0.00967*** (0.00186)
Log(total assets)	-0.0862*** (0.00645)	-0.157*** (0.0161)	-0.0854*** (0.00646)	-0.157*** (0.0161)
Age	-0.000143 (0.000504)	0.0134*** (0.00185)	-0.000305 (0.000501)	0.0133*** (0.00185)
Private ownership	-0.0469** (0.0227)	0.324** (0.127)	-0.0400* (0.0228)	0.300** (0.123)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Constant	2.190*** (0.115)	2.628*** (0.247)	2.084*** (0.115)	2.656*** (0.247)
Observations	4,835	1,116	4,835	1,116
R-squared	0.481	0.679	0.481	0.678

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

Table 10: Robustness 3: Fixed and total capital shares estimates using firm-level data, after dropping West Bengal and Kerala (two most land reform intensive states)

Panel A: State-level data

VARIABLES	(1) Share fixed capital	(2) Share total capital	(3) Share fixed capital	(4) Share total capital
Most Fertile Ceiling size	0.102***	0.073***		
	(0.018)	(0.017)		
Average ceilings			0.0230***	0.00529*
			(0.00617)	(0.00634)
Net state domestic product	-0.000***	-0.000***	-0.00404	-0.00705***
	(0.000)	(0.000)	(0.00257)	(0.00251)
Population	0.000	0.001**	1.96e-05	0.000880**
Density				
	(0.000)	(0.000)	(0.000457)	(0.000380)
Share SC/ST	-1.560**	-2.605***	-2.652***	-2.910***
	(0.633)	(0.725)	(0.762)	(0.834)
Urban pop share	1.440	1.598*	-0.605	0.751
	(0.883)	(0.937)	(1.017)	(1.120)
Literacy rate	0.018**	-0.002	0.0230***	-0.00141
	(0.008)	(0.009)	(0.00713)	(0.00873)
Soil fertility	-6.153***	-6.431***	-3.200**	-4.017***
	(1.574)	(1.612)	(1.375)	(1.504)
Year FE	Yes	Yes	Yes	Yes
Constant	-0.117	2.771***	0.930*	3.788***
	(0.592)	(0.677)	(0.494)	(0.624)
Observations	322	322	322	322
R-squared	0.242	0.260	0.219	0.234

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

VARIABLES	Panel B: Firm-level data			
	(1) Fixed capital share	(2) Total capital share	(3) Fixed capital share	(4) Total capital share
Most fertile land ceiling	-0.00668***	0.0129***		
	(0.00189)	(0.00458)		
Average Ceilings Size			-0.000105	0.00730***
			(0.000938)	(0.00235)
Log(total assets)	-0.0996***	-0.154***	-0.0982***	-0.156***
	(0.00701)	(0.0175)	(0.00703)	(0.0175)
Age	0.000165	0.0158***	-0.000150	0.0159***
	(0.000534)	(0.00236)	(0.000532)	(0.00233)
Private ownership	-0.0968***	0.20	-0.0860***	0.217
	(0.0253)	(0.137)	(0.0257)	(0.136)
Industry FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Constant	2.177***	-0.0657	2.076***	1.541***
	(0.119)	(0.347)	(0.119)	(0.421)
Observations	4,274	997	4,274	997
R-squared	0.487	0.677	0.485	0.678

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

Heterogeneous impact

- We also consider the distribution of land intensity as defined by the land held as a share of total assets of all sample firms to classify them into high/low land intensity firms depending on whether they are above/below the median land intensity of the particular industry.

- Firms above the median industry-level land intensity are called high land-intensive firms and vice versa for the firms below the median land intensity as indicated by the dummy variable HighLandIntensity.

- We then run regression the following regression to see if there is any heterogeneous impact of the ceiling size on these two groups of firms:

- $Y_{ist} = \beta_0 + \beta_1(MostFertileCeilings_{st}) + \beta_2 * HighLandIntensity + \beta_{12} * MostFertileCeilings_{st} * HighLandIntensity + \beta_3 Z_{ist} + \sum S_j + \sum \tau_t + \sum I_k + \varepsilon_{ist}$

- The coefficient of interest for us is the estimated value of β_{12} that accounts for the effect of the ceiling size for the most fertile land on the investment in fixed and total capital depending on whether the firm has high/low land intensity.

