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The Political Economy of Land Privatization in Argentina and Australia, 1810-1850: A Puzzle

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Abstract

This paper examines a puzzle regarding public land privatization in New South Wales and the Province of Buenos Aires in the early nineteenth century. Both claimed frontier lands as public lands to raise revenue. New South Wales lost control of the public claim as squatters rushed out and claimed vast tracts of land. Property rights thus originated as *de facto* squatters' claims, which government subsequently partially accommodated as *de jure* property rights. Paradoxically, in Buenos Aires, where *de jure* property rights were less secure, original transfers of public lands were nonetheless specified *de jure* by government. The paper develops a model that explains these differences as a consequence of violence and the relative cost of enforcement of government claims to public land.

The institutional origins of the "neo-Europes" are now at the epicenter of debate over the colonial causes of the great divergence between rich and poor countries.[1] According to the factor-endowments thesis of Stanley Engerman and Kenneth Sokoloff, the original factor endowments determined whether colonies would develop coercive labor institutions or free labor and broad ownership patterns. European colonizers set up the latter in sparsely inhabited temperate lands, where they found fewer opportunities to extract rents by exploiting indigenous populations or importing slaves (Engerman and Sokoloff, 1997). Daron Acemoglu, Simon Johnson, and James Robinson (AJR) propose that such places emerged as neo-Europes because European immigrants in these colonies "demanded rights and protection similar to, or even better than, those they were familiar with in their home countries," and this made them better prepared to enter the age of industrialization (2001, p. 1370; 2002, p. 1266; 2005, pp. 414-16).

The AJR proposition suggests a fundamental similarity in how institutions of property rights were set up in such diverse places as North America, Australia, New Zealand, South Africa, Argentina, Uruguay, and southeastern Brazil. But how robust is this generalization? Critics of the factor-endowments thesis look to the South American southern cone as an anomaly that lends credence to an older view that colonies inherited the institutions of the colonizer (North 1981, p. 145-46; 1990, p. 102). The AJR explanation opens the door to the "institutional inheritance" among neo-Europes—the colonizing powers, they argue, replicated the institutions of the home country because they saw it in their interest to do so; but did it matter whether the home country was Britain, Spain or Portugal?

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[1] The term "neo-Europes" originated with Crosby (1993).

This article investigates a puzzle in the emergence of property institutions when comparing two neo-Europes—the colony of New South Wales (NSW) in Australia and the Province of Buenos Aires in Argentina. The governments in all of the neo-Europes originally claimed vast stretches of unsettled land as public land, which they intended to sell or lease to raise revenue. In NSW, although the local government set up institutions to transfer well-defined *de jure* private rights to public land, between 1815 and 1835, it lost control of the claims process on the frontier, as settlers ignored legal channels and fees, and, instead, rushed out to squat on *de facto* claims to land which lacked precise measurement, formal specification or secure legal right. By contrast, the provincial government of Buenos Aires, in the early years of its independence, set up institutions to create a modern *de jure* specification of property rights, which required claimants to survey and register claims. Claimants of public land on the Pampean frontier tended to comply with these requirements—the original leasehold rights on the frontier were thus originally measured and specified as *de jure* property rights. This was true despite chronic political instability that put government enforcement of those rights into question.

The puzzle is the following: if British and Spanish colonies each replicated the property institutions of the home country, why did a strong British colonial government permit widespread illegal taking of land? And why would settlers of NSW reject secure property-rights institutions from a strong British government when settlers of Buenos Aires accepted them from a weak, recently independent and unstable government, less able to deliver, and less likely to deliver impartially? The notion that institutions are determined by the identity of the colonizer does not explain it—the institutional inheritance argument, as ordinarily stated, predicts the opposite outcome.

Also contrary to the AJR explanation, historical research shows that the first settlers of neo-Europes were often *not* eager to have government intervene to provide institutions of private property. John Weaver, in a comparative study of the colonial United States, Australia, New Zealand, and South Africa, shows that local governments often lost control of the settlement process. Rights to land emerged out of the "rule-breaking conduct of land-seeking individuals and consortia," which met with "a grudging official toleration for [these] defiant acts of land taking" (2003, pp. 5-6). Lee Alston, Edwyna Harris, and Bernardo Mueller find similarly that first-possessor rights originated out of the land-taking *de facto* claims of squatters on the frontiers of the western United States, Australia and Brazil (2012, p. 744). It may be no surprise that the ex-convicts and bushrangers of NSW chose to evade the law. But why did the fiercely independent *gaucho* and *estanciero* of Buenos Aires accede to government control that settlers in other neo-Europes resisted?

Most theories of the emergence of property rights explain the demand for property rights better than the supply. Harold Demsetz' pioneering study, for example, argues that property rights emerge only as the gains from internalizing rent dissipation from open access exceed the costs of defining the property right (1967, p. 350). Alston and various coauthors argue similarly that first possessors on a frontier typically prefer to specify and enforce *de facto* property rights. In the first phases of frontier settlement, a *de jure* property right is rarely valuable enough to justify the cost of survey and registration (Alston, Libecap and Mueller, 1998, 1999a,b; Alston, Libecap and Schneider, 1997; Barzel, 1997). Alston, Harris and Mueller (2012) examine the political economy of the transition from *de facto* to more secure *de jure* rights as an outcome of rising returns to land.

The theoretical literature begs the question why a strong government would permit

the taking of land by squatters if this behavior deprived the government of a revenue source. Weaver (2003) shows that neo-European governments did try to assert control over the public domain, but they often ended up tolerating squatters' takings. This paper develops a model to explain when and why governments chose to assert their claims to public land (and then sell or lease it) in some cases, while, in others, they chose not to assert them.

Two supply considerations, left unaddressed in the literature, matter: (1) the revenue objectives of colonial governments and (2) the competing prior claims to the frontier. First, before governments could claim a potential revenue stream from the transfer of *de jure* property rights to frontier land, they had to enforce their prior public claim to the land. When and where they chose to do this, we argue, depended on the costs and benefits of enforcement. If, as Alston *et al*., (2012) argue, remote land on the frontier was of little value, government might choose not to enforce its claims, leaving the land free for squatters to move in and assert their own preemptive claims, which could be politically difficult to deny *ex post*.

Second, first peoples asserted a competing prior claim. The risk of conflict mattered even in the sparsely inhabited regions of NSW and Buenos Aires. Conflicts between settlers and native peoples threatened the security of property rights and the value of frontier lands in both neo-European settlements. The analysis borrows from Douglas Allen's (1991) work on indigenous resistance to homesteading, and offers a contribution to the literature on violence and institutions (Umbeck, 1981; North, Wallis and Weingast, 2009; North, Summerhill and Weingast, 2000).

Our model shows that the extent of the threat affected the private substitution of *de*

facto for *de jure* rights and the government's decision to assert its claims on the frontier. The interaction of the two decisions determined whether property rights originated as *de facto* or *de jure*. It explains, first, why in NSW, in the 1820s and 1830s, government chose not to halt an unauthorized land rush, even though it lost revenues from potential land sale or lease and lost control of the settlement process. Second, it explains why a similar rush for land by squatting and claiming rights of first-possession was not a prominent theme in the history of Buenos Aires.

The Market for Public Land

Why would a government permit an illegal land rush of squatters to encroach on public land if it had alternative plans to sell or lease it for revenue? In this section and the next, we build a model that shows how a government's apparent indifference to enforcing remote public claims could be rational, how conditions on the frontier affected this decision, and how differences in the original specification of property rights could be explained by the risk of property loss or violence on the frontier.

The remotest lands on the frontier had little market value. Following Alston *et al.*, our model assumes the net present value of land, $v(r)$, derived from the expected stream of earnings, falls with distance from the port, r, as overland transport costs rise and the cost of bringing goods to market increases, as shown in Figure 1 (1999b, pp. 83-87). The price p at which the government sells a property right to land on the frontier depends on $v(r)$, and a price-discriminating government may try to set $p = v(r)$.[2] The government cannot,

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[2] Both governments in our study sold or leased land at various times. For the leasing case, we assume that the government sets the rental price equal to the present value of expected earnings over the term of the lease. Both governments also issued land grants in compensation for military

however, successfully charge the full rent-extracting price, as prospective buyers have an option to claim the land by squatting.

