

Land Inequality and Rural Unrest: Theory and Evidence from Brazil

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Abstract

What is the relationship between landholding inequality and rural unrest? And why does land reform that ostensibly addresses rural grievances sometimes exacerbate unrest? We advance the understanding of these longstanding questions by shifting the emphasis from how landholding inequality fuels rural grievances to how it captures the collective action capacity of landowners. Using municipal-level data from Brazil's massive land reform program from 1988-2008, we demonstrate that the relationship between landholding inequality and unrest is conditional. Isolated threats to landed elites in the form of land invasions are difficult to repel, generating a positive relationship between landholding inequality and one-off land invasions. By contrast, sustained, broader local threats triggered by nearby land reforms catalyze landowner organization to repel land invasions, leading to the reverse relationship. The findings provide a novel answer for why a straightforward link between land inequality and rural unrest is elusive, and may generalize to a broad range of similar cases.

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What is the relationship between inequality in landownership and rural unrest? And why does land reform that is aimed at undercutting potential grievances sometimes inflame the countryside? These questions have a long intellectual pedigree, rooted in the idea that because access to land is the cornerstone of rural life, a skewed distribution of landholdings can fuel rural grievances and unrest (Brockett, 1992; Russett, 1964; Verwimp, 2005). At the same time, land reform – the chief policy tool available to ameliorate land inequality and address rural grievances – should have the potential to successfully mitigate rural unrest (e.g. Wood, 2003).

Early attempts to establish a relationship between landholding inequality and political violence nonetheless yielded inconclusive results. Whereas Russett’s seminal work uncovered a positive link between land inequality and unrest (Russett, 1964), a finding echoed by Midlarsky (1988) and Binswanger, Deininger, and Feder (1995), other scholars have found little systematic relationship (Brockett, 1992; Collier and Hoeffler, 2004; Cramer, 2003; Lichbach, 1989; Moore, Lindström, and O’Regan, 1996; Muller and Seligson, 1987). Furthermore, there is mixed evidence as to whether land reform always has the intended consequences of generating stability in the countryside (e.g. Alston, Libecap, and Mueller, 2000; Finkel, Gehlbach, and Olsen, 2014; Mason, 1998; Moore et al., 1996).

This paper revisits these important debates, motivated by persistent high land inequality alongside land squatting and organized land invasions in many developing countries, as well as ongoing efforts to stamp out these problems through land reform. While doing so, we advance the literature by addressing central issues of measurement and theory construction – key concerns that bedeviled earlier conclusions on the subject (see, e.g., Cramer, 2003; Lichbach, 1989).¹

We focus on how and when land reforms spill over geographically into more unrest in the case of Brazil’s ongoing and massive land reform program. Brazil’s Gini coefficient of landholding was 0.857 in 2006, one of the highest in the world. During the period 1988–2008, the National Institute of Colonization and Agrarian Reform (INCRA) transferred nearly 75 million hectares of land, an area equivalent to the size of Texas, to almost one million families (INCRA, 2011). At the same time, there were nearly 8,000 land invasions in rural areas – staged by several million individuals – and 1,000 killings of peasants and peasant leaders

¹Indeed, the prominent debate in the 1980s and 1990s on landholding inequality and violence petered out due to the contradictory and ultimately inconclusive nature of earlier findings, driven largely by insuperable data quality problems and resultant measurement disagreements.

(Campos et al., 2007; CPT, 2008). Some of these invasions have been staged in highly unequal municipalities. Yet other unequal municipalities have entirely avoided land invasions and some of the most conflict-prone municipalities are not highly unequal.

Addressing this puzzling pattern yields a novel answer as to why a straightforward relationship between land inequality and rural conflict is elusive. In contrast to most studies that posit an unconditional, linear relationship between landholding inequality and unrest, we argue instead that this relationship is a conditional one that depends on when inequality activates collective action among *landowners* rather than the *landless*. Scholars have long noted that the rural grievances and landlessness associated with land inequality often fail to translate into collective action among peasants given the steep barriers to organization in sparsely populated rural areas where landowners dominate many aspects of rural life and the rural workforce (Muller, Seligson, et al., 1989; Paige, 1975). Yet consistent with the broader literature on elite collective action (e.g. Acemoglu and Robinson, 2006; Ansell and Samuels, 2014), high land inequality typically *does enable* large landowners to act collectively (Galor, Moav, and Vollrath, 2009; Rajan and Ramcharan, 2011; Ziblatt, 2008). A small, wealthy landowning class is conducive to social coherence: landed families disproportionately intermarry, collaborate in business, and are in contact at exclusive social events (e.g. Costa, 2012; Gilbert, 1977).

We explore the collective action capacity of landowners as a mechanism that mediates the relationship between landholding inequality and rural unrest as expressed through land invasions. Land invasions are typically well-organized and pre-planned incursions into large, unproductive estates by landless or land-poor agrarian workers (Hidalgo et al., 2010). We consequently find that *ad hoc* invasions in municipalities with high landholding inequality are difficult for large landowners to protect against. There is thus a positive link between landholding inequality and one-off land invasions. But because land reform allocation in Brazil is largely a demand-driven process such that land grants result from invasions and therefore incentivize them (Alston, Libecap, et al., 2000), there are substantial spillover effects whereby successful land reforms in a region lead to further land invasions in neighboring areas. These broader threats are more easily perceived and defended against. When the impulse among landowners to organize to repel invasions is triggered by nearby reforms that threaten to spill over into land invasions on their property, we therefore anticipate that the hypothesized link between land inequality

and higher conflict will flip: large landowners in highly unequal municipalities will coordinate to fight off an imminent threat of land invasions. Common tactics to repel invasions include organized violence and intimidation (Bruno, 2003), leveraging influence with the police or judiciary to break up squatter settlements and make land invasions more costly and difficult, and campaigns of disinformation about the effects of land reform (Costa, 2012).²

Additional empirical tests enable us to demonstrate that these findings are causal. We address concerns about endogeneity between land invasions and reforms by identifying a selected set of state-level land reforms that do not spur further land invasions across state borders, and hence elicit no organizational response from neighboring landowners over the border. Concerns about endogeneity between land inequality and land invasions are addressed by focusing on municipalities where landholding inequality effectively does not change throughout the period.

We also provide three pieces of evidence to demonstrate that landowner organization is the key mechanism repelling land invasions when regional reforms threaten to spill over. We first test two plausible measures of landowner organization: the selective deployment of violence (often via militias) and intensive soybean cultivation where inputs are costly and access to markets often requires landowner coordination. Both of these measures behave in a similar manner to landholding inequality in stemming spillover land invasion threats from neighboring reforms. Next, we demonstrate that when landowners in municipalities under threat of land invasion have generated political ties to members of the congressional bloc representing rural interests (the *bancada ruralista*), a powerful sign of dense landowner business and kinship networks (Costa, 2012), they are systematically more likely to elide land invasions.

Though this paper focuses empirically on Brazil – itself an important case – it also has implications for the developing world more broadly. Land reform has affected at least 1.5 billion people since 1945 in countries spanning every region of the world (Lipton, 2009, p. 1), and continues to advance in Colombia, India, the Philippines, South Africa, Venezuela, and numerous other countries in sub-Saharan Africa, Southeast Asia, and Latin America. Table 1 displays the subset of these countries that have ongoing land reform programs, are characterized by highly skewed distributions of land ownership, and are plagued by rural unrest in forms

²In an egregious recent case, the son of Senator Ivo Cassol used a helicopter of the state government to shoot at a settlement of 200 families squatting on land near his property in Alta Floresta (Costa, 2012).

such as organized land invasions, land squatting, protests, and rural assassinations. Together these countries comprise over a third of the world's population. Their rural populations are also substantial. Yet despite the ongoing global prevalence of land inequality, rural unrest, and land reform indicated in Table 1, there is relatively little scholarship analyzing how these phenomena are interconnected from a political perspective. This paper aims to take a step to fill this gap.

LANDHOLDING INEQUALITY, LAND REFORM, AND RURAL CONFLICT

The literature on landholding inequality, land reform, and rural unrest has offered important insights into a host of forms of conflict and rebellion, the dynamics of distribution in the countryside, and the role of powerful landowners in rural life. Yet it has long faced a series of obstacles that has made empirically establishing a relationship between inequality and conflict surprisingly difficult. Cramer (2003), for instance, notes that causal mechanisms are underspecified, the type of inequality examined is not always tightly coupled theoretically to the type of conflict measured, and that cross-national measures of land inequality have poor coverage.

Our theoretical argument and empirical strategy address each of these issues. Rather than assuming that land inequality is a proxy for grievances and hence a potential breeding ground for political conflict, we theoretically develop the idea that high land inequality also impacts the ability of landowners to organize. We are consequently able to predict under which conditions high land inequality is likely to lead to land invasions. Furthermore, we generate several additional, more direct measures of landowner organization and verify that these measures behave in a similar fashion to landholding inequality.

We also tackle key empirical issues that have hampered the literature on land inequality and unrest. Instead of trying to measure and explain heterogeneous forms of rural unrest (e.g., rebellion, squatting, land invasions) simultaneously, which raises reliability and validity concerns (Brockett, 1992), this paper instead focuses on one specific type of rural unrest: organized land invasions. This enables us to obtain a measure of unrest that is consistent across space and time. Our theoretical argument regarding rural unrest calls for an empirical focus on inequality in the ownership of land rather than income or wealth inequality. Cross-national data on land inequality are often based on a mix of individual and household level surveys of income or ownership, differ in definitions and quality, suffer high missingness, and consequently are difficult

to compare across time and space (Cowell, 2011; Deininger and Squire, 1996; Fearon and Laitin, 2003). We instead rely on high-quality subnational census-based calculations of landholding inequality, which substantially improves inferential quality. Our data are also not subject to the nonrandom missingness problem that plagues cross-national land inequality data. The substantial heterogeneity of Brazilian municipalities with respect to land inequality and land invasions suggests that much can be learned from a subnational approach. Beyond each of these contributions, we also use subnational differences across states stemming from longstanding institutional legacies to understand the causal directionality of the relationship between land inequality, land reforms and unrest. The remainder of this section builds from these contributions in developing our theoretical argument and a series of empirically testable hypotheses.

Popular pressure for land redistribution has increased in Brazil since democratization, particularly from Brazil's Landless Rural Workers' Movement, or MST (Brown, Brown, and Donaghy, 2011). Land redistribution has dramatically increased in response, notwithstanding large landowners' successful attempts to win important safeguards via constitutional provisions that bar the expropriation of productively used land and mandate market-value compensation for seized property. There is an active land reform program that has settled one million families on 75 million hectares from 1988-2008. This program routinely targets the property of large landowners for land reform when local land invasions – organized occupations of landed estates – pinpoint these properties. Since land invasions are often directed at large properties that are perceived as “unproductive” per the region-specific definitions of productive under the federal land reform law, municipalities with high landholding inequality are especially susceptible to such conflict. Nonetheless, many of the municipalities with the most unequal distributions of land rarely or never witness land invasions or land reforms. Under what conditions, then, does existing landholding inequality translate into land-based conflicts? How do landed elites prevent the local implementation of the land reform law in spite of the legal machinery and existing public demand to redistribute land? And how has this localized resistance contributed to the apparent failure to reduce rural inequality?

Land reform allocation in Brazil, as in many other countries, is largely a demand-driven process. Though the government attempts to settle landless families on mostly remote public lands, much more frequently it simply reacts and responds to land invasions on private land

in more desirable areas with expropriation and subsequent land reform grants. This framework protects large landowners from broad, top-down land redistribution as occurred in countries such as Japan, Peru, and Taiwan. Nonetheless, it simultaneously creates incentives for land invasions and other forms of rural conflict (Alston, Libecap, et al., 2000).

That the program encourages conflict parallels the outcomes of several other prominent land reforms. In Colombia, for instance, land titling in conflictive rural areas led to spillover effects in which nearby communities recognized the need to support rebel groups in order to garner the attention of Colombia's land reform agency (Albertus and Kaplan, 2013). Similarly in Russia following the emancipation of serfs in 1861, land-based rural rebellion actually increased as landlords hijacked the reform implementation process to win favorable land allotments (Finkel et al., 2014). And in southern Italy, tepid initial agrarian reforms just after WWII led to an outpouring of land invasions in 1949 that was only addressed by major land redistribution beginning in 1950 (King, 1973). Building on these other important contributions, we empirically characterize the scale and scope of the spillover effects of reform on unrest. Furthermore, we identify when and why these spillovers can be cauterized locally.

Rather than engaging in costly lobbying for one-off exemptions that may be a lightning rod for public opposition, the nature of the threat of land-based conflict and land redistribution requires local, extra-institutional organization by elites attempting to avoid losing their property. Land invasions are generally well-planned occupations of large and frequently underproductive estates by land-poor rural workers (Hidalgo et al., 2010). These often sudden invasions therefore do not typically occur in areas where land inequality is low and relatively egalitarian smallholding prevails. Instead, they target more unequal municipalities given the supply of land for potential reform, and they are hard for large landowners to predict and avoid when they have little hint that one is coming – typically due to a lack of land reform and land invasion activity in their area. But because land grants come in response to invasions and therefore encourage this tactic, there should be spillover effects such that successful land reforms in a particular area induce additional land invasions in neighboring areas. These threats act as a “shot across the bow” of the landed elite, particularly within local neighborhoods where shared land tenure and similar economic conditions (e.g., rural labor and crop markets) enable landowners to reasonably fear that unrest could spread to their locale. Such spillover effects of reform are more readily repelled where

local landed elites are stronger and can organize to resist invasions – a circumstance found most commonly in more unequal municipalities. Large landowners in these unequal municipalities, typically connected by dense networks and relationships (Brown et al., 2011; Costa, 2012), can coordinate reflexively against evident broad spillover threats from neighboring municipalities.