Table 11: Heterogeneous effects of ceiling size on higher land-intensive firms: Investment in fixed and total capital share estimates using firm level data

VARIABLES	(1) Fixed capital	(2) Total capital	(3) Fixed capital	(4) Total capital
Most fertile ceiling size	-0.0214***	0.00105		
	(0.00635)	(0.0187)		
High land intensity	-0.308***	-0.560	-0.208**	-0.260
	(0.0982)	(0.355)	(0.0821)	(0.221)
High land intensity*Most fertile ceiling	0.0182***	0.0199		
	(0.00660)	(0.0206)		
Average ceilings			-0.00393*	0.00802*
			(0.00234)	(0.00423)
High land intensity*Average ceiling			0.00556**	0.00141
			(0.00242)	(0.00499)
Firm size	-0.0863***	-0.157***	-0.0857***	-0.156***
	(0.00645)	(0.0163)	(0.00648)	(0.0163)
Firm age	-0.000480	0.0111***	-0.000534	0.0113***
	(0.000472)	(0.00210)	(0.000470)	(0.00204)
Private ownership	-0.0473**	0.228*	-0.0414*	0.198*
	(0.0227)	(0.122)	(0.0228)	(0.118)
Industry FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Constant	2.462***	3.058***	2.221***	3.017***
	(0.160)	(0.428)	(0.139)	(0.371)
Observations	4,835	1,116	4,835	1,116
R-squared	0.105	0.259	0.110	0.271

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

Investment is measured as the share of fixed assets to total assets in columns (1) and (3) and share total capital to total assets in columns (2) and 4. A firm has high land intensity if its land to assets ratio is greater than the corresponding industry-level median land to assets ratio. The coefficient of particular interest is the interaction between the ceiling size variable and the high land intensity variable that helps us to capture the effect of land ceiling size on heterogeneous firms with high/low land intensity

Concluding comments

- We find that the lower the size of land ceilings in a state, the lower is the size of fixed and total capital shares.
  - This holds for the historical state-level data 1960-1985.
  - It also persists at the firm-level during 1996-2012 which we refer to as the long-term effect.
- We show 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.
  - We thus argue that the adverse effects of lower land ceilings arise from the higher transaction costs and the higher price premium that firms need to pay to acquire land for industrialisation in states with lower land ceilings.
- 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.
- While one cannot reverse the adverse effects of land reform in a land scarce economy with growing population to feed, options for future policy development needs closer scrutiny of the variations across the states while considering the amendment of the 2013 Land Acquisition Act: Should there be uniform consent (e.g., 80%) requirement for land acquisition across the states?

Thank you

Literature Review and Contributions

▸ We contribute to different strands of the literature

▸ **Corporate investment Literature**:

- Fazzari, Hubbard & Petersen (1998) studied the relation between corporate investment and cash flow to test for the presence and significance of financing constraints
- La Porta et al. (1997, 2002) are the first to study how investor protection rights affect corporate valuation.
- More Recently, effects of regulation and policy on investment are being considered:
- Djankov et all. (2010), study the impact of corporate taxes on investment and entrepreneurship.
- Agrawal (2011) studied the impact of an investor protection law namely, "blue sky laws", on corporate behaviour and value
- Tarantino (2013), examines a link between bankruptcy law and investment decisions.

▸ This paper, to our knowledge, 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.

Literature Review and Contributions

- **Industrial Economics Literature**
  - This focuses on the location choice of industries
  - Deichmann et al. (2008) : Key factors affecting choice include factor prices (wage); Utility service (Electricity and power); Labour and regulation; market access and transport, Firms in supplier industry; Firms in own industry etc.
  - Lall and Chakravorty (2005) list Land; Capital; Labour; Infrastructure; transport; Regulation and Spatial location as major determinants of investments.
  - Mukin and Nunnenkamp (2010) study the locational choice for foreign investors: in addition to better infrastructure, they highlight the importance of locations where other foreign investors already located.
  - However none of these studies consider the access to land and the role played by exogenously given land reform legislations as ours
  - We argue that access to land as determined by the local legislations could be a key driver of investors' choice of industrial location.

Literature Review and Contributions

▸ **Development literature**:
- Existing studies have examined the effects of land reform policy on Poverty, Productivity, sustainable development etc.
  - Besley & Burgess (2000) study the impact of various land reforms legislations over1958 to 1992 in 16 major Indian states on growth and poverty.
  - Sazama & Davis (1973) examine both theoretically and empirically, the effectiveness of a land tax as a regulatory tool for boosting agricultural output and productivity.
  - Ghatak & Roy (2007): find mixed effects of land reform on agricultural productivity depending on the type of land reform.
- However, the effects of land reform on corporate investment remains unexplored.
- Most land reform legislations were completed by 1985 shortly before India initiated its economic liberalisation programme that aimed at industrialisation.
- 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)

Other controls

➢ State- Level Controls:
* Log (state output) : log of (Net State Domestic Product)
* Population Density: ratio of total Population (State) to state size
* Percentage share of ST/ SC Population
* Percentage share of Urban to Rural
* Literacy rate : Total Literate/ total population *100
* Soil fertility : ratio of net sown area land area
* Labor Militancy : Log (Total Man days lost in industrial Disputes)
* Year fixed effects

➢ Firm level Controls:
* Size: Ln (TA)
* Age : Age of the firms in years
* Population Density : ratio of total Population (State) to state size
* Intangibility : intangible fixed assets/total fixed assets
* Industry and Year fixed effects