[Insert Figure 1 about here]

A squatter forgoes the property-rights protection of the state but evades paying for land by, in effect, disputing the state's claim. When left unimpeded, squatters historically have often acquired *de facto* preemptive rights, since attempts by government to reverse their claims *ex post* could be politically costly (Alston *et al.*, 2012; Weaver, 2003, pp. 74-76). Given the settlers' squatting option, government has an incentive to define a zone of settlement with an official settlement boundary, r^E. The government then commits to deploy resources to enforce its claims and provide *de jure* property-rights specification and enforcement inside, but not outside, r^E. To sell public land inside r^E, the government incurs costs to specify and measure the tracts to be sold and commits to enforce buyers' *de jure* rights; without enforcement, prospective purchasers would prefer to squat than to buy. We assume $e(r)$, ($e' > 0$), bundles these specification and enforcement costs.

Where should government set the official settlement boundary, r^E? With $v(r)$ declining and $e(r)$ rising with distance, the net marginal gain from the sale and enforcement of public land rights is negative beyond the point where $e(r)$ exceeds the marginal appropriable revenue. Once government sets r^E, settlers have two options: They may settle within the zone of settlement and purchase a *de jure* right to public land at price p, or squat outside the zone, where payment is not enforced. The *de jure* right is bundled with third-party government enforcement, which offers greater security against the risk of property loss from dispute, encroachment or theft. In Figure 1, $v(r)$ is drawn assuming *de*

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service, a substitute use of public lands which is not described explicitly in the model.

jure rights and effective government enforcement, but government provides this only inside r^E. Outside r^E, settlers incur a cost, s, to take private measures to enforce their claims and to contribute to cooperative (second-party) measures with other settlers.

We make two critical assumptions regarding the cost and effectiveness of private enforcement by settlers. First, the cost of private and cooperative enforcement activities, s, for firearms, sheepdogs or private militias is localized and thus unrelated to the location, r, of the settler's claim. Second, private and second-party enforcement are less effective than government enforcement, thereby leaving a residual risk, ρ, of property loss from private security. It follows that the value of privately enforced claims, $(1-\rho)v(r)$, is lower than the value of governmentally enforced claims, $v(r)$, as shown in Figure 1.[3]

On the frontier, settlers are willing to squat up to the point, r^S, beyond which $(1-\rho)v - s < 0$, shown in Figure 1. They are unwilling to purchase a *de jure* right to public land if the net present value of squatted land exceeds the net present value of government enforced *de jure* land.[4] Therefore, a necessary condition for a sale is: $v - p \geq (1-\rho)v - s$; or stated in terms of the sales price,

$$p \leq \rho v + s . \tag{1}$$

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[3] The risk factor, ρ, and cost of private security, s, are not independent, but in the application below we suppress the relationship and treat the effectiveness of private security as fixed.

[4] Historical accounts in both places tell also of squatting inside the official boundaries. The model may be extended to account for it by assuming a probability θ^E that a squatter inside r^E will be removed by government and θ^S that a squatter outside r^E will be removed. Squatting inside the boundary occurs with differences in land quality and asymmetric information about $v(r)$ between users and government. But, if $\theta^E > \theta^S$, the overall results are similar to those described.

The source of the insecurity of settler land claims on the frontier matters. Alston, Libecap, and Mueller assume the risk of property loss falls with distance from the market as land competition from encroaching settlers falls (1999a,b). But this overlooks the risk of resistance from indigenous peoples, which, if significant, is likely to increase as one moves away from the port into remote lands on the frontier. If so, then ρ increases with r and $(1-\rho)v$ falls more steeply as r rises. In Figure 1, the dotted curve bk represents the value of squatted land if the risk of violence rises with r. Line bd represents the usual assumption of declining risk. Our model accounts for both possibilities.

Revenue Objectives

How did governments decide where to draw this boundary, r^E? This section derives conditions for setting r^E assuming governments maximized revenues subject to equation (1). The government maximizes net revenues from two sources: sales of public lands, L, and taxes, $tY(G,r^E,r^S)$, where t is the tax rate and Y is the value of production in "taxable sectors." It provides two types of public services, the specification and enforcement of property rights to land (on the frontier), E, and other government services, G. In a featureless plain, the distance r^E along any radius renders the same net revenues from land sales, $\int_0^{r^E} [p(r)-e(r)]dr$. F transforms the decision margins on each radius, r, into an area; and $F' > 0$. The government's objective function is:

$$\max_{r^E,G} F\left(\int_0^{r^E} [p(r)-e(r)]dr\right) + tY(G,r^E,r^S) - C(G) + R \qquad (2)$$

$$R = F\left(\int_0^{r^E} \alpha(v-p)dr + \int_{r^E}^{r^S} \beta[(1-\rho)v-s]dr\right) + \gamma(1-t)Y \qquad (3)$$

where the first term in equation (2) is the net revenue from public land sales and the second

term is revenue from the taxable sector which is a function of other public services, *G*, and external benefits from pastoral production in the zone of settlement. External benefits increase with r^S and may increase or decrease with r^E. The cost of providing other public services, including the transaction costs of collecting taxes, is $C(G)$.

The final term, *R*, in equation (2), captures the rent-seeking influence of political constituents. Either government might be influenced or captured by a powerful interest group—cattle-raising interests in Buenos Aires or sheep-raising interests in NSW. The model accounts for the influence of a powerful or dominant interest group by combining the government and the interest group into a single "ruling interest" that seeks to maximize the joint income of the government and its supporters. The logic applied here is adapted from the so-called "redistributive model" of government of Martin McGuire and Mancur Olson (1996). Its advantage is simplicity as it captures the effect of rent-seeking interests without excessive complication of the model.

The three terms in *R*, on the right-hand side of equation (3), capture three sources of rents that accrue to the government's supporters. The first term gives the rents appropriated by supporters' purchases of public lands inside r^E, where α is the share of public land sales purchased by supporters. The second term is the rents that supporters appropriate by squatting, where β is the share of squatted land occupied by supporters. The third term $\gamma(1-t)Y$ is the private post-tax earnings from other activities that supporters appropriate, where γ is the share that goes to supporters.

Assuming an interior solution, a necessary condition for optimal r^E is:

$$e = \rho v + s + (\alpha - \beta)[(1-\rho)v - s] + [t + \gamma(1-t)]Y_{r^E} / F' \tag{4}$$

where $tY_{r^E} = 0$ ($Y_{r^E} = \partial Y / \partial r^E$), To interpret this condition, we develop four possible cases,

reflecting different political economic settings. As a baseline case, we assume that $R = 0$, that the government may behave indifferently to, or is unconstrained by, political constituents. This corresponds to McGuire and Olson's "autocratic" model of government. The baseline is simply a special case that permits the simplest and most intuitive prediction of how the government determines r^E. Upon this baseline, we then identify three other possible cases from the more general model, with non-zero constituent influence. In each case, the logic of the baseline continues to hold, and the influence of political constituents has an incremental (positive or negative) effect on the baseline case.

Case 1. Baseline case. If $R = 0$, the first-order condition simplifies to

$e = \rho v + s + tY_{r^E} / F'$. Intuitively, if $tY_{r^E} = 0$, r^E is chosen so that the marginal cost of government enforcement, e, is equal to the marginal cost of private enforcement, $\rho v + s$. The model predicts (1) the official settlement boundary, r^E, that defines an official zone of settlement, and (2) a von-Thünen band of squatter settlements with *de facto* claims that forms outside the zone of settlement, as depicted in Figure 2. Although the government forbids settlement beyond r^E, settlers choose to squat beyond it as long as $(1 - \rho)v \geq s$. Under this condition, settlement from the port to r^E is supported by *de jure* specification and enforcement of property rights; while a band of squatting or *de facto* claims forms outside the boundary, r^E, which does not have government sanction or enforcement. The squatters' band terminates at the distance, r^S, where the marginal value of unprotected land $(1 - \rho)v$ is equal to the cost of private security, s.