There are thus two main features of the link between inequality and unrest that we examine. The first is what causes land invaders to target specific areas, which when successful may yield land redistribution. This is perhaps most easily understood by considering how land inequality initially attracts land invasions in areas where the land reform program is not already active. The second feature we examine is what mitigates whether land reform results in further land invasions in neighboring areas. Here the organizational capacity of landowners is key in catalyzing collective defense to spillovers, and such capacity is strongly linked to landholding inequality.

This discussion implies that land invasions tend to start first in places with higher inequality, and in circumstances in which they spread to neighboring areas due to land reform, do so most frequently in municipalities with only middling levels of inequality. These latter municipalities are places where there is a sufficient supply of large land to invade, and where landowners are less effective at coordinating quickly and reflexively to defend their property collectively. This leads to the following set of hypotheses:

Hypothesis 1. *Land invasions that occur absent neighboring land reforms are more likely in municipalities with higher landholding inequality.*

Hypothesis 2. *Land reforms in the region surrounding a municipality are likely to spur invasions in that municipality. This effect should be reversed in municipalities with high landholding inequality where elites have the capacity to organize in order to repel neighboring threats.*

Identifying the causal direction of the relationship between land invasions and land reforms presents an empirical challenge. To determine the effect of land reforms on subsequent land invasions, we leverage the fact that only some states have the legal authority to use public lands to satisfy demands for land redistribution. This authority is rooted in the 1850 Land Law, which enabled some states – but not all – to adopt authority over local public lands (see Silva, 1996). Variation in states’ authority to distribute public lands yields differential diffusion patterns for different types of land reforms. Land grants based on publicly owned lands, usually executed directly by state governments, may spur additional invasions in the same state but

are unlikely to affect neighboring municipalities across state borders where the process for public land grants is run independently. We should observe no such spillovers across state borders because land invaders learn little about their state authorities' political willingness to recognize public land claims (if they even have the legal ability to do so) from a neighboring state's proclivity to use public land for reforms. Furthermore, in some states there is simply no mechanism for the state government to distribute public land. By contrast, land reform projects based on expropriated private land, which are overwhelmingly implemented by the federal land agency INCRA, should exhibit no such border effects. Land invaders can reasonably expect to have a higher chance of such grants of private land, even if located in a different state.

This discussion yields several predictions. If a state government redistributes public lands to meet specific demands for land reform, we would only expect subsequent land invasions in neighboring municipalities *within the same state*. By contrast, federal land grants through INCRA that predominantly use expropriated private lands should have spillover effects in the geographical neighborhood whether within or across state borders.

To test our claim that land reforms spur additional subsequent land invasions, we formulate the following hypotheses:

Hypothesis 3a. *Land reforms based on expropriated private land increase the likelihood of land invasions in neighboring municipalities.*

Hypothesis 3b. *Recognitions of public land claims increase the likelihood of land invasions in neighboring municipalities only within the same state but not across state borders.*

Critically, if land reforms based on expropriations of private land and recognitions of public land claims do indeed spill over differently to neighboring municipalities, we should also expect a different response by private landowners. From the perspective of a landowner worried about potential land invasions on their property, expropriations in the surrounding region are a threat to their own landholdings via spillovers whereas recognitions across state borders are not. Hypothesis 2 can therefore be refined to examine whether local landowners have the capacity, as proxied by the landholding Gini, to respond to the threat of land invasions spurred by "relevant" land reforms with the potential to spill over: in-state recognitions of public land claims and private land expropriations.

To more directly test whether landowner organization is the mechanism repelling spillover

threats of land invasions, we also turn to additional alternative measures of landowner organization. As with the landholding Gini, some of these measures take higher values in areas where both landowners have a capacity to organize and, by contrast, land invaders find attractive tracts of land to invade. These alternative measures should therefore behave in a similar way to landholding inequality. In particular, while large landowners cannot always prevent isolated land invasions, they should effectively forestall local land invasions when they are catalyzed to organize by neighboring land reforms. We test two plausible measures of landowner organization: the selective deployment of violence (mainly through militias) and intensive soybean cultivation where inputs are expensive and coordination is frequently availed to make market access more economical. Tests of the previous hypotheses using these measures in place of the landholding Gini allow us to provide further evidence that the landholding Gini in part captures landowner organization.

The landholding Gini, the deployment of violence, and intensive soybean cultivation all tap the capacity of landowners to organize reflexively to repel land invasions in the face of spillover threats. Yet they are also “contaminated” by information about the attractiveness of land to potential land invaders; these measures are therefore hypothesized to be linked to isolated land invasions. Theoretically, a “purer” measure of landowner organization or a measure that captures ex ante organization that serves as a deterrent threat should be able to forestall even isolated land invasions. Political connections via representation in the national parliament meet both of these requirements. Political connections should therefore make it less likely that there are land invasions in a municipality and should also cauterize spillover effects induced by neighboring expropriations. We test this implication systematically later in the paper to further tap whether landowner organization serves to undermine land invasions.

The next section provides background on Brazil’s land reform program before turning to the empirical section to test the hypotheses and observable implications formulated above.³

³Consistent with the logic formulated here, one might also expect that if landowners are able to organize effectively against the threat of land invasion, we would expect the Workers’ Party (PT) vote share in presidential and mayoral elections to decline following reform-induced threats from neighboring municipalities given the PT’s status as a historical ally of Brazil’s landless workers movement. This likely operates via the mechanism of clientelism (Brown et al., 2011). The Appendix provides evidence to support this hypothesis.

LAND REFORM IN THE BRAZILIAN CONTEXT

Rural poverty, a highly unequal distribution of land, and informal land ownership have been salient issues in Brazil and Latin America more broadly since the creation of massive estates and trusts during colonization. When Brazil became a republic in 1889, land policy was decentralized to states and large landowners gained substantial influence over policymaking. Some states adopted legislation that mirrored the 1850 Land Law, legally prohibiting squatting but in practice enabling large landowners to incorporate more frontier lands (Silva, 1996). As Alston, Harris, and Mueller (2012, p. 763) write, “Local oligarchies dominated access to land and power in their regions, usually through the figure of the all-powerful coronel who presided with feudal-like rights and reigned through a mixture of paternalism and violence, strengthened by his association to central state politicians to whom he could deliver votes.” Importantly for the purposes of the empirical analysis below, these state-level laws endowed some but not all states with authority over public lands (Silva, 1996).

Land reform in Brazil began under military rule with the Land Statute and the creation of the Brazilian Institute for Agrarian Reform (IBRA) and the National Institute for Agricultural Development (INDA) in 1964 after the democratically elected João Goulart was ousted in a coup. IBRA and INDA were intended to undercut pressure for land redistribution levied by social movements such as peasant leagues (Assunção, 2006). In 1971, IBRA and INDA were merged into the National Institute for Rural Settlement and Agrarian Reform (INCRA). INCRA is now a federal agency subordinated to the Agrarian Development Ministry, which itself is subordinate to the executive. The head of INCRA is appointed by the Minister of Agrarian Development.

Social protest reemerged in the late 1970s and early 1980s. The MST began at this time as small groups of farmers in Brazil’s south occupied unproductive lands (Brown et al., 2011). The group pledged to reduce inequality through the transfer of land to peasants in rural areas at its first national conference in 1984. The military stepped down from power in 1985. The MST burgeoned in subsequent years and has now spread across the country, becoming the most sophisticated rural social movement with strong internal discipline and local chapters throughout Brazil.

Under popular pressure from social movements and against a backdrop of rural violence, President Sarney made agrarian reform a priority at the outset of his administration in 1985.

Agrarian reform was nonetheless stifled during his term as landowners pressured for a focus on incorporating public rather than private land into the reform sector, and an increase in compensation. Landowners were simultaneously organizing to defeat land reform proposals in the Constituent Assembly. Landholding interests within the National Confederation of Agriculture, the state Federations of Agriculture, and the Brazilian Rural Society joined in 1986 to form the Union of Rural Democracy (UDR) in the Constituent Assembly (Payne, 1992, p. 15). The UDR successfully pushed for a provision in the 1988 Constitution that protects productive private property from expropriation. The 1988 Constitution set the stage for the structural incentives for land invasions and the processes of land reform that have persisted largely unchanged until the present. Large landowners, some with links to the UDR, contemporaneously unleashed a campaign of violence in the countryside, coordinating at a local level to create militias and defend their farms from land invasions (Bruno, 2003).

Collor (1990-1992) continued policies that benefitted large landowners. Although his campaign platform included the elimination of the ban on expropriating productive property, he appointed Antonio Cabrera Filho – a wealthy cattle rancher and member of the UDR – as his Minister of Agriculture. Little land was expropriated during his tenure.

Land reform resumed with Collor's impeachment. A February 1993 amendment to the Constitution stipulated that the government pay "market price" for land it expropriates (Assunção, 2006, p. 8). Reform accelerated under Cardoso along with land conflicts and land invasions, primarily associated with the MST. Between 1995 and 2002, Cardoso redistributed 21 million hectares of land through 4,300 decrees, of which 16 million hectares were expropriated. From 2003 to 2010, President Lula da Silva acquired 43.5 million hectares of land through INCRA for the purposes of land reform (INCRA, 2011).

Land reform in Brazil since its democratic transition has been largely reactive. As (Carter, 2010, p. 19) summarizes, "[Land reform] has strived mainly to appease rural conflicts, rather than promote family farming through proactive measures aimed at transforming the rural structure and its power relations... [A]ll governments have engaged in an ad hoc distribution process." Yet while landowners have avoided the worst-case scenario of large-scale redistribution, they have not halted a land reform program that is increasing in scope and that incentivizes land invasions that target large landowners. Landowners essentially uniformly seek to avoid

the disruption, legal battles, and expropriation that may result from invasions of their property. Consequently, large landowners seek to organize and coordinate to repel imminent threats of land invasions and subsequent expropriation by INCRA.

RESEARCH DESIGN AND DATA

The analysis examines the determinants of threats to landed elite interests in the form of land invasions. It also provides evidence that elite organization amidst threats reduces spillovers of neighboring reforms into additional land invasions.

Dependent Variable: Land Invasions. The dependent variable is land invasions. We identify distinct land invasions that occurred in each municipal-year in Brazil from 1988–2008. The main measure is a count of the total number of land invasions in each municipal-year. For robustness checks we also use an indicator for whether any land invasion took place in a given municipality-year, and an indicator for the number of families that took part in the invasions. Data on land invasions are taken from Dataluta (Campos et al., 2007), a database on land conflicts hosted by São Paulo State University that is widely viewed as the most comprehensive and authoritative source of data on land invasions. The bulk of the information on land invasions in Dataluta comes from the CPT, an NGO with ties to the National Conference of Bishops of Brazil, which collects data on land invasions from primary sources such as social movements, trade unions, political parties, government agencies, and churches. It also gathers data from local, state and national newspapers, police records, and government agencies.

Dataluta records a total of 7,609 land invasions from 1988–2008. In addition to the number of invasions, Dataluta also provides the number of families that participated in each invasion. Over 1.1 million families (constituting several million individuals) participated in land invasions during the period. Spatially, land invasions have occurred at the fringes of Brazil’s continuing urban expansion, with many land invasions in the states of Minas Gerais, São Paulo, and Rio Grande do Sul (see Figure 1a).

Key Independent Variables. The first key independent variable is land reform. Land reform is carried out principally by INCRA, though some public land recognitions are implemented by states as discussed above. The latter set of recognitions are included in the INCRA data. INCRA reports detailed data on the location, size, and type of all land reforms conducted

(e.g., expropriation of private land versus public land recognitions), as well as the number of beneficiaries settled through a particular land grant.

The majority of land distributed through INCRA's land reform program is acquired through expropriation of private property. Under Brazil's 1988 Constitution, only unproductive land is subject to expropriation. A 1993 Constitutional amendment further requires that compensation for land seized must be at prevailing market rates. Of the 7,864 reform projects from 1988–2008, a total of 5,680 settlements (72%) were created on expropriated private land. The remainder of the land came from the recognition of settlements on public lands (18%), negotiated purchases from the private sector (6%), and transfers from other state agencies (4%).

Spatially, land reforms match the distribution of land invasions fairly well (see Figure 1b). Land invasions have significantly outpaced land reform efforts in areas with the greatest pressures to reform, such as the states of Minas Gerais, São Paulo, and Rio Grande do Sul. In the Amazonian states of Brazil's Northwest, large tracts of land have been offered for settlement despite the fact that there is much less demand for land.

Land reform grants in Brazil are commonly made following an earlier land invasion. Similarly, existing land reform projects are likely to affect the calculations of landless agrarian workers and increase the risk of land invasions nearby. We contend that particular types of reforms will affect private landowners differently, which enables us to identify the causal direction of the relationship. State-led reform projects based on public land recognition in neighboring municipalities across state borders should pose little threat to landowners and consequently elicit no organizational response. By contrast, expropriation-based reforms in the region increase the threat of additional land invasion spillovers.