[Insert Figure 2 about here]

If there are positive externalities to extending the boundary r^E, due to $tY_{r^E} > 0$, government would extend r^E farther out to where the marginal net loss from land sales

equals the marginal gain from the externality. This might result if tax collection were more effective from *de jure* owners than from squatters. If, however, there is no difference in tax collection, $tY_{r^E} = 0$ is more likely. The latter best suits Buenos Aires and NSW in our period of study, where import duties were the principal non-land source of taxation. Expansion of the squatters' band at r^S increases tax revenues, or $tY_{r^S} \geq 0$; but, with the exception of Case 4 below, the government has no influence on the outer boundary, r^S, as it is entirely dependent on how far out squatters are willing to wander.

The last two terms on the right-hand side of equation (4) are, respectively, the marginal rent that supporters receive from an increase in r^E (i.e., the net increase in value of a *de jure* relative to a *de facto* claim for a given parcel) and the marginal benefit to the ruling interest from externalities of claiming the additional lands, either collected as taxes or provided as net rents to government supporters. The marginal benefit from externalities hinges on the sign of Y_{r^E} as discussed above, likely to be zero in the cases we examine. All other terms in equation (4) are nonnegative, except $(\alpha - \beta)[(1 - \rho)v - s]$. The sign of this term tells whether the government would choose to extend or contract the enforcement boundary, r^E, in response to constituents' or supporters' demands relative to the baseline case. The model predicts three cases beyond the special baseline case.

Case 2. Smaller official zone of settlement. If $(1 - \rho)v - s > 0$ at r^E and $\alpha - \beta < 0$, constituent settlers, who prefer *de facto* to *de jure* land claims, pressure government to set r^E so as to define a smaller official zone of settlement relative to the baseline to leave more land open to squatting, an accommodation of squatters' *de facto* claims.

Case 3. Larger official zone of settlement. If $(1 - \rho)v - s > 0$ at r^E and $\alpha - \beta > 0$, constituent settlers, who expect to benefit from government enforcement of their property

claims, pressure government to extend r^E beyond the baseline case, which extends the area of *de jure* specifications and the official zone of settlement.[5]

Case 4. Government-led territorial expansion. If $(1-\rho)v - s \leq 0$ at r^E, no squatting would be observed, the opportunity cost from squatting is no longer a binding constraint, and the first-order condition expressed in equation (5) no longer applies. The necessary condition becomes instead: $e = p + \alpha(v - p) + [t + (1-t)\gamma]Y_{r^E} / F'$. In this case, as settlers encounter strong indigenous resistance, the government is pressed to use revenues from other sectors to subsidize territorial expansion for the benefit of the ruling interest despite an increase in the marginal cost of enforcement at r^E.

Three comparative static results are central to the discussion below. First, as the demand for exports of wool or cattle products (hides, salted beef and tallow) rises, land values, $v(r)$, are driven upward, and outer settlement boundary, r^S, shifts outward as settlers occupy more land and extend the frontier. Second, the level of risk ρ could have a large effect on the relative size of the squatters' band. A greater indigenous threat on the frontier increases ρ and pulls r^S inward and pushes r^E outward. A severe threat could keep r^S close to r^E or cause the squatters' band to vanish, as in Case 4.

Third, independent of changes in ρ, rising land values, $v(r)$, create an incentive for government to shift the enforcement boundary, r^E, outward over time. Changing the boundary, however, is not frictionless. Assuming *ex ante* official zones of settlement are set initially when few settlers were on the frontier (a reasonable assumption in the two cases we examine), *ex post* after settlers migrate out and claim *de jure* or *de facto* rights,

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[5] This outcome is consistent with selective enforcement of property rights, as in Haber *et al.* (2003), and with some types of limited-access orders described in North *et al.* (2009).

governments are no longer free to behave as if pre-existing private claims do not exist. As land values rise, governments may desire to reassert the public claim over lands formerly taken by squatters. But if the government tries to redraw r^E over existing *de facto* claims, it is likely to stir up resistance, even violence, from squatters. How the official zone of settlement may be altered *ex post* depends on the political institutions.

It is beyond the scope of this article to explain how *de facto* rights were transformed into *de jure* rights, which is an inherently political process. The model presented here is a one-shot model of the initial stage of settlement, when there are few *de facto* claims and the government is free to set the boundary unconstrained. A separate online appendix at **[insert URL]** extends the model to consider how, in subsequent stages, the emergence of competing *de facto* claims on the frontier can constrain the government's ability to redraw the boundary. Alston *et al.* (2012) argue that the transition from *de facto* to *de jure* rights may be smooth if *de facto* claimants control the legalization process or if squatting is minimal; but disputes between the government and squatters may provoke political conflict, violence on the frontier, or result in the state's use of force (pp. 748-49).

Settlement Zones and Risk

How consistent is the model with patterns we observe in NSW and Buenos Aires? First, both governments were in need of raising local revenues; both targeted public land as a big potential source of revenue; and land policies in both broadly conformed to the predicted patterns. In particular, in the early stages of settlement, they defined official boundaries and zones of settlement, engaged in *de jure* transfers of public land within the boundaries, and discouraged settlement or refused third-party protection and enforcement

outside the boundaries.[6]

Colony of New South Wales

In NSW, through the early 1820s, the penal colony's settlement was concentrated in the immediate area around Sydney.[7] Conflicts between Aborigines and settlers and the natural barriers of mountain ranges limited the expansion of farms and stock grazing. Land settlement expanded as new lands were discovered ideal for stock grazing, a breed of merino sheep with wool suitable for export was disseminated, the free population grew, ocean shipping rates declined, and settlers' ability to prevail in conflicts with Aborigines increased.

The transition from a penal colony with limited demand for crown land to a colony with thriving wool exports and a growing demand for crown land was accompanied by NSW government actions to define settlement boundaries and provide *de jure* specification and enforcement within those boundaries. In 1829 the NSW government specified boundaries for Nineteen Counties and labeled their perimeter as "Limits of Location." The Nineteen Counties, shown in Figure 3, centered on Sydney stretching inland from the coast into the grasslands beyond the Blue Mountains.

[Insert Figure 3 about here]

According to equation (4), the official settlement boundary would be drawn where the marginal cost of government specification and enforcement of *de jure* property rights

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[6] Britain's Royal Proclamation of 1763 set settlement boundaries for its North American colonies, while the Dutch East India Company's *plakat* of 1688 did the same for the Cape Colony.

[7] See McLean (2012), chs 3-4 for a careful analysis of the NSW economy and squatting through 1850.

began to exceed the marginal opportunity cost from squatting. How did resistance from the Aboriginal bands using these lands affect the government's cost of enforcing *de jure* rights and its 1827 decision regarding how far out to authorize settlement? Aborigines resisted, but the amount of resistance was constrained by the small size of each Aboriginal band, limited cooperation due to histories of inter-group warfare, and a sparse, declining population.[8] Aborigines did not organize large-scale forces and avoided direct military confrontation, using, instead, terror tactics against settlers and soldiers. They raided farms and stole food, sheep, and cattle, destroyed resources, and sometimes injured or killed "intruders" stationed on the runs. Hundreds of shepherds and thousands of Aborigines perished in land conflicts.[9] Aboriginal resistance raised the cost to government of enforcing *de jure* property rights on any given parcel, as only a limited number of British forces were available to police sheep runs scattered widely over a huge expanse of territory.

The government's decisions in the mid-1820s to set settlement boundaries, to

[8] Using Butlin's (2003) estimates of population in Victoria, population density fell from 0.22 km^2 in 1778 to 0.04 km^2 in 1834/35 to 0.008 km^2 in 1853. We cite population densities for Victoria due to a lack of reliable population estimates for NSW. In the 1820s Aborigines were sufficiently skilled and organized using traditional weaponry (spears) to resist attacks from trained British soldiers with firearms. In the 45 seconds it took for a soldier to reload a breech loading gun, an Aboriginal could throw up to six spears. Intimate knowledge of terrain also favored Aborigines. Connor (2008), Broome (2010), and Coates (2006) argue that the extent of Aboriginal resistance to the early settlement in NSW and Victoria has been understated in earlier historical accounts.

[9] Settlers in the 1830 who negotiated with Aborigines to share land experienced little violence. See Belich (2009), pp. 272-73; and Broome (2010), chs. 2-3, for overviews of frontier violence.

survey lands within the boundaries, and to provide *de jure* enforcement for those lands were accompanied by a change in how it transferred rights to crown lands within the settlement boundaries to settlers. Until 1831, the land grant was the primary instrument for privatizing crown lands, with the grant conditional on improvement and subject to an annual quit rent. Land revenues were small because quit rents were small and often in arrears.[10] London's dissatisfaction with quit rent revenues in NSW and other British colonies helped to provoke the 1831 Ripon Regulations, which provided for sales of NSW crown lands.[11] These regulations standardized how crown lands were privatized throughout the Empire and were expected to generate more revenue from privatization. They required colonial governments to privatize crown lands within defined settlement boundaries by selling surveyed parcels, selected by a potential buyer, at auction subject to a minimum price of 5 shillings per acre.[12]

The success of public land sales was limited for two reasons. First, the minimum price provided in the Ripon Regulations overpriced much of the land inside the Limits of Location, leading to some squatting on these lands (Weaver, 1996,), pp. 986-87).[13] Second, news from a series of exploratory expeditions told of the vast expanse of lands

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[10] As the local economy developed, Britain adopted policies to reduce its financial commitments and assist emigration of English workers to the colony. The Colonial Office targeted revenues from crown land sales to fund emigration. Burroughs (1967), pp. 60-69, 173, 249, 266. Butlin (1994), pp. 54-55, 84-92; Roberts (1975), p. 136.

[11] Goderich to Darling, 9 Jan. 1831, H.R.A, 16, pp. 19-22.

[12] Land Regulations, H.R.A. I, 16, pp. 864-7. Weaver, (2003), p. 214.

[13] See n. 4 on extending the model to squatting inside the official boundary.

beyond the Limits suited for sheep runs.[14] Enterprising colonists responded quickly,

walking flocks of thousands of sheep hundreds of kilometers to establish new sheep runs.

By the early 1830s, a full-blown land rush had developed, with settlement spreading far

beyond the Nineteen Counties (See Roberts, 1975, pp. 135-45; Weaver, 2003, pp. 138,

142, and 1996, p. 988; and Rolls, 1981, pp. 72-89). Thus, as the expected value of lands

beyond the Limits rose, settlers found that it paid to squat beyond the Limits rather than to

squat or buy *de jure* rights inside them.[15]

  As the land rush continued through the 1830s, the outer edge of the squatters' band,

r^S, extended hundreds of kilometers into the grasslands in the interior. From 1835, a

second rush emerged to occupy lands in Port Phillip, with the settlement of what became

Melbourne on Port Phillip Bay, providing the market outlet. Settlers came from the

Northeast, following the tracks of the wagons left by Surveyor General Thomas Mitchell's

exploratory expedition of Victoria, and from the south, crossing the Bass Strait from Van

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[14] Exploratory expeditions included: Wentworth, Lawson, and Blaxland's crossing of the Blue

Mountains in 1813; Oxley's 1817 and 1819 explorations of the Lachland and Macquarie Rivers;

Currie's and Ovens's voyage on the Murrumbidgee River in 1823; Cunningham's discovery of

Pandora's Pass in 1823 and exploration of major rivers in 1827; Sturt's explorations of the

Murrumbidgee River and Murray River; and the three expeditions undertaken by Surveyor-General

Mitchell, including his path-breaking 1836 wagon trek through Australia Felix. See Figure 3.

[15] Land values rose due to a free population that grew more than fourfold from natural increase,

immigration, release of convicts; and favorable movements in the price and tariff on wool. Wool

prices more than doubled from the mid-1820s to mid-1830s as shipping rates fell by 80 percent,

and the British tariff on wool imports was eliminated in 1825. See Clark (2003), Appendix Table 4;

Australian Bureau of Statistics (2008), Table 1.1; 6 Geo. 4 c. 111 regarding the wool tariff.

Diemen's Land to Port Phillip.

Port Phillip emerged as another major port. Governor Richard Bourke tried to avert the unauthorized land rush, and avoid the preemptive actions of settlers from Van Dieman's Land, by opening a restricted area for official settlement there in 1836, with its own administration. The lands on this protected bay were especially valuable because they were at a site that could emerge as another potential commercial hub, which settlers recognized. These developments are captured in a minor extension of the model to account for multiple ports with official zones and squatters' bands extending from each, which may overlap.

In the squatters' bands, three factors contributed to declining risk of property loss, ρ, and cost of private security, s. First, settlers obtained an advantage in violence over Aboriginals due to drastic declines in Aboriginal populations from exposure to European diseases.[16] Second, the use of mounted soldiers and settlers on the frontier after 1826 provided an additional advantage in violence to settlers. Third, incumbent squatters developed informal second-party institutions to enforce *de facto* rights against encroachment from neighbors or newcomers and resistance from Aboriginal groups who also resided on or harvested resources from these lands.[17] As a consequence, squatters settled farther and farther out; that is to say, the settlement boundary, r^S, shifted outward as

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[16] See Broome (2010), ch. 4, and Butlin (2003, pp. 143-48) who estimates that the Aboriginal population in Victoria in 1778—perhaps 50,000 people—fell by more than 75 percent by 1834/35 and by another 80 percent by 1853.

[17] See Alston, Harris and Mueller (2012), Alston, Libecap and Mueller (1998), and Dennen (1976) for analysis of similar activity in the western United States.

$(1-\rho)v-s$ rose on the frontier.

Province of Buenos Aires

The Province of Buenos Aires also maintained an official zone of settlement

defined by an official boundary (*linea de fronteras*), defended by a line of forts to the south

to protect the city of Buenos Aires and its surroundings. First built in 1741, before 1810

the line had never extended farther than 100-120 km inland and to the south from the Río

de la Plata or the city of Buenos Aires, as shown in Figure 4. Unlike NSW, there was no

significant squatting beyond the *linea de fronteras,* primarily because it was the indigenous

tribes, not the Spanish, who controlled the territory (Avellaneda, 1865; Barba, 1997, p. 25;

Cárcano, 1917, pp. 27-30; Carretero, 1972; Halperín Donghi, 1963; Infesta, 1993, p. 73;

Zimmerman, 1945).

[Insert Figure 4 about here]

The density of the indigenous population on the *pampa*, estimated at about 0.07

inhabitants per km^2, was less than double that of Australia.[18] A key difference, however,

was the social and economic integration of this population with the Andean civilization to

the west where the population density was significantly greater, estimated at 1.45

inhabitants per km^2 (Rosenblatt, 1954; Pyle, 1976). The tribes of the *pampa* descended

from the Araucanians of the Chilean Andes, giving a heritage that provided the *pampa*

tribes with a richer institutional foundation, compared with the Australian Aborigines,

upon which to solve problems of collective action, including a more effective military

organization during times of war (Canals Frau, 1946, pp. 761-66; Cooper, 1946, p. 724).

By 1810, the line of military defense, r^E, had reached no farther south than the

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[18] Compare n. 8.

Salado River (with some periods of retreat). Throughout its history, the colony was under

constant threat of invasion from the nomadic tribes that controlled lands to the south of the

Salado River. The colonial and republican governments negotiated many short-lived

treaties trying to keep the peace (Muñíz, 1929, p. 93). The greatest threat came from the

warlike Pampa and Ranquel tribes, who lived farther to the south and migrated northward

in organized expeditions to rustle herds of cattle to be driven and marketed to the

Araucanian communities in the Chilean Andes. They routinely conducted raids on

horseback in bands of typically 70-100 to raze and pillage isolated *haciendas* and steal

cattle and horses. They ambushed parties of travelers and killed or took prisoners. The

frontier was under constant threat (Barba, 1997, pp. 23-27; Best, 1960, vol. 1, pp. 110-11;

vol. 2, pp. 317-53; Tapson, 1962, pp. 6-7).