To test our claim, we calculate the number of these different types of reforms (expropriations vs. public recognitions) in a 100km radial region around a municipality, separately for in-state and out-of-state neighbors. The differential patterns of these spillovers allow us to identify the causal relationship between land invasions and land reforms. Information is more likely to diffuse via regional news, radio, and social movements within local neighborhoods. Furthermore, the shared climates, crop types, and land tenure allow would-be invaders to reasonably infer that an invasion in their locale might be treated by INCRA in a similar fashion to a nearby invasion. The results, however, are not sensitive to this specific threshold choice of 100km.

The second main independent variable is land inequality. We use land inequality as an indicator of the capacity of landholding elites to organize, though as discussed above, it also contains information on the availability of land for potential grants to land invaders. Importantly, our measure taps *landholding* inequality and does not include the landless, which renders it a more accurate measure of inequality among landowners and thus better taps coordination capacity while still capturing the attractiveness of an area for possible land invasions. In highly unequal municipalities, in which landowners are stronger and better organized, we expect landowners to organize against such looming threats and be better able to repel potential land invasions. Landowners may find it harder to organize in more equal municipalities and thus more often will succumb to the threat of land invaders.

Land inequality is taken from IBGE's detailed agricultural censuses of 1995 and 2006 and measured using a Gini coefficient. Missing years of data during the period are interpolated. After 25 years of democratic rule, landholding inequality in Brazil remains stubbornly high. Even in many areas where land reform has already taken place, average landholding inequality has often barely changed. This is most typically because the reform sector is small relative to the nonreform sector (the median land reform affects only about 1% of a municipality's land). Furthermore, substantial reforms are at times offset by the growth of large agribusiness farming sugarcane or soybeans. As emphasized by Hidalgo et al. (2010), the relative stasis of land inequality eliminates concerns of endogeneity running between land inequality and land invasions – a point we return to in the analyses below.

Additional measures of landowner organization are discussed below as they arise.

Controls. The models include a series of other time-varying determinants of land invasions whose omission may confound the results. The percentage of the rural population, taken from the Brazilian Institute of Geography and Statistics (IBGE), is measured as the percentage of a municipality's population that is rural. We expect the effect of this variable to be negative given that most land invasions occur not in remote, rural areas but instead in peripheral zones of urban and semi-urban areas (Brown et al., 2011). Income per capita, measured in thousands of constant log 2000 Reais and taken from IBGE, is an indicator for local development and may capture the capacity to implement local reform or the attractiveness of a land settlement with access to infrastructure and markets. Change in log income per capita, included in the models

predicting land invasions, captures the possibility that negative economic shocks spur invasions (Hidalgo et al., 2010). We also include a variable for agricultural production in millions of constant log 2000 Reais from IBGE. Agricultural value may affect invasions or reform since it proxies for a supply of land for possible reform, as well as land productivity that makes property more attractive for squatters.

The models also include a cumulative measure that taps the history of reform in a municipality. The cumulative measure of land reform captures the number of past land grants, which may either encourage further land invasions or diminish the number of encampments prepared to invade land. Given that the stock of land in a municipality is rarely exhausted due to land reform, we expect the former condition – an increase in invasions – to prevail.

Summary statistics of the variables are found in the Appendix in Table 7.⁴

EMPIRICAL ANALYSIS: LAND INVASIONS AND LAND REFORM

To account for the substantial heterogeneity across municipalities, we estimate negative binomial regressions for all count data. On average, 7% of municipalities experience a land invasion or a land reform in a given year. However, there is a maximum of 31 invasions and 21 land grants recorded in a single municipality-year. In robustness tests where the dependent variable simply measures the presence of any land invasions, we estimate logistic regressions.

For invasions Y_{it} occurring in year t in a particular municipality i , we thus estimate

$$(1) \quad Y_{it} = \mathbf{X}_{it}\beta + \alpha_s + \delta_t + \epsilon_{it}$$

where \mathbf{X}_{it} is a matrix of time-varying independent variables, α_s are state fixed effects, and δ_t are cubic year polynomials given the trend in land invasions over the period,⁵ with a density following the negative binomial distribution with the exception of when we dichotomize the dependent variable (see Greene, 2003, p. 745). Standard errors are clustered by municipality.

While the Brazilian land reform program has involved millions of people and distributed millions of hectares of land, the majority of municipalities in Brazil never experience a land

⁴We also tested controls for the partisan affiliation of mayors and governors. Perhaps unsurprisingly given the comparatively weak role of ideology in Brazilian political parties, these variables were sensitive to model specification and never influenced the main results. We return to a discussion of partisanship in the final section.

⁵The results are nearly identical using year dummies.

invasion (71%) or a land reform (65%), leaving 96 percent of municipality-years with no event. A municipal fixed effects model would therefore restrict our sample by three-quarters in a non-random fashion and exclude municipalities in which there was either no demand for land redistribution or, more importantly, where landowners were able to repel land invasions entirely, and in a manner consistent with theoretical expectations.⁶ Take for example the municipality of Sertão in Rio Grande do Sul. In the aftermath of democratization, a small number of landowners with sprawling properties organized under the Pacto de União e Resposta Rural (PUR) to repel land invaders and protect their property (Bruno, 2003). As a wave of neighboring land reforms in the late 1990s and mid-2000s threatened to catalyze nearby land invasions, these landowners successfully repelled local invasions to their property via the PUR. Similarly, the municipality of Bela Vista do Maranhão, located in a region of sustained land conflict, has not itself experienced any land invasions or reforms. Despite fertile conditions for rural conflict, including very high land inequality (the land Gini was 0.91 in 2000), poverty (ranked in the bottom five percent in human development in Brazil), the abuse of rural labor in slavery-like conditions (CPT, 2008), and several hundred land invasions in nearby municipalities, landowners have successfully resisted invasions and calls for land redistribution. Excluding such municipalities through the use of municipal fixed effects *because* they have not experienced any land invasions removes many of the most likely cases in which our theoretical argument applies.

Land Inequality and Land Invasions. Estimations analyzing the determinants of land invasions are presented in Table 2. We present the raw coefficients in the negative binomial models. Model 1 indicates that on average, municipalities with high landholding inequality are substantially more likely to be targeted for land invasions. This model does not account for the potential pressures from neighboring reforms that could incentivize land invaders while also catalyzing large landowners in the most unequal municipalities to organize to repel them. The negative coefficient on the percentage of the population that is rural indicates that it is not the municipalities with large empty tracts of land as in the Amazonian region in the Northwest of Brazil that experience most invasions. Instead, it is on the fringes of smaller urban areas where the interests of poor,

⁶The main results are nonetheless consistent using municipal fixed effects models, though the statistical and substantive significance of the coefficients is typically considerably reduced, as expected given the large amount of data dropped. See Table 8 in the Appendix for a series of municipal random and fixed effects models.

landless families and rich, rural landowners collide. Invasions are also more likely in municipalities with a substantial agricultural production, which are often dominated by large agribusinesses.

Providing landless families with land grants through land reform projects is ostensibly politically oriented toward providing a pressure valve for landed conflict. However, in a demand-driven land reform process such as Brazil's, land invasions commonly respond to land grants, raising the expectations that direct action will yield benefits. Past land reforms consequently often encourage further invasions. Model 2 tests this proposition by including variables for the number of neighboring land reforms (within 100km) in the previous year and for the cumulative number of previous land grants in a municipality.⁷ As expected, both of these variables are strongly positively linked to land invasions in the present.

Model 3 includes an interaction term between land inequality and neighboring reforms, now enabling a direct test of both Hypotheses 1 and 2. Land inequality should be associated with more land invasions in the absence of neighboring reforms given the attractiveness of land to potential land invaders alongside the steep barriers to effective coordination among large landowners when it comes to predicting and forestalling isolated invasions. The positive coefficient on the lower order term for land inequality supports Hypothesis 1 in this fashion. Hypothesis 2 anticipates that well-organized landowners in highly unequal places should be most able to coordinate to repel imminent neighboring “spillover” demands for land. As expected, the interaction term is negative and highly statistically significant.⁸

To better understand how land inequality interacts with neighboring reforms, Figure 2 displays the marginal effects of neighboring reforms for municipalities without previous neighboring land reforms (Figure 2a) and for municipalities with existing substantial land reform activities in the surrounding region (Figure 2b). For ease of interpretation, these figures use the Model 4 estimates, where the dependent variable is an indicator for whether any land invasion occurred in a given year. In Figure 2a, we find that the marginal effect of moving from no neighboring reforms to a small number of neighboring reforms on the probability of observing an invasion is positive and increasing across much of the range of landholding

⁷The neighboring region across all regressions is defined by the set of all municipalities in a 100km radius. Reforms in the region are then the sum of all reform projects in the past year in those neighboring municipalities.

⁸The results and those that follow are also robust to controlling for municipal population growth, which in part captures in/out migration that may influence land invasions.

inequality. However, while additional recent neighboring reforms increase the probability of a land invasion, Figure 2a also shows that the spillover effects are smaller at very high levels of landholding inequality. When land invasions spread due to land reform, they do so most frequently in municipalities with only middling levels of inequality.

Theoretically, we would expect landowners to organize more effectively once the threat of spillovers from neighboring reforms becomes more visible and sustained. Figure 2b displays the marginal effect of additional neighboring reforms on the probability of observing an invasion over the range of landholding inequality for municipalities that are *already* surrounded by neighboring reforms. Our theory indicates that these are places in which landowners, faced with severe threats of spillovers from neighboring municipalities, should be most likely to organize quickly to repel spillover invasions. Indeed, this figure illustrates that the marginal effect declines across the range of landholding inequality, and is lowest in municipalities with the highest levels of inequality. The change in the marginal effect for this estimate in Figure 2b indicates that spillover effects become weaker for every incremental change in landholding inequality once the threat level from neighboring reforms is sufficiently high.⁹

To give a sense of the magnitude of these results, consider that there is a 3.7% chance of having a land invasion in a given municipality-year across the dataset. The peak of the marginal effect in Figure 2a, 1.3 percentage points, increases the likelihood of a land invasion over the baseline probability within the whole dataset by 35%. At the highest levels of inequality, neighboring reforms only yield an estimated 0.9 percentage point increase in the likelihood of an invasion, which translates to a 24% increase in the likelihood of a land invasion – a full 11% drop in the likelihood even in areas with low previous neighboring reform activity. In a region with high reform activity, as described by Figure 2b, the average probability of any municipality experiencing a land invasion increases substantially. However, as predicted by the theory, increased higher landholding inequality is again associated with lower spillovers. In other words, while inequality is conducive to attracting land invasions, spillover threats from neighboring municipalities are weaker

⁹That we estimate the spillover effects to still be net positive supports the notion that the landholding Gini also contains information about the attractiveness of an area to potential land invaders. Nonetheless, we cannot reject the possibility that the ripple effect disappears in the most unequal municipalities in both marginal effects estimations.

in municipalities with the highest levels of inequality. Plausible concerns about an endogenous relationship between land invasions and land reforms are addressed in Table 3. The Model 4 results for the other variables are largely similar to the negative binomial specification in Model 3.¹⁰

Model 5 uses the number of families participating in land invasions as the dependent variable to test whether spillover effects and landholding inequality are influencing the magnitude as well as simply the occurrence of land invasions. All results remain similar to the models with the count of invasions as the dependent variable. Indeed, as Model 6 of Table 8 indicates in the Appendix, the main interaction term is also negative and statistically significant when introducing municipal fixed effects to this specification ($p < 0.05$).

Overall, Models 1-5 of Table 2 demonstrate that unequal, somewhat urbanized municipalities with substantial agricultural production and a reservoir of poor people are most likely to experience land invasions. Reforms in neighboring municipalities encourage invasions in more equal places, but there is no such spillover effect in highly unequal municipalities.

Addressing Endogeneity in Land Inequality. Are the main results in Models 1-5 of Table 2 driven by an endogenous relationship between landholding inequality and land invasions? It could be the case, in particular, that land invasions, when met with land reform, drive down the landholding Gini through the redistribution of large properties. This could yield a mechanical positive link between baseline landholding inequality and land invasions.

Several pieces of evidence cast strong doubt on this possibility. First, the correlation between land invasions and changes in the landholding Gini is a mere -0.006. Similarly, lagged land invasions are a poor predictor of changes in the landholding Gini. This is because only a small number of land invasions spurred reforms large enough to drastically change the landholding Gini in a municipality over this time period. The representative land invasion met with reform affects only about 1% of a municipality's land. The average change in the land Gini is essentially zero for municipalities without reforms, few reforms, or even many reforms. But because some subset of land invasions may result in large changes to landholding inequality, Models 6-8 of Table 2 replicate Models 3-5 but restrict the sample to municipalities where landholding inequality changed by less than 0.05 between the agricultural censuses of 1995 and 2006, an annual change

¹⁰This is not particularly surprising given that of all the municipalities that experienced any land invasions, only 43% witnessed more than one invasion.

of less than 0.005.¹¹ The results for the set of municipalities with stability in landholding inequality are very similar to previous models. Indeed, the results in *all of the tables that follow* are robust to this experiment. By demonstrating that the results hold in municipalities where landholding inequality effectively does not change, and that land invasions and changes in land inequality are weakly linked during the period of analysis, we can be confident that land inequality is affecting patterns of land invasions rather than the other way around.

Identifying Spillover Effects of Land Reforms. Land invasions do not only respond to land reforms; indeed, in many cases land reforms respond to previous land invasions. As Hidalgo et al. (2010, p. 3) write, “Land invaders are the principal beneficiaries of land redistribution.” We therefore need to address possible endogeneity between land invasions and land reforms in order to identify the causal effects of recent neighboring reforms on land invasions in a municipality. Our empirical strategy employs the fact that some Brazilian states – mainly Acre, Maranhão, Mato Grosso, Piauí, Rio Grande do Sul, São Paulo – use public lands for land reform projects while in other states the federal land agency INCRA is the overwhelmingly dominant or sole provider of land grants. If land reforms in neighboring municipalities do indeed spill over and encourage land invasions, such spillovers should be different depending on the type of reform.

The recognition of claims on public lands should only affect the likelihood of subsequent invasions within the same state. No such diffusion effects should be observed across state borders where the policy process for public land recognitions is run independently. Indeed, in some states there is simply no legal mechanism for the state government to distribute public land. By contrast, land reform projects relying on expropriated private land should exhibit no such differential effects across state borders. We can therefore use the classification of land reform projects as public recognitions or private expropriations for our empirical identification strategy.

Table 3 presents the regression estimates of the spillover effects of land reforms on land invasions. Models 1 to 3 indicate support for Hypotheses 3a and 3b. Neighboring expropriations, both in the same state and across state borders, increase the risk of invasions. However, recognitions of public land claims only diffuse within state borders but do not increase the likelihood of invasions in other states. We interpret this as *prima facie* evidence that reforms

¹¹Results are similar when restricting to annual land Gini changes of less than 0.003 or even 0.001 (see Appendix Table 10).

indeed encourage additional invasions, but only if potential land invaders can reasonably expect to be the recipient of a land grant of the same type. Model 4 of Table 3 combines neighboring reforms based on expropriations and in-state public land grants into an overall count of “relevant neighboring reforms.” As expected given the Model 3 results, “relevant neighboring reforms” encourage additional land invasions whereas neighboring out of state land recognitions do not.

The fact that land reforms based on private expropriations and public land recognitions in the same state encourage land invasions but out of state land recognitions do not enables a more precise test of Hypothesis 2. Model 5 of Table 3 interacts the landholding Gini with the land reform measures from Model 4. The results again support Hypothesis 2: relevant neighboring reforms spur additional invasions but not in municipalities with very high landholding inequality. There is no spillover effect of out of state public land recognitions on land invasions, regardless of landholding inequality.

It may be the case, however, that land invasions in a municipality spur or are correlated with subsequent land reforms in the municipality’s neighborhood, which themselves catalyze additional land invasions in that municipality. To address this endogeneity concern, we turn to first instances of land invasions. Model 6 of Table 3 is specified similarly to Model 5 but excludes municipality-years that correspond to municipalities that have previously experienced land invasions. This model demonstrates that relevant neighboring reforms spur first instances of land invasions, thereby increasing our confidence that we are indeed capturing spillover effects whereby neighboring reforms lead to invasions rather than some cyclical invasion-reform relationship. The magnitude of the coefficients of interest decline somewhat but the results hold strong.

Alternative Measures of Landowner Organization. Tables 2–3 indicate that recent, “relevant” land reforms in geographically close municipalities encourage subsequent invasions by landless peasants. Landowners in highly unequal municipalities, however, can reduce and even neutralize these threats of spillovers from neighboring reforms into potential invasions. This is consistent with our argument that landowners in highly unequal places are better able to reflexively mobilize their organizational capacity to thwart the threat of imminent invasions. The remaining analyses test additional manifestations of landowners’ capacity to mobilize against reform spillovers.

If the Gini coefficient of landholding inequality is acting to suppress land invasion spillovers

by activating large landowners' latent capacity to organize, then we should expect other measures of landowner organization to behave in a similar fashion. Because organizing collectively is costly and land invasions are rare and difficult to predict, large landowners cannot always prevent one-off land invasions. Yet when they are catalyzed to organize by neighboring land reforms they should effectively forestall local land invasions. We test two direct proxies for landowner organization in this section: the selective deployment of violence and intensive soybean cultivation where inputs are costly and access to markets often requires coordination among producers.

The Deployment of Violence. The first type of organization in the countryside is the formation of militia groups and the hiring of hit men to intimidate and even murder peasant activists and land invaders. The heyday of rural violence occurred in the first decade following Brazil's 1985 democratization. As the UDR formed to shield productive private property from expropriation in the Constituent Assembly, powerful landowners coordinated locally to create militias and local defense groups and hire gunmen to protect their property (Bruno, 2003). Yet violence hardly dissipated in the 1990s. To the contrary, rural assassinations jumped in the early 2000s to levels close to those in the early 1990s. Between 1988 and 2008 there were 1,000 killings of peasants and peasant leaders (CPT, 2008). We create several measures of rural killings based on data from the CPT.

In municipalities that have witnessed rural assassinations, we can infer that landowners at least have the *capacity* to organize. We therefore first code municipalities that had any rural killings in the period 1988-2008 as having an organized landowner presence. Because this capacity may develop in response to threats of invasions later in the period, we also recode this variable as indicating landowner organization only in the years during and after a rural assassination. Finally, we create a measure that captures the number of previous assassinations up to the present. These measures, of course, are imperfect. Landowners with the capacity to deploy violence will not always need to use it, especially if it serves as an effective deterrent. Miscoding such cases as indicating an absence of landowner organization, however, biases *against* our hypothesis.

We anticipate that rural assassinations in the absence of neighboring reforms should be associated with additional invasions. This is not, of course, because land invaders want to risk assassination in seizing land. Isolated land invasions are hard to defend against and may even elicit a violent backlash from landowners trying to respond to invaders. Land invaders, for their

part, are nonetheless *ceteris paribus* attracted to valuable and sprawling landed estates vulnerable to potential expropriation — precisely the circumstances that provide landowners an incentive to organize to protect their property. Land reforms in neighboring areas, by contrast, serve as a ‘warning shot’ to landowners to step up their efforts to repel land invasions lest their municipality is targeted by invaders next. We therefore anticipate that neighboring land reforms should spill over into additional invasions, but this effect should be substantially reduced in the presence of the demonstrated capacity of landowners to organize: namely, to inflict violence on land invaders.

Table 4 presents several models indicating how the deployment of violence in the presence of neighboring land reforms influence land invasions. Given the insignificance of out of state public land recognitions in Table 3, and to ease interpretation of the remaining interaction terms and their constituent variables, we drop the indicator for out of state public land recognitions in these and subsequent models.¹² In Models 1-3 of Table 4 we find that rural assassinations in municipalities that have no neighboring land reforms are linked to additional invasions. Further supporting our argument, these models indicate that the spillover effects of neighboring land reforms on land invasions are significantly lower in municipalities where landowners have the demonstrated capacity to inflict violence on land invaders. A sufficiently high capacity of landowner organization in Model 3 (around the 95th percentile for municipalities with some violence during the period), measured by the count of previous assassinations, actually entirely inoculates a municipality from any spillover effects of neighboring reforms. These results closely mirror the results using landholding inequality as a measure of landowners’ organizational response presented in Table 3.

Intensive Soybean Cultivation. A separate indicator of landowners’ capacity to organize derives from the type of crops that they produce. Whereas some crops such as wheat are conducive to small-scale farming, other crops benefit from economies of scale (Rajan et al., 2011). Furthermore, crops vary in their need for mechanization and investment intensive inputs such as specialized fertilizers and irrigation. Economies of scale and capital intensive inputs are perhaps best captured by Brazil’s ongoing and massive soybean boom, which has favored large landowners and agribusiness. The expansion of the soy frontier since the 1970s in Brazil has required several agricultural and social adaptations: the use of liming and other fertilizers

¹²This variable is consistently statistically insignificant and small in magnitude, and its omission does not influence the results.

in large amounts to increase land quality, the extensive use of tractors, sophisticated technical experimentation (e.g., genetic adaptation of soy varieties), the construction of storage facilities, and farmer organization to transport harvests to the main markets (Bragança, Assunção, and Ferraz, 2014, pp. 6-7). Though these adaptations do not put soybean production out of the reach of smaller farmers and cooperatives, they nonetheless all favor large landowners and agribusiness.

There are two ways in which we measure organizational capacity among soybean producers. The first is with a measure of soy yields per hectare (“soybean intensity”), with data from IPEA. Large soy producers with the resources to invest in the adaptations listed above are more likely to have higher soy yields per unit area. Their ability to construct storage facilities and organize joint links to broader markets also endows them with a greater capacity to act collectively to repel invasions when neighboring reforms threaten to spill over. Importantly, soybean intensity is rarely high enough to exempt producers from expropriation on the basis of INCRA’s productivity criteria: properties can still fall short of full productivity on the basis of the “Degree of Land Use” criteria, which large landowners criticize for not taking sufficient account of the need to fallow land and adapt land use to short-term market fluctuations. Furthermore, it is documented that local technology improvements that enhance productivity result in more steeply rising productivity criteria from INCRA, making producers victims of their own efficiency. INCRA estimates that an incredible 62% of rural land fails to meet INCRA’s productivity criteria. And large producers on the agricultural frontier where property rights are often contested and chains of title are hard to trace can still run afoul of INCRA if they cannot prove that their property was legally obtained and registered – an issue INCRA claims is widespread.

The second way we measure organizational capacity is by identifying the proportion of cultivated land in a municipality used for soy production. In municipalities in which a high concentration of landowners produce soy, we expect landowners to have a better capacity to organize against the threat of land invasions. This is mainly due to the fact that landowner organization should be more likely when a greater proportion of landowners are cultivating the same crop nearby each other and are therefore more likely to have business and social ties. These two measures are strongly correlated ($\text{corr}=0.66$). On the flipside, attractive, well-producing areas for soy production are also appealing targets for land invasions as smaller farmers are squeezed out and fallow periods provide an opportunity for clandestine squatting

on extensive properties where monitoring is costly. Similarly to landholding inequality then, we may expect these areas to attract potential land invaders if not met with an organizational response elicited by the threat of nearby land invasions.

Models 4-5 of Table 4 investigate how organization among soybean producers affects land invasions in the presence of neighboring land reforms. For each of these models we subset the data to the set of municipalities that have any soybean production during the entire period to eliminate municipalities that are entirely unsuited to soybean cultivation and therefore will not evidence these dynamics. In a manner paralleling Models 1-3, land invasions are more likely in areas with intensive soybean cultivation and municipalities in which a large proportion of land is used for soy cultivation. We attribute this to demand for access to land in these areas on the part of land invaders. Land invasions are also more likely in municipalities surrounded by relevant neighboring land reforms. The interaction between these variables, however, is again negative and statistically significant, indicating that organized soy producers are able to repel the threat of land invasions spilling over from neighboring reforms. In Model 5, the municipalities that nearly exclusively cultivate soy can almost entirely block any spillover land invasions associated with neighboring reforms.

Political Connections to Parliament. We next investigate the role of political connections – an eminent and powerful sign of organization – in stifling the spillover effects of neighboring land reform on local land invasions. Arguably, the pinnacle of landowner organization is having a connection to a member of parliament who is part of the powerful congressional bloc representing landowner interests. Political connectedness also differs from the previous measures of organization in several key ways: it captures landowner organization without necessarily capturing demand for land by potential land invaders, and it represents ex ante rather than reflexive organization that can serve to project an effective deterrent threat. Political connections should therefore make it less likely that there are land invasions in a municipality and should also cauterize spillover effects induced by neighboring expropriations.

Landowners that are politically and economically connected to – or that themselves are – members of the powerful congressional bloc representing rural interests (the *bancada ruralista*) are more capable of projecting power ex ante to would-be land invaders. Not only are these connections themselves generative of organizational strength, but landowners with such ties can more

effectively exert personal influence within the bureaucracy, call attention and state resources (including the police) to remove squatter settlements and act against rural unrest, and leverage a reputation of political power that serves as a deterrent threat. Connected landowners are also likely to coordinate with other local large landowners in an effort to forge a unified front against land invasions. As Costa (2012, pp. 85-86) aptly demonstrates, landowner social and economic networks are foundational to the concentration of rural municipal power, which is both “vertically integrated into federal politics and horizontally deployed in state government through the tentacles of powerful landowners that seek to protect their heritage and kinship networks and influence policy.” In municipalities where landowners have these connections and organizational tools at their disposal, baseline rates of land invasions should be lower, and spillover effects should be absent.

Furthermore, political connections represent a “purer” measure of landowner organization in that it is not necessarily coterminous with the attractiveness of land to potential land invaders. Parliamentary members are elected within multimember state districts, of which there are 26 – dramatically fewer than Brazil’s 5,500 municipalities. As a result, it would be very difficult, though not impossible, for landowners in any given rural municipality with few votes to place one of their own members in the parliament. There should thus be more of a decoupling between economic and personal ties of parliamentarians represented in the *bancada ruralista* and localized threats to the commercial property of these political representatives and their business associates. Electoral influence is in no way deterministic of having a member of the *bancada ruralista* elected who happens to have business-related landholdings in a particular municipality.