If common raids were conducted in bands, when their claims to land or livestock on

the *pampa* were threatened, the opposing tribes formed military alliances and organized

forces numbering in the thousands. They deployed cavalry formations learned from the

Europeans in the war of independence and from deserter *gaucho* military commanders.

And they combined these tactics with superior local knowledge and better logistics—

intimate knowledge of the desert terrain, ability to move swiftly in large numbers, ability

to survive by foraging, and control of routes to the Andes where they could obtain reserves

and supplies. They were skillful on horseback with the traditional lance and *bola*, but also

used firearms and an occasional cannon they stole from the *haciendas*.[19]

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[19] One of the largest invasions involved an alliance of the Pampa, Ranquel and Tehuelche tribes

who amassed a force of 5,000 warriors, which in 1823 penetrated a wide stretch of the line of

defense, overtook forts and towns, and stole 150,000 cattle and horses (Best, 1960, vol. 2, pp. 332-

The war of independence against Spain had left the new republic cut off from the colonial silver trade. Chronic internecine political struggle and war with Brazil created additional need of revenue for defense and debt service.[20] The vast "underutilized" land in the interior offered a promising resource for expanding the pastoral economy. One of the first acts of the revolutionary government was to claim the interior *tierras realengas* of the former viceroyalty as public or "fiscal" lands and authorize the sale of public land on the frontier to raise revenues. On these frontier lands, to strengthen the line of defense, the government granted land to war veterans on the condition that they resided locally and assisted the militia in the district's defense (Cárcano, 1917, pp. 14, 26-30; Coní, 1956, p. 16; Halperin Donghi, 1963; Irigoin, 2004).

The sale of public lands, initiated in 1813, did not generate much revenue, as the land for sale to the south was exposed to Indian attack (See Table 1).[21] According to one report, the insecurity caused prices of frontier land to amount to no more than a month's rent (Coní, 1956, pp. 36, 163). A land grant program was instituted in 1817 to compensate former soldiers for services and fortify the line of defense with armed settlers, and to defend a settlement south of the Salado at Dolores. It was no more successful. Commenting on how properties in the exposed areas were abandoned, Miguel Angel

33; Muñíz, 1929, pp. 143, 151-65).

[20] In 1821, the public debt amounted to 2 million pesos, approximately the same as government receipts for that year (Burgin, 1946, pp. 52-54).

[21] The most important income source was customs, which after 1821 exceeded 85 percent of annual receipts except during periods of blockade. Revenues from public land sales and *emphyteusis* never exceeded 4.5 percent of annual revenues (Amaral, 1998, pp. 14, 195, 200; Burgin, 1946, pp. 47-49, 167, 195-97; Halperin Donghi, 2005, pp. 69, 165, 274; Newland and Salvatore, 2003, p. 23).

Cárcano remarks: "If they couldn't guarantee the property rights of the land they gave away, how could they possibly sell it?" (Cárcano, 1917, pp. 30-31). Before 1826, then, *estancias* for raising livestock, towns, or villages were built up to the line of defense, which stopped at the Salado River, as shown in Figure 4.[22]

[Insert Table 1 about here]

As the export market for cattle products expanded, political demands intensified not only to defend the border but to secure the land to the south for grazing livestock (Halperin Donghi, 1963; Irigoin, 2004). In response, successive governors organized military regiments for "desert campaigns" in 1820-21, 1823-24, 1826-27, and 1828-34 to push back the boundaries of Indian control and extend the line of defense beyond the Salado River to the south. These more aggressive attempts at territorial expansion were met with full-fledged warfare.

Contrary to European stereotypes, before 1833, the indigenous forces often matched or dominated Buenos Aires forces in battle. Most desert campaigns were failures, especially the early attempts. Before the successful campaigns of 1826 and 1833, Rómulo Muñíz remarks, "the opinion existed that it was almost impossible to defeat [the Indians]," a view that did not change until Colonel Federico Rauch in 1826 and General Juan Manuel de Rosas in 1833 used diplomacy to form alliances with local tribes, giving them access to

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[22] Amaral finds at that time a few *estancias* had been founded on the Salado River, but none beyond it (1998, pp. 63, 135, 185). See also Cárcano (1917), pp. 14, 25-27; Coní (1956), p. 16. The first fort and settlement built south of the Salado River, in 1817, at Kaquelhuincul, near the town of Dolores, was destroyed by Indian attacks in 1821, when settlements south of the Salado were abandoned (Infesta, 2007, p. 73).

superior knowledge of the terrain and customs of rival tribes, and improved supply links (Muñíz, 1929, p. 149).[23]

The absence of squatting on the *pampa* is, therefore, consistent with Case 4 of the redistributive model—the band of squatters vanished because the threat on the frontier, ρ, was too high for isolated settlers to defend claims using private enforcement. Even for the largest *estancieros*, organized military protection at sufficient scale was necessary, and local second-party arrangements comparable to those that developed in NSW were not an adequate substitute in the much riskier Buenos Aires frontier. It was not the opportunity cost from squatting that constrained the *porteño* (Buenos Aires') government's enforcement of public land claims. Rather, it was the cost of military defense of new territorial claims against a large and relatively well-organized indigenous opposition. Therefore, relative to the NSW colonial government, the government of Buenos Aires had a bigger role in securing land for new settlement. Expansion of settlement on the *pampa* was government-led. When the military succeeded in pacifying new territory, the government first claimed it as public land and then made provisions to transfer rights *de jure* to private individuals.

Property Rights Specification on Public Lands

Each government attempted to create *de jure* property rights to privatize public land and raise revenue, but the different challenges they faced caused the emergence of property rights on the frontier to follow a *de facto* path in one case and a *de jure* path in the other.

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[23] The line of defense was never static. There were significant losses of territory after the fall of Rosas in 1852 (Best 1960, vol. 2, pp. 317-53; Cárcano, 1917, pp. 26, 87-89; Garavaglia, 1999, pp. 39-41; Infesta, 2007, p. 16; Tapson, 1962).

New South Wales

At the inception of the NSW colony, the government allocated land by providing for land grants to retired military personnel, emancipated convicts, free settlers and commissioned officers. After eligible recipients selected land for grants, the Surveyor General was to survey the land. Payment of an annual quit rent was specified in the grant. The 1822 and 1823 Bigge reports, commissioned by the Colonial Office to investigate the NSW government, criticized the time required to complete the surveys and the low collection rate of quit rents from previous grants. They recommended ending free selection—lands would instead be surveyed in advance "and laid out in districts" from which selections could be made. The Colonial Office responded in 1825 by issuing the "King's Instructions", which authorized a comprehensive survey of the Colony and the division of surveyed public lands into counties, hundreds, and parishes.

In 1826, the NSW government announced the approximate boundaries of "Nineteen Counties" within which grantees could select land. With the appointment in 1827 of a new Surveyor General, Thomas Mitchell, and the assignment of additional staff, work on both the survey and boundary specification proceeded more quickly. By October 1829, boundaries for the Nineteen Counties with their 23,083,200 acres had been fully delineated, and the Office of the Colonial Secretary published a public notice of the boundaries, known as the "Limits of Location". Between 1828 and 1834, Mitchell and his staff surveyed virtually all of the 1,946,478 acres of crown land privatized within the Limits during this period. Just 73 farms remained to be measured as of June 1834 (Cumpston, 1955, pp. 107, 124).

Despite the close attention paid by the London and Sydney governments to the

delineation of *de jure* rights to surveyed parcels within a settlement boundary, settlers'

calculus over whether to buy (or be granted) land with *de jure* rights or to make a *de facto*

claim on land beyond the Limits shifted toward *de facto* claims while the survey inside the

Limits was proceeding. As described on pp. 16-17, after they received new information

about the large quantities of land highly suitable for grazing beyond the Limits, squatters

rushed out to claim *de facto* lands. In the meantime, the resistance from the Aboriginal

population, decimated by disease, declined.