We measure political connections by capturing land ownership of businesses that are owned by members of the *bancada ruralista* or have political ties to the *bancada ruralista*. Data are taken from Costa (2012), who gathered details on business landholdings directly from INCRA for the year 2003. We fill in the same data across municipalities for the remainder of the electoral period until 2006. We create three measures from the data on business connections. The first is a simple dummy variable that flags municipalities where businesses that are politically connected to the *bancada ruralista* own land. The second is a count variable that measures the strength of these connections through the number of politically connected businesses with landholdings in a municipality. Finally, we test a measure of the logged area

of land (in hectares) held by businesses with direct ties to the *bancada ruralista*.¹³

Table 5 provides the estimation results of the determinants of land invasions as a function of pressures due to neighboring land reforms and ties to national parliamentarians in the *bancada ruralista*. In Models 1–3 we find that the presence of businesses that hold land and have political connections to the *bancada ruralista* significantly tempers land invasions in a municipality. This is true whether we operationalize political business ties as a simple indicator, a count of landholdings, or the area of landholdings in a municipality. Past neighboring land reforms, for their part, continue to spill over into additional invasions. Although this holds even in municipalities in which landowners have ties to powerful politicians, the effect of political connections forestalls all but the most extreme waves of neighboring reforms (corresponding to the 99th percentile of neighboring reforms in Model 1).

ALTERNATIVE EXPLANATIONS

There are two primary alternative explanations that could account for the patterns observed in the analyses above. This section takes up these alternatives in turn.

Peasant Versus Landowner Organization. The first alternative explanation would claim that peasant rather than landowner organizational capacity accounts for the observed pattern of land invasions. Perhaps facing a hostile rural environment absent reform spillovers, collective action barriers are high and can only be overcome when the most organized landless social movement, the MST, is willing to aid peasants in order to call attention to landlessness – a tactic that could be especially effective in unequal municipalities that shed a harsh light on rural inequity. Then when there is a permissive environment in the form of neighboring reforms, peasants find organizing invasions easier across the board and thus the most unequal municipalities are no longer specifically targeted.

Table 6 tests this alternative explanation by differentiating highly organized land invasions that involve the MST from those that are not supported by this key social movement. If we find that the same patterns of land invasions obtain for both more and less organized land invasions,

¹³Results are similar when measuring political connectedness through the self-reported personal or family-owned landholdings of members of the *bancada ruralista*, though somewhat weaker, perhaps due to well-documented underreporting of personal landholdings (Costa, 2012).

then we can infer that it is the response side of landowner organization rather than peasant organization that is driving the results. Models 1-2 of Table 6 are specified the same way as Model 3 of Table 2 and Model 5 of Table 3 but exclude municipality-years in which the MST was involved in land invasions, with data taken from Dataluta as detailed above. The findings largely mirror those for the full sample presented in the earlier tables. Models 3-4 instead exclude municipality-years in which the MST was *not* involved in land invasions. Again the results mirror the previous results and those in Models 1-2 of Table 6. In short, whether self-organized or aided by a powerful social movement, land invasions follow similar patterns vis-a-vis landholding inequality and neighboring land reforms. This casts doubt on peasant organization as a mechanism driving the results – perhaps not too surprising given the presumptively much higher barriers to organization for several hundred landless peasant families versus a small number of locally rooted large landowners.

Political Partisanship. The second alternative explanation for where land invasions materialize is the political affiliation of political executives, namely mayors, governors, and the president. State governors are powerful actors in the Brazilian political system. Furthermore, the police that can be used to evict squatter settlements are controlled at the state level. Mayors, for their part, may either give local cover to or politicize land squatters. The president indirectly appoints the head of INCRA and can use her administrative clout to direct the land reform process. Political partisanship could therefore provide an alternative explanation for the findings if, for instance, one-off land invasions targeting unequal municipalities are hard to rebuff, but when there is an evident threat of invasions due to neighboring reforms, political concordance between mayors and governors on the right yields police deployment to protect powerful large landowners in unequal places. A similar finding could obtain if governors and the president on the right agree on “law and order” policing in response to unrest – especially in municipalities where politically powerful landowners have the clout to call a governor’s attention.

We test this alternative by examining the patterns of land invasions where there is political concordance between mayors and governors and governors and the president on the right and, separately, political concordance on the left.¹⁴ If the alternative is correct, we should expect political concordance on the left to yield either (i) more land invasions regardless of landholding

¹⁴We assign the ideological orientation of presidents, governors, and mayors on a three point (left-center-right) scale using the ideological coding of Brazil’s splintered party system by Carreirão (2006).

inequality; or (ii) the systematic targeting of more unequal municipalities with land invasions regardless of spillover threats given a broader pool of sympathetic voters. Regardless, it is hard to countenance why unequal municipalities would face lower rates of invasions in the face of spillover threats under left rule. The results of these tests, reported in Table 11 of the Appendix for reasons of space, indicate that the same patterns of land invasions obtain irrespective of whether mayors and governors or governors and the president share political views on the left or the right. In all eight of the estimated models, land invasions unfold in the same way regardless of the partisan alignment of political executives. These results suggest that it is again landowner organization rather than partisanship driving the results. This likely resonates with scholars of Brazil, who have long noted the muted importance of ideology in political decision-making (e.g. Samuels, 2003), perhaps with the exception of the more programmatic party PT.

CONCLUSION

This paper investigates two prominent interrelated questions. First, what is the relationship between land inequality and rural unrest? And second, why does land reform aimed at undercutting rural unrest sometimes fail? Despite offering many important insights, previous research on these questions is mixed. We investigate landowner organization as a mechanism that conditions the relationship between landholding inequality and rural unrest. Earlier scholarship emphasized how land inequality generates rural discontent, thereby potentially spurring conflict. Our theoretical corrective emphasizes that land inequality also taps the presence of large landowners – actors much more equipped to act collectively when prompted. This observation dovetails with key findings from the growing literature on elite collective action.

Using municipal-level data from Brazil’s massive land reform program and the universe of nearly 8,000 land invasions staged by several million individuals over the period 1988–2008, we demonstrate that while isolated threats to large landowners in the form of land invasions in highly unequal areas are difficult to repel, landowners can successfully resist land invasions when broader local threats catalyze them to organize. Spillover land invasions spurred by neighboring land reforms are cauterized where land inequality is high. They are also forestalled where landowners have the demonstrable capacity to deploy violence, where large soybean producers dominate the countryside, and where landowners have political connections to the *bancada ruralista* in

parliament. Landed elites in these municipalities coordinate to counteract potential invasions. The relationship between landholding inequality and land invasions is therefore conditional on active landowner organization. Future research might test which organizational strategies are most effective in other contexts, and whether a similar mechanism operates among business and other economic elite groups whose property rights face sporadic and consequential threats.

While only further research can robustly demonstrate how our findings generalize, Table 1 indicates a broad set of potentially similar contemporary cases. Extant research on cases such as Colombia, Italy, and Russia suggests that the dynamics we highlight are at play in at least some of these cases. And given the demand-driven structure of land reform in cases like Chile, South Africa, and Venezuela, it would hardly be surprising if not only do land invasions spur reform in these countries, but landowners are also galvanized to act collectively in places where local threats to their property are evident. Importantly, inequality, rural unrest, and land reform are unlikely to subside in the near future in countries listed in Table 1, and the growing rural populations and land pressure in parts of the developing world imply that this list – and with it the importance of the questions this paper engages – is likely to grow. Though landowners in many of these countries may organize in response to threats transmitted through channels other than nearby land reforms – such as burgeoning local social movements or a broadening of political participation through the extension of the franchise or the reduced ability to engage in clientelism – the long history of powerful landowners suppressing rural dwellers suggests that such organization can still work to undercut the relationship between landholding inequality and unrest.

TABLE 1. Ongoing
Land Reforms and Types of Land Conflict in Countries with Highly Unequal Landholdings

Country	Landholding Inequality	Types of Land Conflict	Land Reform Ongoing Since
Bolivia	0.77	Land invasions, squatting, protests, strikes	1996
Brazil	0.86	Land invasions, squatting, protests, rural assassinations	1964
Chile	0.91	Land invasions, protests	1993
Colombia	0.80	Squatting, strikes, blockades	1961
El Salvador	0.81	Land invasions, squatting	1992
Guatemala	0.85	Land invasions, squatting	1998
India	0.6	Squatting, protests, rallies	1947
Kenya	0.77	Land invasions, squatting, protests	2009
Malawi	0.46	Land invasions, protests	2004
Namibia	0.36	Land invasions, squatting	1995
Nepal	0.49	Land invasions, squatting, protests	1957
Philippines	0.55	Land invasions, protests, rural assassinations	1963
South Africa	0.70	Land invasions, protests, strikes	1994
Venezuela	0.88	Land invasions, squatting	2001
Zimbabwe	N/A	Land invasions, squatting	1992

The data for landholding inequality come from Lipton (2009), the FAO's World Census of Agriculture, Brazil's national statistics agency, Deininger and Squire (1996), and USAID. Inequality figures are from the most recent year available.

TABLE 2. Determinants of Land Invasions in Brazil, 1988–2008

Dependent Variable:	Full Sample					Municipalities where $ \Delta \text{Land Gini} < 0.005$		
	Invasion Count			Invasion Dummy	Invasion Families	Invasion Count	Invasion Dummy	Invasion Families
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Land Gini	5.725*** (0.383)	5.141*** (0.358)	6.332*** (0.460)	5.531*** (0.367)	8.547*** (0.793)	7.840*** (0.614)	7.053*** (0.507)	9.729*** (1.286)
Neighboring Reforms		0.403*** (0.030)	1.373*** (0.203)	1.204*** (0.159)	2.101*** (0.365)	1.626*** (0.281)	1.484*** (0.226)	2.123*** (0.508)
Land Gini*Neighboring Reforms			-1.273*** (0.265)	-1.098*** (0.206)	-2.342*** (0.471)	-1.604*** (0.365)	-1.455*** (0.294)	-2.342*** (0.664)
Percent Rural	-0.681*** (0.216)	-0.671*** (0.204)	-0.671*** (0.203)	-0.666*** (0.178)	-1.234*** (0.347)	-0.774*** (0.291)	-0.901*** (0.244)	-1.617*** (0.467)
log(Ag Production)	0.303*** (0.023)	0.236*** (0.022)	0.237*** (0.022)	0.240*** (0.020)	0.271*** (0.035)	0.240*** (0.031)	0.236*** (0.029)	0.279*** (0.049)
log(Income per capita)	0.030 (0.165)	0.225 (0.153)	0.241 (0.151)	0.302** (0.120)	0.038 (0.220)	0.298 (0.183)	0.258 (0.167)	0.078 (0.317)
$\Delta \log(\text{Income per capita})$	-2.046** (0.816)	-0.843 (0.876)	-0.785 (0.868)	-2.068*** (0.537)	1.623 (1.320)	-1.609* (0.826)	-2.387*** (0.693)	0.238 (1.911)
Cumulative Grants		0.202*** (0.015)	0.202*** (0.015)	0.137*** (0.011)	0.249*** (0.026)	0.215*** (0.024)	0.138*** (0.016)	0.266*** (0.038)
Time Trend	YES	YES	YES	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	101433	101433	101433	101433	101433	58113	58043	58113

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-tailed). Standard errors in parentheses (clustered by municipality). Constants estimated but not reported. All independent variables are lagged by one period. “Neighboring Reforms” include all land grants in municipalities within a 100km radius. All reform count measures are log-transformed. Models 6-8 are restricted to municipalities in which the landholding gini changed by less than 0.005 annually from 1996 to 2006.

TABLE 3. Identifying spillover effects of land reforms on land invasions, 1988–2008
 Dependent Variable: Number of Land Invasions

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Neighboring Expropriations	0.445*** (0.032)					
Neighboring Recognitions out of State	-0.063 (0.085)	-0.082 (0.088)	-0.082 (0.088)	-0.049 (0.083)	0.301 (0.495)	-0.379 (0.679)
Neighboring Expropriations in State		0.356*** (0.032)	0.351*** (0.032)			
Neighboring Expropriations out of State		0.330*** (0.056)	0.322*** (0.056)			
Neighboring Recognitions in State			0.115* (0.065)			
Relevant Neighboring Reforms				0.338*** (0.027)	1.298*** (0.178)	1.097*** (0.244)
Land Gini*Relevant Neighboring Reforms					-1.242*** (0.229)	-0.937*** (0.316)
Land Gini*Neighboring Recognitions out of State					-0.461 (0.633)	0.560 (0.866)
Land Gini	5.212*** (0.361)	5.196*** (0.360)	5.158*** (0.361)	5.099*** (0.358)	6.224*** (0.427)	5.319*** (0.444)
Percent Rural	-0.680*** (0.203)	-0.662*** (0.205)	-0.661*** (0.204)	-0.690*** (0.202)	-0.691*** (0.202)	-0.764*** (0.218)
log(Ag Production)	0.234*** (0.022)	0.232*** (0.022)	0.233*** (0.022)	0.234*** (0.022)	0.235*** (0.022)	0.219*** (0.025)
log(Income per capita)	0.221 (0.149)	0.227 (0.150)	0.234 (0.151)	0.218 (0.152)	0.234 (0.151)	0.171 (0.140)
Δ log(Income per capita)	-0.770 (0.876)	-0.815 (0.872)	-0.802 (0.875)	-0.954 (0.875)	-0.880 (0.868)	-1.124 (0.853)
Cumulative Grants	0.208*** (0.015)	0.208*** (0.015)	0.206*** (0.015)	0.204*** (0.014)	0.203*** (0.014)	0.186*** (0.031)
Time Trend	YES	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	101433	101433	101433	101433	101433	86498

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-tailed). Standard errors in parentheses (clustered by municipality). Constants estimated but not reported. All independent variables are lagged by one period. “Relevant Neighboring Reforms” include all expropriations (in-state and out-of state) and in-state land grants in municipalities within a 100km radius. All reform count measures are log-transformed. Model 6 is restricted to the subset of municipalities that have not previously experienced a land invasion.

TABLE 4. Landowner Organization and Spillover Effects of Land Reforms, 1988–2008

Measure of Organizational Capacity: Operationalization:	Rural Assassinations			Soy Cultivation	
	Any	Past	Count	Intensity	Proportion
	Model 1	Model 2	Model 3	Model 4	Model 5
Relevant Neighboring Reforms	0.354*** (0.030)	0.358*** (0.028)	0.345*** (0.027)	0.469*** (0.072)	0.401*** (0.053)
Landowner Organization	1.059*** (0.102)	0.828*** (0.117)	0.162*** (0.041)	0.106 (0.068)	1.203*** (0.239)
Landowner Organization*Reforms	-0.174*** (0.050)	-0.227*** (0.055)	-0.044** (0.020)	-0.087** (0.036)	-0.346** (0.151)
Land Gini	4.852*** (0.362)	5.005*** (0.358)	5.084*** (0.359)	7.330*** (0.540)	7.395*** (0.538)
Percent Rural	-0.662*** (0.205)	-0.665*** (0.202)	-0.677*** (0.203)	-0.127 (0.278)	-0.229 (0.276)
log(Ag Production)	0.212*** (0.022)	0.224*** (0.022)	0.232*** (0.022)	0.155*** (0.043)	0.102*** (0.038)
log(Income per capita)	0.181 (0.155)	0.181 (0.153)	0.190 (0.153)	0.156 (0.233)	0.102 (0.231)
Δ log(Income per capita)	-0.898 (0.861)	-0.963 (0.858)	-0.944 (0.869)	-0.773 (1.232)	-1.080 (1.202)
Cumulative Grants	0.180*** (0.015)	0.189*** (0.015)	0.194*** (0.015)	0.218*** (0.023)	0.214*** (0.022)
Time Trend	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES
Observations	101433	101433	101433	43976	44628

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-tailed). Standard errors in parentheses (clustered by municipality). Constants estimated but not reported. All independent variables are lagged by one period. “Neighboring Relevant Reforms” include all expropriations (in-state and out-of state) and in-state land grants within a 100km radius. All reform count measures are log-transformed. Models 4-5 are estimated for the subset of municipalities with any soy production over the period.

TABLE 5. Political Connections and Spillover Effects of Land Reforms, 1988–2008
 Dependent Variable: Number of Land Invasions

Connectedness measure:	Dummy	Count	log(Area)
	Model 1	Model 2	Model 3
Relevant Neighboring Reforms	0.215*** (0.049)	0.211*** (0.049)	0.213*** (0.049)
Political Connection	-0.940*** (0.320)	-0.149** (0.076)	-0.146*** (0.052)
Political Connection*Reforms	0.045 (0.217)	0.050 (0.045)	0.017 (0.035)
Land Gini	4.348*** (0.533)	4.294*** (0.533)	4.346*** (0.533)
Percent Rural	-1.124*** (0.336)	-1.113*** (0.336)	-1.125*** (0.337)
log(Ag Production)	0.205*** (0.032)	0.204*** (0.032)	0.205*** (0.032)
log(Income per capita)	0.188 (0.266)	0.169 (0.267)	0.179 (0.266)
Δ log(Income per capita)	3.574 (3.167)	3.526 (3.173)	3.585 (3.171)
Cumulative Grants	0.179*** (0.017)	0.179*** (0.017)	0.179*** (0.017)
Time Trend	YES	YES	YES
Fixed Effects	YES	YES	YES
Observations	21741	21741	21741

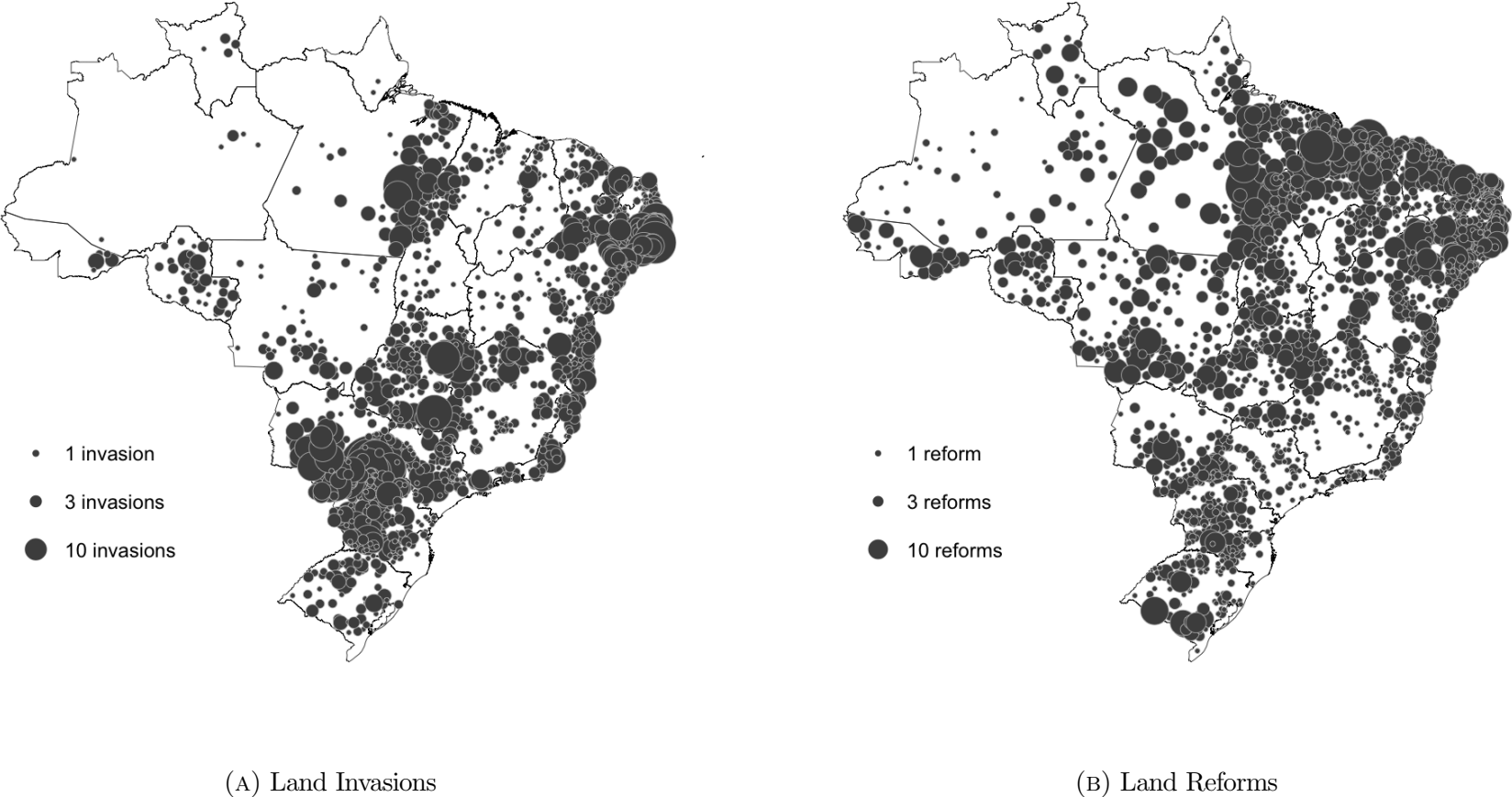
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-tailed). Standard errors in parentheses (clustered by municipality). Constants estimated but not reported. All independent variables are lagged by one period. “Relevant Neighboring Reforms” include all expropriations (in-state and out-of state) and in-state land grants within a 100km radius. All reform count measures are log-transformed.

TABLE 6. Peasant Organization as an Alternative Explanation for Land Invasions, 1988–2008

Peasant Organizational Capacity:	Non-MST Invasions		MST supported Invasions	
	Model 1	Model 2	Model 3	Model 4
Neighboring Relevant Reforms	9.683*** (1.508)	18.410*** (3.550)	1.397 (1.407)	4.425 (3.053)
Land Gini	28.181*** (5.243)	14.283 (14.259)	6.206 (5.084)	18.097 (11.658)
Land Gini*Neighboring Relevant Reforms	-10.915*** (1.953)	-19.688*** (4.664)	-2.528 (1.801)	-6.916* (3.965)
Percent Rural	2.251*** (0.407)	16.064** (6.606)	-0.833 (0.550)	-4.222 (5.605)
log(Ag Production)	-0.380*** (0.051)	0.185 (0.276)	-0.110* (0.062)	0.058 (0.238)
log(Income per capita)	-1.227*** (0.330)	67.045*** (2.445)	-0.484 (0.408)	3.420** (1.606)
Δ log(Income per capita)	-11.468*** (3.304)	-10.412** (4.991)	0.451 (6.127)	-5.130 (8.682)
Cumulative Grants	0.175*** (0.036)	1.060*** (0.205)	0.052 (0.040)	-0.017 (0.136)
Time Trend	YES	YES	YES	YES
Fixed Effects	STATE	MUNI	STATE	MUNI
Observations	15841	15841	16162	16162

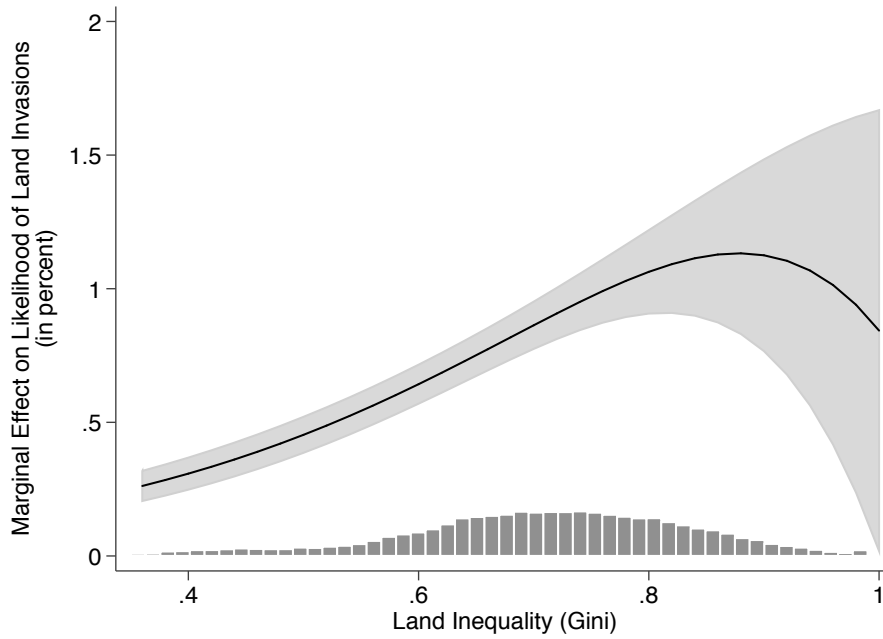
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-tailed). Standard errors in parentheses (clustered by municipality). Constants estimated but not reported. All independent variables are lagged by one period. “Relevant Neighboring Reforms” include all expropriations (in-state and out-of state) and in-state land grants within a 100km radius. All reform count measures are log-transformed. Models 1-2 include all observations with no invasions and invasions not supported by Brazil’s landless movement (MST). Models 3-4 include all observations with no invasions and invasions supported by the MST.

FIGURE 1. Land Invasions and Land Reforms in Brazil, 1988–2008

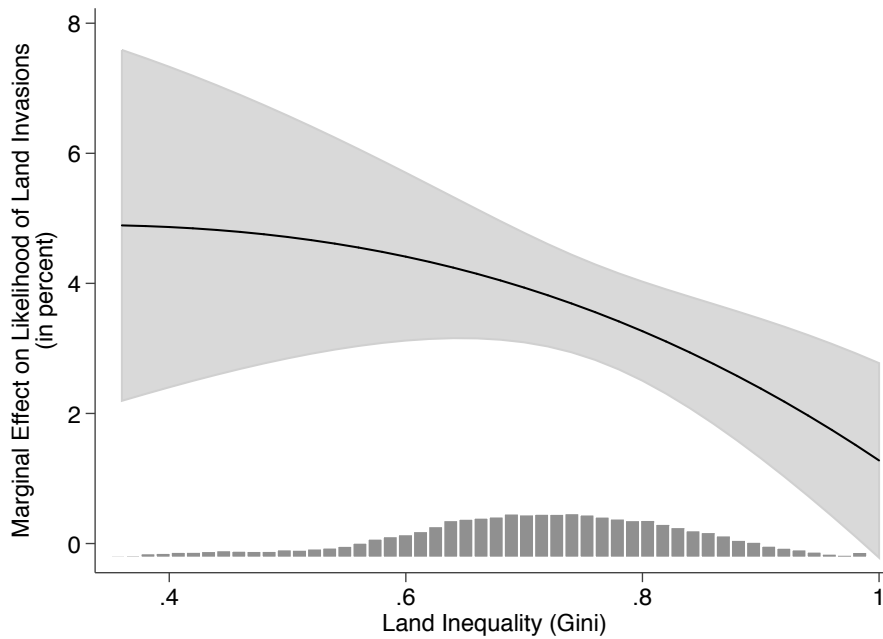


Note: Data on land invasions are from the Comissão Pastoral da Terra (CPT).
Data on land reform are from the Instituto Nacional de Colonização e Reforma Agrária (INCRA).