As the population in NSW increased and the market for wool grew, more squatters

looked to establish sheep runs at the frontier. Roberts describes how newcomers and

earlier settlers on neighboring holdings negotiated to establish boundaries. As threats of

encroachment grew, incumbent squatters often worked together to defend their *de facto*

claims from newcomers (Roberts, 1975, pp. 277-84).[24] By the late 1830s, however,

increased competition for land led squatters to use an increasing number of devices to

increase the size of their *de facto* claims and to seek the help of colonial officials to enforce

them.

As the value of land $v(r)$ increased beyond the Limits of Location (where $r > r^E$),

the model predicts that a revenue-seeking government might try to extend r^E, although, if it

did, existing claimants could resist. These pressures began to appear in the 1830s, as the

Colonial Office, Edward Gibbon Wakefield and his supporters, and certain local interests

pressed the NSW government to reassert the public claim to land occupied by squatters.

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[24] Alston *et al.,* (2012), pp. 750-53, provide details of second-party enforcement, such as

cooperation among squatters to enforce *de facto* claims against new entrants and the colonial

government. Weaver (1996), pp. 992-96, discusses second-party specification during the 1830s.

Self-interested squatters resisted, and, in response, the NSW government took three measures that progressively reasserted its claims with some accommodation to squatters' claims within certain parameters.

The first measure, an act of 1833, addressed the problem of squatting on public lands *within* the boundaries of settlement by providing for the lease of crown land for grazing *inside* the Limits.[25] The new law created district commissioners with authority to administer and enforce rent collections (Abbott, 1971, p. 137; Buckley, 1955, p. 405).[26] A second measure, an act of 1836, provided for districts and commissioners *outside* the Limits and required that squatters purchase a license for an annual fee of £10.[27] The licenses reasserted government's claim to a revenue stream from the crown lands. While they legitimized squatting, the licenses were not leases and did not transfer *de jure* rights to land in the conventional sense because they did not specify the boundaries, location or size of a squatter's claim, which continued to be defined by second-party norms. Licenses were, therefore, of limited value to settlers who desired to establish government specification and enforcement of their *de facto* claims.

In 1839, a third act provided additional powers to enforce the public claim to land

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[25] Settlers selected choice tracts of land for purchase, such as a tract with a water source, but used much larger tracts of public lands *de facto* as "back runs" dependent on the water source.

[26] An Act for protecting the Crown Lands of the Colony from Encroachment, Intrusion and Trespass. 4 William IV, No. 10 (28 August 1833). Rent under the act was set at auction with an upset rent of £1 per section of 640 acres. Abbott (1971) argues that Governor Bourke meant for the leasing provisions in this act to apply to lands beyond the Limits of Location.

[27] An Act to restrain the unauthorized occupation of Crown Lands. 7 Will IV, No.4 (29 July 1836).

in the squatters' band.[28] It vested district commissioners with powers to remove a

squatter's license without appeal, to remove or destroy stock, to define the boundaries of

the sheep run, to investigate charges of violence against Aborigines, and to collect license

fees and newly imposed taxes on stock. It provided district commissioners with a small

mounted police force to help enforce adjudications.[29] Squatters complained that the 1839

Act diminished their *de facto* land rights by giving the government an annual option to

terminate their license without compensation for improvements, which rendered second-

party-enforced transfers or liens for credit less secure.[30] Governor George Gipps' decision

in 1842 not to renew squatter William Lee's license symbolized the increased insecurity

and triggered growing opposition to government encroachments as squatters defended *de

facto* rights on the principle of prior possession.[31]

De jure land sales and increased enforcement produced substantial revenues from

crown lands between 1833 and 1841, but very little thereafter. Between 1833 and 1841, the

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[28] An Act further to restrain the unauthorized Occupation of Crown Lands and to provide the means

of defraying the Expense of a Border Police. 2 Vict., No. 27 (22 March 1839).

[29] After the 1839 act, commissioners stationed beyond the Limits of Location were paid regular

salaries, had wide discretionary authority, and police under their command. Those stationed inside

the Limits were paid on commission, and had little authority to enforce their decisions (Buckley,

1955, pp. 405-06). See also Weaver (2003), p. 138.

[30] A March 1839 decision by the Supreme Court of NSW ruled that a squatter who had taken out an

annual license was secure in his claim against intrusion by any party but the crown (Scott v. Dight,

NSWSupC 16 (1839); Burroughs, 1967, p. 147).

[31] See *Sydney Morning Herald*, 24 August 1842, for a report on a petition from squatters to the

Legislative Council addressing the nonrenewal of Lee's license.

crown sold 2,003,088 acres, with land sales revenue accounting for roughly16 percent of annual colony revenues.[32] After 1841, land sales revenues fell to less than 3.25 percent of annual colony revenues due to an increase in the minimum price of land within the Nineteen Counties and depressed economic conditions in NSW's grazing industry.[33] They were hit hard in 1842 by plummeting wool prices during the global depression and suffered a sharp decline between 1841 and 1845 (See Table 2). This led to suspension of assisted migration and a search for new revenues to resume the program.

[Insert Table 2 about here]

The circulation of Governor Gipps' proposed Occupation and Purchase Regulations of 1844 marked a turning point in the nature of political representation in the colony. The proposed Purchase Regulations were, in particular, offensive to squatters' interests. They would have required squatters to purchase 320 acres of each sheep run at £1 per acre as a homestead to qualify for an 8-year license for a fee to obtain the right of use of the remainder of the squatter's run. At the termination of the license, squatters could renew a license with the purchase of another 320 acres. Yet, since blocks for purchase were to be auctioned, an outsider could compete for the right to control the entire run. In short, the Purchase Regulations were aimed directly at reasserting the colonial government's claim to

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[32] The public revenue figure consists of funds provided from the British Treasury to the Commissariat, the colonial land fund (excise, customs, and other assorted colonial taxes), land sale revenue, and other fees charged for the use of crown property (Butlin, 1994, ch. 10, Appendix 4).

[33] Another restriction on the use of land sales to raise revenue was the 1842 Waste Lands Act, in which Britain's parliament set a relatively high minimum price at auction and required the survey of lands prior to sale. Squatters chose to pay a £10 annual license fee for an unlimited number of *de facto* acres rather than purchase *de jure* land with a £1 minimum price.

squatters' *de facto* land claims and revenue from their sale (Abbott, 1971, p. 171).

As Gipps moved to implement parts of the Occupation Regulations in 1845, opposition in London to the Regulations increased, as the NSW wool industry gained powerful political support due to rapidly growing imports of Australian wool by the British woolens industry. In 1831, Australian wool imports of £62,333 accounted for just 6.6 percent of the all wool imports into England, but by 1845 they had increased almost tenfold, to £603,764 or 30 percent of the value of wool imported into England.[34]

Squatters and stakeholders in the wool trade formed alliances to oppose Gipps' regulations. A coalition of colonial grazers and newly formed associations of English and Scottish woolens manufacturers, shipping companies, and bankers, all with linkages to Australian wool production, formed in 1845 to lobby members of Parliament and other influential figures. By mid-1846, the coalition's efforts paid off with Parliament's passage of the Australian Waste Lands Act, which established a set of *de jure* rights to *de facto* claims that provided more security of tenure than the Purchase Regulations had proposed. Squatters obtained 14-year leases, a preemptive right to purchase at least 160 acres for £1 per acre, and the right to cultivate the land for subsistence. Only the occupying tenant could purchase a station's land during the term of the lease, and leases in the unsettled interior districts could be renewed. Rights of preemption or compensation for improvements were recognized. [35]

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[34] By 1850, Australian wool imports into England rose sharply again, amounting to 50.5 percent of wool imports (Burroughs, 1967, Appendix I).