FIGURE 2. Marginal Effect of Neighboring Reforms on Invasions



(A) Marginal Effect for Municipalities without Neighboring Reforms



(B) Marginal Effect for Municipalities with Neighboring Reforms

Note: Figure (A) displays the marginal effect of *neighboring reform* (starting from no neighboring reforms) on the probability of observing an invasion in municipalities over the range of landholding inequality using the Model 4 estimates from Table 2 (with 95% confidence intervals). Figure (B) displays the marginal effect of *neighboring reform* for the same model, but for municipalities with already high levels (30) of neighboring reforms. The overlaid histograms along the x-axis show the distribution of land inequality in the estimation sample.

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APPENDIX

TABLE 7. Descriptive Statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Land Invasions (Count)	0.07	0.5	0	31	116823
Land Invasions (Dummy)	0.04	0.19	0	1	116823
Land Invasions (Families)	9.58	99.90	0	12540	116823
Land Grants (Count)	0.07	0.44	0	21	116823
Land Grants (Families Settled)	6.19	62.2	0	3719	116823
Land Grant Area	594.59	17455.33	0	2450381	116823
Cumulative Land Grants	0.58	2.1	0	75	116823
Neighboring Reforms	2.33	4.56	0	81	116823
Neighboring Expropriations	1.67	3.62	0	78	116823
Neighboring Recognitions	0.4	1.79	0	44	116823
Neighboring Federal Reforms	1.89	3.9	0	79	116823
Neighboring State Reforms	0.34	1.68	0	46	116823
Land Inequality (Gini)	0.71	0.13	0.01	0.99	114947
Percent Rural	0.44	0.24	0.01	0.99	115605
log(Agricultural Production)	8.21	1.63	-1.11	14.59	107485
log(Income Per Capita)	5.05	0.69	2.54	7.33	115605
Δ log(Income Per Capita)	0.07	0.05	-0.15	1.09	115605
Municipality with Rural Assassinations (Dummy)	0.08	0.28	0	1	117559
Rural Assassinations in the Past (Dummy)	0.05	0.22	0	1	117559
Rural Assassinations (Count)	0.1	0.76	0	28	117559
Soy Intensity (Yield in Tons per Hectare)	0.58	1	0	8	114536
Soy Proportion (Share of Farm Area)	0.08	0.18	0	0.98	107495
Political Business Connection (Dummy)	0.02	0.12	0	1	33588
Political Business Connection (Count)	0.07	1.11	0	48	33588
Political Business Connection (Area)	77.51	2820.95	0	195309	33588
PT Vote Share for President	34.32	17.94	1.16	93.37	81033
MST supported Invasions	0.02	0.12	0	1	116823
PT Vote Share for Mayor	5.81	14.02	0	100	71367
Δ Land Gini	0.01	0.09	-0.74	0.73	114870

FIGURE 3. Land Invasions and Land Reforms in Brazil, 1988–2008

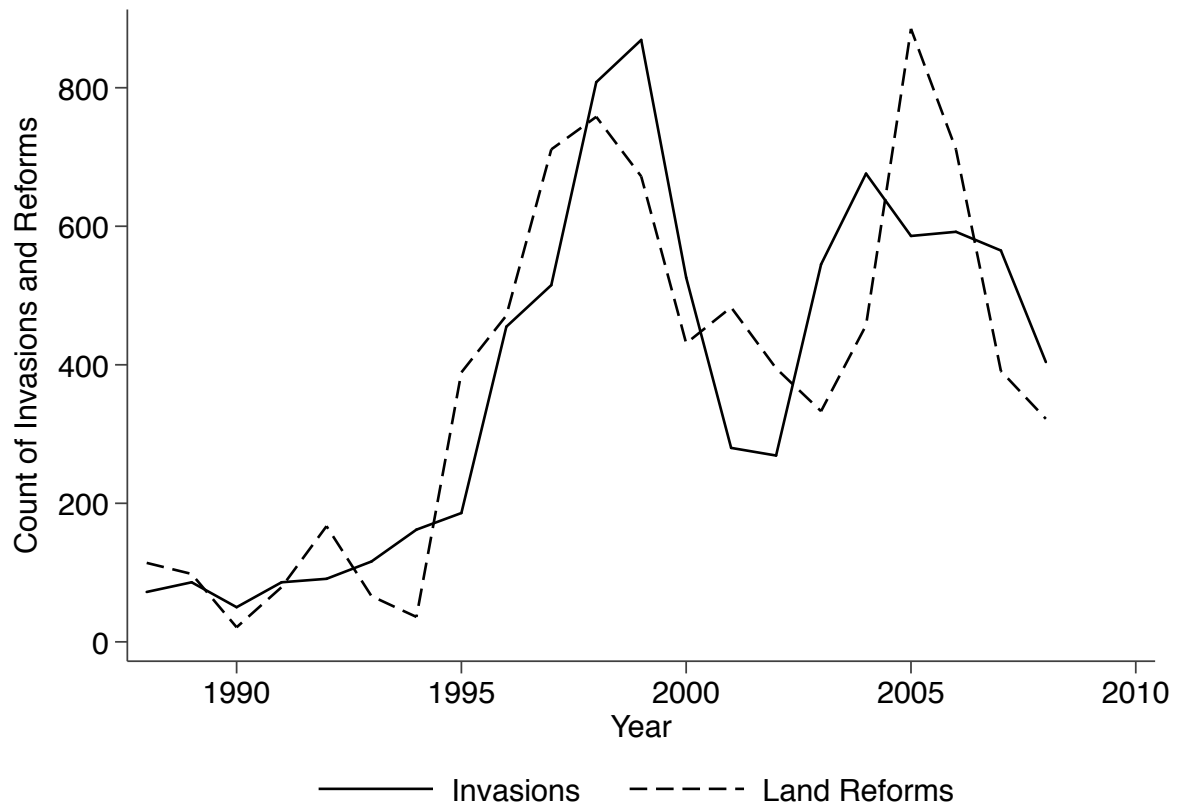


TABLE 8. Determinants of Land Invasions in Brazil, 1988–2008:
Including Municipal Fixed Effects as Robustness Check

Invasions Measure as DV:	Full Sample						Δ Land Gini < 0.005	
	Count	Families	Count	Families	Count	Families	Count	Families
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Land Gini	4.481*** (0.318)	5.065*** (0.247)	1.384*** (0.351)	1.968*** (0.289)	1.209*** (0.398)	1.862*** (0.311)	1.257* (0.737)	2.784*** (0.484)
Neighboring Reforms	0.941*** (0.144)	1.421*** (0.118)	0.650*** (0.155)	0.715*** (0.138)	0.415** (0.163)	0.542*** (0.144)	0.483** (0.242)	0.799*** (0.210)
Land Gini*Neighboring Reforms	-0.865*** (0.184)	-1.272*** (0.150)	-0.420** (0.199)	-0.444** (0.177)	-0.316 (0.208)	-0.399** (0.184)	-0.425 (0.309)	-0.715*** (0.267)
Percent Rural	-0.692*** (0.145)	-0.899*** (0.101)	-0.328* (0.182)	-0.309** (0.121)	-0.023 (0.206)	-0.372*** (0.132)	-0.544* (0.286)	-0.706*** (0.186)
log(Ag Production)	0.194*** (0.016)	0.295*** (0.012)	-0.029 (0.019)	0.090*** (0.014)	0.056*** (0.020)	0.131*** (0.014)	0.031 (0.028)	0.117*** (0.020)
log(Income per capita)	0.182*** (0.068)	0.080* (0.049)	0.660*** (0.049)	0.456*** (0.041)	0.463*** (0.090)	0.213*** (0.060)	0.461*** (0.125)	0.262*** (0.085)
Δ log(Income per capita)	-2.529*** (0.448)	-2.068*** (0.443)	-1.153*** (0.397)	-0.958** (0.383)	-2.666*** (0.462)	-2.349*** (0.462)	-2.843*** (0.636)	-2.765*** (0.641)
Cumulative Grants	0.025*** (0.004)	0.074*** (0.002)	0.005 (0.004)	0.056*** (0.003)	-0.005 (0.005)	0.054*** (0.003)	-0.001 (0.006)	0.047*** (0.004)
Time Trend	YES	YES	NO	NO	YES	YES	YES	YES
Fixed Effects	NO	NO	YES	YES	YES	YES	YES	YES
Observations	101433	101433	29812	29275	29812	29275	17103	16811

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-tailed). Standard errors in parentheses (clustered by municipality for regression without municipal fixed effects). Constants estimated but not reported. All independent variables are lagged by one period. “Neighboring Reforms” include all land grants in municipalities within a 100km radius. All reform count measures are log-transformed. Models 7 – 8 are restricted to municipalities in which the landholding gini changed by less than 0.005 annually from 1996 to 2006. Models 1 – 2 include municipal random effects and models 3 – 8 include municipal fixed effects.

WORKERS' PARTY (PT) VOTE SHARE

Electoral results are yet another way to capture landowner responses to the threat of invasions posed by neighboring land expropriations. In Brazil, the political party most clearly associated with support for land reform is the Workers' Party (*Partido dos Trabalhadores*, or PT). Brazil's Workers' Party has historically been an ally of Brazil's landless workers movement (MST) and other agrarian reform activist groups (Ondetti, 2011).¹⁵

If landowners are able to organize effectively against the threat of land invasion, we would expect the PT vote share in presidential and mayoral elections to decline following reform-induced threats from neighboring municipalities. This should primarily operate via clientelistic exchanges of private goods for votes.¹⁶ A wide range of literature on Brazil has long traced the clientelistic role of large landowners in generating favorable electoral support by influencing rural voters (e.g. Alston, Harris, et al., 2012; Brown et al., 2011; Leal, 1975). Such an imposition of the landed elite's political preferences on the electorate can only be expected in municipalities where landowners have sufficient control: places where land inequality is already high (Brown et al., 2011).¹⁷ In less unequal municipalities where landowners likely wield less power on the electorate, we expect that support for the PT will increase following neighboring reforms that have spillover potential.

To test this, we construct a dependent variable that taps the change in the vote share of the PT. We measure the change in PT electoral support by the municipal level vote share of PT candidates in presidential and mayoral elections over the period 1994–2008.¹⁸ We estimate the determinants for the change in PT vote share, ΔV_{it} occurring in election year t (relative

¹⁵The relationship between the PT and the MST was one of mutual support. The MST as an organization provided support for the party and the political campaigns of its candidates. Some of the landless movement's founders in the South even joined the PT's ranks and became successful PT politicians (Ondetti, 2011, p. 127).

¹⁶Land reform targeting private property is overwhelmingly conducted at the national level by INCRA, which as part of the executive is controlled by the presidency. On the other hand, clientelistic practices of exchanging votes for private goods are likely more pronounced in mayoral elections.

¹⁷Brown et al. (2011) argue that land invasions should increase support for the PT in highly unequal municipalities; this is yet another reason why landowners would want to organize to forestall land invasions locally.

¹⁸The support for mayoral PT candidates is harder to measure consistently. In many municipalities, the PT either does not field its own candidate or forms part of a coalition of parties supporting one of the candidates in the race (73% of municipal elections in the time period covered by the analysis lacked a PT candidate). By contrast, the PT (and particularly Lula) played a significant role at the presidential level throughout this period, providing a consistent measure over time of support for the party by municipality.

to the previous election result) in a particular municipality i as follows:

$$(2) \quad \Delta V_{it} = \mathbf{X}_{it}\beta + \alpha_s + \delta_t + \epsilon_{it}$$

where \mathbf{X}_{it} is a matrix of time-varying independent variables, α_s are state or municipal fixed effects depending on the model, and δ_t are year fixed effects. We use linear regression and cluster standard errors by municipality.

Table 9 presents the regression estimates of the determinants of PT support in presidential and mayoral elections. Neighboring relevant reforms are now measured as the sum of relevant expropriation-based land reforms and within-state land recognitions in municipalities within a 100km radius over the past three years before an election (i.e., during the past legislative period). Model 1 indicates that faced with a threat as measured by neighboring relevant reforms, landowners are able to temper the support of PT candidates in subsequent presidential elections in places with high landholding inequality.¹⁹ Model 2 is specified similarly to Model 1 but includes municipal rather than state fixed effects. Unlike in the models with land invasions as the dependent variable, introducing municipal fixed effects in models with $\Delta Voteshare_{it}$ as the dependent variable does not lead to the exclusion of large parts of the sample. The coefficient on the interaction term indicates that the results strengthen.

Models 3–4 replicate Models 1–2 but now use the PT vote share in municipal elections as the dependent variable.²⁰ Though efforts of suppressing the PT vote are more likely to influence outcomes in mayoral elections than in presidential ones see, e.g., Brown et al., 2011, there is a countervailing factor: land reform targeting private property is almost entirely carried out by INCRA, which is part of the federal executive branch. Models 3–4 demonstrate results consistent with Models 1–2, though the substantive and statistical significance of the interaction terms is lessened. The somewhat less precise estimates in these models (p=0.15 on the interaction term in Model 3) are not surprising given that the PT does not field candidates in all municipalities, likely leading to an underestimate of latent PT support and therefore larger confidence intervals in these models.

For ease of interpretation, Figure 4 calculates the average marginal effects of neighboring

¹⁹There is no evidence that recognitions out of state behave the same way.

²⁰Municipal elections are offset from presidential elections by two years.

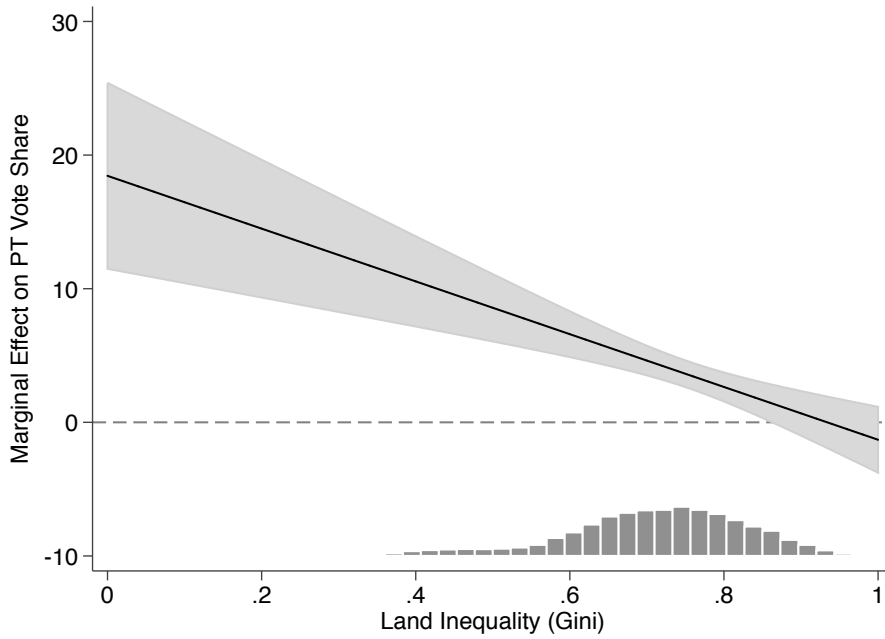
land reforms on PT vote share over the range of landholding inequality in both presidential and mayoral elections using the Model 2 and Model 4 specifications. At low levels of landholding inequality, relevant land reforms in the past three years before an election in neighboring municipalities unsurprisingly garner support for PT candidates. In highly unequal municipalities, by contrast, relevant land reforms in surrounding municipalities *decrease* the support of PT mayoral candidates and provide no boost to PT presidential candidates. We interpret this as evidence of the organizational capacity of landlords in these municipalities. Consistent with Brown et al. (2011), large landowners in unequal places are capable of using their clientelistic capacities to buy off, intimidate, and otherwise reduce the vote share of their political opponents.

TABLE 9. Determinants of PT support, 1994-2008
 Dependent Variable: Change in Vote Share of Worker's Party

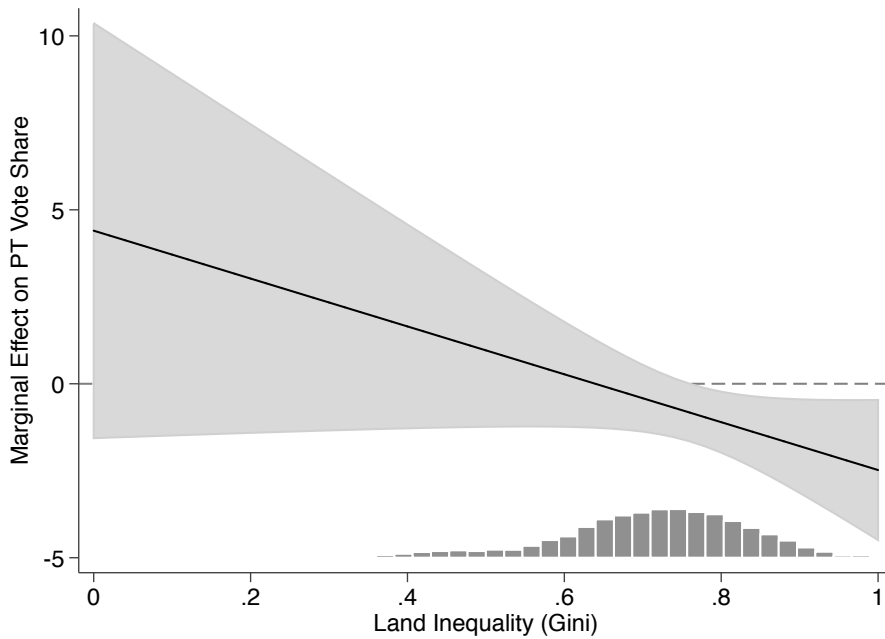
Election Type:	Presidential		Mayoral	
	Model 1	Model 2	Model 3	Model 4
Neighboring Relevant Reforms	9.683*** (1.508)	18.410*** (3.550)	1.397 (1.407)	4.425 (3.053)
Land Gini	28.181*** (5.243)	14.283 (14.259)	6.206 (5.084)	18.097 (11.658)
Land Gini*Neighboring Relevant Reforms	-10.915*** (1.953)	-19.688*** (4.664)	-2.528 (1.801)	-6.916* (3.965)
Percent Rural	2.251*** (0.407)	16.064** (6.606)	-0.833 (0.550)	-4.222 (5.605)
log(Ag Production)	-0.380*** (0.051)	0.185 (0.276)	-0.110* (0.062)	0.058 (0.238)
log(Income per capita)	-1.227*** (0.330)	67.045*** (2.445)	-0.484 (0.408)	3.420** (1.606)
Δ log(Income per capita)	-11.468*** (3.304)	-10.412** (4.991)	0.451 (6.127)	-5.130 (8.682)
Cumulative Grants	0.175*** (0.036)	1.060*** (0.205)	0.052 (0.040)	-0.017 (0.136)
Time Trend	YES	YES	YES	YES
Fixed Effects	STATE	MUNI	STATE	MUNI
Observations	15841	15841	16162	16162

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-tailed). Standard errors in parentheses (clustered by municipality). Constants estimated but not reported. All independent variables are lagged by one period. "Neighboring Relevant Reforms" include all expropriations (in-state and out-of state) and in-state land grants. All reform count measures are log-transformed.

FIGURE 4. Marginal Effects of Neighboring Reforms on PT Voteshare



(A) Presidential Elections



(B) Mayoral Elections

Note: The figure displays the marginal effect of neighboring land reforms on PT vote share over the range of landholding inequality in (a) presidential elections using the Model 2 estimates from Table 9; and (b) mayoral elections using the Model 4 estimates from Table 9. Shaded regions indicate 95% confidence intervals. The overlaid histogram along the x-axes shows the distribution of land inequality used in the estimations.

TABLE 10. Sensitivity to Potential Endogeneity in Land Inequality, 1988–2008

Dependent Variable:	Invasion Count			Invasion Dummy			Invasion Families		
	$ \Delta < 0.005$	$ \Delta < 0.003$	$ \Delta < 0.001$	$ \Delta < 0.005$	$ \Delta < 0.003$	$ \Delta < 0.001$	$ \Delta < 0.005$	$ \Delta < 0.003$	$ \Delta < 0.001$
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Change in Land Gini:									
Land Gini	7.840*** (0.614)	7.732*** (0.790)	7.695*** (1.405)	7.053*** (0.507)	6.856*** (0.656)	6.931*** (1.180)	9.729*** (1.286)	8.518*** (1.323)	14.864*** (1.878)
Neighboring Reforms	1.626*** (0.281)	1.798*** (0.352)	1.801*** (0.550)	1.484*** (0.226)	1.653*** (0.284)	1.312*** (0.484)	2.123*** (0.508)	2.089*** (0.532)	3.586*** (0.633)
Land Gini*Neighboring Reforms	-1.604*** (0.365)	-1.784*** (0.457)	-1.835*** (0.705)	-1.455*** (0.294)	-1.620*** (0.372)	-1.228* (0.631)	-2.342*** (0.664)	-2.215*** (0.688)	-4.471*** (0.817)
Percent Rural	-0.774*** (0.291)	-1.136*** (0.307)	-0.973** (0.477)	-0.901*** (0.244)	-1.034*** (0.266)	-0.721* (0.430)	-1.617*** (0.467)	-2.172*** (0.538)	-3.521*** (0.914)
log(Ag Production)	0.240*** (0.031)	0.227*** (0.036)	0.202*** (0.062)	0.236*** (0.029)	0.220*** (0.035)	0.179*** (0.061)	0.279*** (0.049)	0.252*** (0.056)	0.225** (0.098)
log(Income per capita)	0.298 (0.183)	0.312 (0.205)	0.698* (0.366)	0.258 (0.167)	0.318* (0.187)	0.789** (0.308)	0.078 (0.317)	0.008 (0.347)	-0.176 (0.615)
$\Delta \log(\text{Income per capita})$	-1.609* (0.826)	-1.268 (1.005)	-0.112 (1.548)	-2.387*** (0.693)	-2.049** (0.881)	-0.711 (1.516)	0.238 (1.911)	-0.240 (2.023)	0.862 (2.777)
Cumulative Grants	0.215*** (0.024)	0.224*** (0.030)	0.258*** (0.039)	0.138*** (0.016)	0.151*** (0.021)	0.200*** (0.048)	0.266*** (0.038)	0.301*** (0.047)	0.234*** (0.070)
Time Trend	YES	YES	YES	YES	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	58113	39383	13488	58043	39328	13399	58113	39383	13488

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-tailed). Standard errors in parentheses (clustered by municipality). Constants estimated but not reported. All independent variables are lagged by one period. “Neighboring Reforms” include all land grants in municipalities within a 100km radius. All reform count measures are log-transformed.

TABLE 11. Political
Affiliation of Governors and Mayors as an Alternative Explanation for Land Invasions, 1988–2008

Political Actors: Political Alignment:	Ideological Agreement Governor and Mayor				Ideological Agreement Governor and President			
	Left	Right	Left	Right	Left	Right	Left	Right
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
All Neighboring Reforms	1.491*** (0.264)	1.446** (0.588)			1.655*** (0.296)	1.535*** (0.592)		
Relevant Neighboring Reforms			1.459*** (0.229)	1.596*** (0.519)			1.645*** (0.269)	1.388** (0.557)
Neighboring Recognitions out of State			-0.813 (0.861)	-2.969* (1.686)			-0.356 (0.926)	-1.899 (1.594)
Land Gini*All Neighboring Reforms	-1.409*** (0.348)	-1.560** (0.734)			-1.637*** (0.375)	-1.802** (0.744)		
Land Gini*Relevant Neighboring Reforms			-1.425*** (0.298)	-1.844*** (0.656)			-1.675*** (0.335)	-1.701** (0.698)
Land Gini*Neighboring Recognitions out of State			1.020 (1.101)	3.396 (2.166)			0.535 (1.204)	2.389 (2.055)
Land Gini	6.641*** (0.644)	7.984*** (1.366)	6.529*** (0.586)	7.987*** (1.269)	6.752*** (0.709)	4.921*** (1.045)	6.662*** (0.667)	4.558*** (0.962)
Percent Rural	-0.461* (0.254)	-1.157** (0.505)	-0.500** (0.251)	-1.143** (0.506)	-0.733** (0.292)	-2.431*** (0.452)	-0.758*** (0.290)	-2.425*** (0.449)
log(Ag Production)	0.229*** (0.028)	0.284*** (0.062)	0.225*** (0.028)	0.291*** (0.062)	0.297*** (0.033)	0.218*** (0.042)	0.296*** (0.032)	0.218*** (0.042)
log(Income per capita)	0.450*** (0.172)	-0.388 (0.371)	0.447*** (0.171)	-0.345 (0.369)	0.131 (0.239)	-0.093 (0.336)	0.122 (0.241)	-0.120 (0.332)
Δ log(Income per capita)	-1.272 (0.866)	-5.668** (2.424)	-1.403 (0.863)	-5.613** (2.386)	2.197 (1.819)	4.378 (3.565)	2.219 (1.828)	4.571 (3.541)
Cumulative Grants	0.234*** (0.021)	0.107*** (0.028)	0.236*** (0.021)	0.116*** (0.029)	0.312*** (0.028)	0.118*** (0.015)	0.311*** (0.027)	0.120*** (0.015)
Time Trend	YES	YES	YES	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	43455	4414	43455	4414	50890	9251	50890	9251

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-tailed). Standard errors in parentheses (clustered by municipality). Constants estimated but not reported. All independent variables are lagged by one period. “All Neighboring Reforms” include all land grants within a 100km radius. “Neighboring Relevant Reforms” include all expropriations (in-state and out-of state) and in-state land grants within a 100km radius. All reform count measures are log-transformed. Models 1-4 include all observations in which governors and mayors are ideologically congruent, Models 5-6 select observations of political agreement between governors and the president.