[35] The 14-year leases applied to most squatters' districts; however, in the intermediate districts near Port Phillip, they were given 8-year leases, with an option to sell the lease each year (Buckley,

The passage of the Australian Waste Lands Act of 1846 highlights rising political influence of squatters as the government's reassertion of its claims is consistent with a relative shift in shares from $\alpha - \beta \leq 0$ to $\alpha - \beta > 0$. This implies a change in the equilibrium outcome of the model from Case 1 or 2 to Case 3, as squatters shifted from resisting government interference with *de facto* claims to demanding that the government convert their *de facto* claims into government-enforced *de jure* rights. This is a transition that occurred progressively from 1833 to 1845.[36]

Buenos Aires

If transition from *de facto* to *de jure* specification in some form seems to have been the norm in most neo-Europes, Buenos Aires was an exception. It was also an exception among the newly independent republics of the Spanish empire. The colony had inherited the Spanish system of defining and recording boundaries, with its many "deformities" that compromised the "security of property, its clarity, and transfer" (Cárcano, 1917, pp. 34, 42, 56; Dye, 2006, pp. 196-97; Zimmerman, 1945, p. 6). The founding leaders in Buenos Aires moved quickly to modernize the measurement and definition of property rights.

The desire to generate revenue from public land to service government debt was an underlying incentive. After attempts at land sales failed, *porteño* leaders turned to the institution of the *emphyteusis*, a transferable 20-year leasehold arrangement, which became by far the most important contractual arrangement for the transfer of public land.[37] Its

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1956, p. 179; Burroughs, 1967, p. 321; Abbott, 1971, pp. 159-76; Weaver, 1996, pp. 1004-05).

[36] Ibid. Alston *et al*., (2012), pp. 751-52, discusses the transition. Harris (2012) discusses how credit reforms after 1845 favored squatters.

[37] *Emphyteusis,* handed down from Roman legal tradition, was used in Spain to privatize the

adoption originated as part of a financial reform implemented in 1821 and 1822 to consolidate the state's chaotic government debt. To provide security for a bond issue of 6.4 million pesos issued in London by the end of 1824, the government prohibited the alienation of all public land and pledged all its immobile and mobile property as a guarantee.[38] A few months later, it authorized the *emphyteusis* of public land to mobilize its long-term use for cattle grazing and generate revenue.

The early republican leaders understood that, without clear definition of the boundaries and size of claims, the revenue due the government from *emphyteusis* could be too easily disputed or obscured. The initial steps were taken in 1824 under Governor Martín Rodríguez to set up a Topographical Department to conduct a general survey of land to be opened for *emphyteusis* and to keep an official land registry of surveys and claims filed. Under the *emphyteusis* law, claimants were required to survey each claim, which then had to be examined by the courts and filed with the land registry.[39]

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crown's patrimony. Argentina's adaptation provided originally for a freely transferable lease of 20 years, reduced later in 1828 to a 10-year term renewable for a second term, in exchange for an annual rent initially of 3 percent of the assessed value, later increased to 4 percent for agricultural and 8 percent for livestock operations (Adelman, 1994, p. 100; Cárcano, 1917, pp. 53-59, 67; Coní, 1956, pp. 32-38, 162-4; Infesta, 2007, pp. 30-31, 38-39).

[38] The government defaulted on its foreign debt in 1825 and adopted inconvertible paper currency in 1826 (Bordo and Végh, 2002, pp. 463-6; Burgin, 1946, pp. 52-54; Marichal, 1989).

[39] An act of 30 June 1826 called for the compilation of a public registry, referred to as the *Gran libro de la propiedad pública*, and provided that all claims of *emphyteusis* must appear in the official registry to be recognized by law (Cárcano, 1917, p. 42; Infesta, 2007, pp. 32-37; Sábato, 1990, p. 42). Oddone (1956), pp. 50-51, notes that it is unknown whether *enfiteutas* (lessees) who

What evidence is there that original *de jure* specification was implemented? First,

in the expansion to the south of the Salado, enabling legislation for *de jure* specification

preceded the government's actual taking possession of the land. For example, the enabling

law that provided for *de jure* specification of *emphyteusis* lands to be acquired in the 1826

desert campaign preceded the launch of the campaign by several months. Second, records

show that most claims were filed in the first few years after the military campaigns were

completed with accompanying provisions for *de jure* transfers. Figure 5 shows that over 60

percent of the claims of public land in *emphyteusis* were made in 1826-28 and 1833-34.

Peaks in 1826 and 1834 coincide with successful campaigns. The 1828 peak reflects a

failed campaign, but the territory it encompassed was reclaimed in the 1833 campaign.[40]

[Insert Figure 5 about here]

Using data from María Elena Infesta, we find that about 76 percent of the public

land was transferred originally in *emphyteusis*.[41] About 22 percent was in land grants, and

only 3 percent was privatized by sale. This is not to say that sales of public land on the

frontier were unimportant. Almost half of all land ever held in *emphyteusis*, about 36

percent of all public land transfers, was later alienated by sale or grant by the Rosas

dictatorship between 1836 and 1843, much of it to the holders of *emphyteusis* contracts.

But when considering the specification of property rights in public land, the distinction

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failed to file were ever denied their claims.

[40] As Figure 5 shows, many *emphyteusis* claims were filed in 1828, yet most remained insecure

until the campaign of 1833 (Cárcano, 1917, p. 66; Infesta, 2007, pp. 38-40).

[41] Infesta finds records for 2.7 million acres of land that were transferred from the public domain in

one of three forms – sale, *emphyteusis* or grant (1987; 1993; 2007, p. 46).

between the original and subsequent transfers is crucial. In the original transfers under *emphyteusis*, surveys, formal boundaries, and registration were required by law. The original *de jure* specification for *emphyteusis* contracts created initial land measurements which underpinned and facilitated the subsequent sale of a *de jure* right.

De jure specification and enforcement were not perfect in an environment of political instability, scarce government resources, and bureaucratic inexperience with modern methods of measurement. Some public land was known to be occupied without title, but many of these claims apparently fell inside the old line of defense and were probably a legacy of the "deformities" of the former Spanish system of defining and recording property rights to land (Amaral, 1994, pp. 69-70, 101, 187; Dye, 2006, pp. 195-98). To firm up property rights, the government extended *de jure* recognition of *de facto* claims in disputed lands north of the Salado if claimants could demonstrate continuous occupation of the lands. But south of the Salado it does not seem to have been as necessary. As Governor Juan Manuel de Rosas cracked down in 1835 on rent evasion on *emphyteusis* lands, other flaws in the survey methods came to light, such as overlapping claims that arose because surveys were often done in isolation. To correct the problem, the Governor called for a new general survey of the province in 1835, district by district (Infesta, 2007, pp. 36, 41, 74-75; Coní, 1956, pp. 34-36, 126, 162-63).

The political instability of the early years created other problems. The books that kept the central land registry were lost in 1827 in the takeover of the provincial government by the Federalists. Governor Manuel Dorrego called upon the Topographical Department to recreate the registry by requiring all *emphyteusis* claimants to come forward and reregister or forfeit their claims (Infesta, 2007, pp.37-38; Oddone, 1967, pp. 50-51).

Such incidents reveal certain imperfections in the maintenance of *de jure* rights, but they underscore the effort and intent of government actors to establish *de jure*, rather than *de facto*, specification of *emphyteusis* rights.

The *emphyteusis* law was revised in 1826 and 1828 to favor powerful lessees (*enfiteutas*)—cattle interests, at the expense of revenues. Rental fees were reduced even as land became more valuable. Meanwhile, the government defaulted on its foreign debt and resorted to inflationary finance. With rents made payable in depreciating paper, real rental fees fell to a fraction of their original level. A square league that earned 160 pesos in 1826 paid a real value of only 34 pesos in 1830 (Cárcano, 1917, pp. 67-68).[42] The preference for inflationary over debt finance reflected cattle interests with assets in land and livestock, which did not erode with inflation, while it hurt investors with assets in government bonds redeemable in depreciating paper (Irigoin, 2000a, p. 198, 2000b).

Weak governments found rent collection difficult, but their repeated efforts to enforce rental payments on public leases constitute evidence of government asserting its claim (Coní, 1956, pp. 113-14, 123; Cárcano, 1917, p. 74). But stronger government permitted stronger measures of enforcement. Governor Rosas, who became known as "the Restorer of the Law," took decisive action against holders of *emphyteusis* contracts in arrears, decreeing in 1836 that they had two months to purchase their land, after which it would be sold (Infesta, 2007, pp. 41-44; Carretero, 1971; Lynch, 1981).

Chronic debt led the Rosas government to try to reclaim *emphyteusis* land as an alternative revenue stream. In 1836, the assembly lifted the prohibition on sales of public land on the condition that Governor Rosas would use all proceeds to amortize government

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[42] The rate of depreciation is calculated from peso price of gold reported in Burgin (1946), p. 69.

debt, and that land held in *emphyteusis* could only be sold to the *enfiteuta* (lessee) (Burgin, 1946, p. 176; Coní, 1956, pp. 118-30, 135, 251-53). When sales proceeds from this act were found disappointing, Rosas in 1838 decreed all *emphyteusis* contracts in a certain zone unrenewable and targeted for sale. Existing contract holders had a two-month preemptive right to purchase their land. All *emphyteusis* lands in the zone were subject to sale, even if their contracts were not about to expire.[43]

Rosas is known for wielding the power of the state to enforce laws selectively to favor his political supporters (Adelman, 1999, pp. 111, 116). The 1838 decree was used to confiscate the land of political opponents and redistribute it to supporters. It is unknown how much land was confiscated, but warrants for 669 square leagues (4.5 million acres) were acquired in some fashion and reissued to supporters (Infesta, 1987, 2007, pp. 80-92; Sábato, 1990, pp. 41-45). As with other predatory regimes, the greater capacity of Rosas to enforce property rights enabled him also to confiscate them. The original form of property-rights specification preceded Rosas, but the decline of the rule of law under Rosas meant that d*e jure* specification did not ensure *de jure* enforcement.

Ironically, orderly public land transfers based on *de jure* specifications in Buenos Aires became more insecure, whereas the *de facto* claims in NSW became more secure as provisions for *de jure* rights replaced or were extended to *de facto* claims.

Conclusion

Whether or not the factor-endowments thesis holds, might variation in institutions

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[43] The zone roughly corresponded to the area inside the line of defense by 1826. Coní (1956) comments that contracts signed under the 1828 law would end on 31 December 1837, so the 1838 decree terminated many leases before the contractual date (p. 130).

between neo-Europes be explained by the institutions of their colonizers? The former British colony might have taken the lead in setting up well-defined property rights, whereas former Spanish colonies might have lagged behind in setting up similar institutions. It seems counterintuitive, then, that Buenos Aires set up institutions that provided for *de jure* specification of property rights on the frontier during the 1820s and 1830s, while NSW, like most other neo-Europes, lost control of the settlement process as squatters rushed out and made unauthorized *de facto* claims.

Our explanation of this puzzle accentuates the role of government and its revenue objectives, and the role of violence from competing indigenous claimants to frontier land. Previous factor-endowments accounts overlook these fundamental elements of frontier settlement. Even though public land disposal ultimately generated little revenue, local governments' attempts to make their vast frontiers a source of revenue guided early public land policies.[44] Land sales require costly specification and enforcement of *de jure* property rights and these costs prompted governments to set official settlement boundaries beyond which they refused to support settlement, specification or enforcement.

Differences in the strength of resistance of first peoples explain differences in settlement patterns and institutions. Typically, if government did not remove them, squatters stood ready to make *de facto* claims beyond the official boundary. But the threat of violence on the frontier from indigenous confrontation raised the opportunity costs of squatting. In Buenos Aires, the threat was great, making it too risky to settle without military campaigns to secure new land. By contrast, in NSW, the risk from Aboriginal

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[44] On this point, see Kanazawa (1996) on the political economy of land disposal by auction and preemption in the United States.

resistance was not as great, and it did not deter squatters from going out and claiming land they had to defend themselves.

The institutional capacity of first peoples to solve problems of collective action affected their ability to mount an effective resistance. The Europeans in NSW had a strict comparative advantage in the use of violence. Bands of Aborginals did not have the political organization or technology to mount an effective resistance. By contrast, Buenos Aires' military forces could not assume a strict comparative advantage. The Pampean Indians were effective at organizing militarily. Tribal alliances combined indigenous skills and organizational capacity with military technology, tactics learned from the Europeans, cavalry, guns, and the occasional cannon to defeat *porteño* attempts at territorial expansion. Furthermore, recent exposure to European disease weakened and reduced the Australian Aboriginal population but not South American Indian populations who, exposed since the sixteenth century, had developed immunities.

Our findings support a factor-endowments explanation, but they warn against oversimplified notions of how property-rights emerge in neo-Europes. They are not simply imported because European settlers demand them from government. They may originate from government action, but, as Naomi Lamoreaux (2011) argues, they sometimes emerge out of illegal takings. In our analysis, how property rights originate depends on the opportunity costs of settlers, who may choose to seek government protection or may chose, instead, to self-enforce a *de facto* claim. When public, private and outsider claims collide, how these competing claimants find resolution depends on how the comparative advantage of force is distributed between the parties. Yet ironically, even if a strong government has a monopoly in the use of violence, it may not be able, or willing, to secure control over the

institutions of property on a vast frontier. The government's monopoly of force is easily dissipated over a vast territorial claim that is costly to enforce. At greater distances from the seat of government power, property rights depend even more on the resolution of competing claims, including competing indigenous claims, and often, but not always, the substitution of *de facto* for *de jure* specification and enforcement of property rights.

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Table 1. Fiscal Revenues for the Province of Buenos Aires, 1822-1850
(Annual averages in thousands of gold pesos)

	1822-1824	1825-1828	1830-1834	1835-1836	1837-1840	1841-1844	1845-1848	1849-1850
Customs	6,696	4,135	514	552	289	2,355	1,075	2,859
Production, trade & property taxes	180	298	26	17	37	139	86	98
Stamps, licenses, etc.	331	371	23	24	44	72	71	93
Government services	168	256	9	10	8	14	13	15
Sale and lease of state properties	346	334	23	34	47	35	12	3
Emphyteusis	-	-	7	10	13	-	-	-
Sale of public land	79	17	8	18	24	-	-	-
Income from financial operations	1,690	4,712	92	13	573	5	716	-
Proceeds from debt issue	1,584	3,311	59	8	-	-	-	-
Monetary emissions	-	967	-	-	495	4	716	-
Voluntary or forced contributions	-	100	-	-	-	32	1	-
Other	116	220	1	4	4	2	1	-
Total	9,528	10,425	688	654	1,003	2,654	1,975	3,068

Sources: These figures are summarized from Halperin Donghi (2005), pp. 169-89, 223-44, deflated using peso prices of gold from Burgin (1945), pp. 69, 165, 274.

Table 2: Sales of NSW Crown Lands, NSW Public Revenues, and NSW Immigrants

Year	Commissariat, Land Fund, and Colonial Fund Revenues (£'000)	Revenue From Sale of Crown Lands (£'000)	Percent of NSW Gov. Revenues from Sale of Crown Lands (percent)	Crown Lands Sold (acres)	Total Immigrants to NSW
1832	-	12.5	-	20,860	2,006
1833	278.5	25	8.98	29,025	2,685
1834	382.1	41.8	10.94	91,399	1,564
1835	563.4	80.8	14.34	271,947	1,428
1836	814.6	126.5	15.53	373,978	1,721
1837	696.5	120.2	17.26	368,483	3,477
1838	994	116.3	11.70	315,090	7,430
1839	798.5	153	19.16	283,130	10,549
1840	955	314.6	32.94	183,944	8,486
1841	616.1	90.4	14.67	86,092	22,483
1842	733.5	14.6	1.99	21,733	8,987
1843	524.5	10.8	2.06	4,660	1,142
1844	557	7.4	1.33	4,013	4,687
1845	518.8	16.7	3.22	5,513	1,096

Notes: Total revenues for the Commissariat Fund (Table 4(a)), the Colonial Fund (Table 4(c)), and the Land Fund (Table 4(e)) were adjusted to remove fund balances.

Sources: Total colonial revenues and land sale revenues are from Butlin (1994), Appendix 4, Tables 4(a), 4(c), and 4(e). Crown lands sold and immigration data are from Burroughs (1967), Appendices II and III.

Figure 1. The Market for Public Land on the Frontier
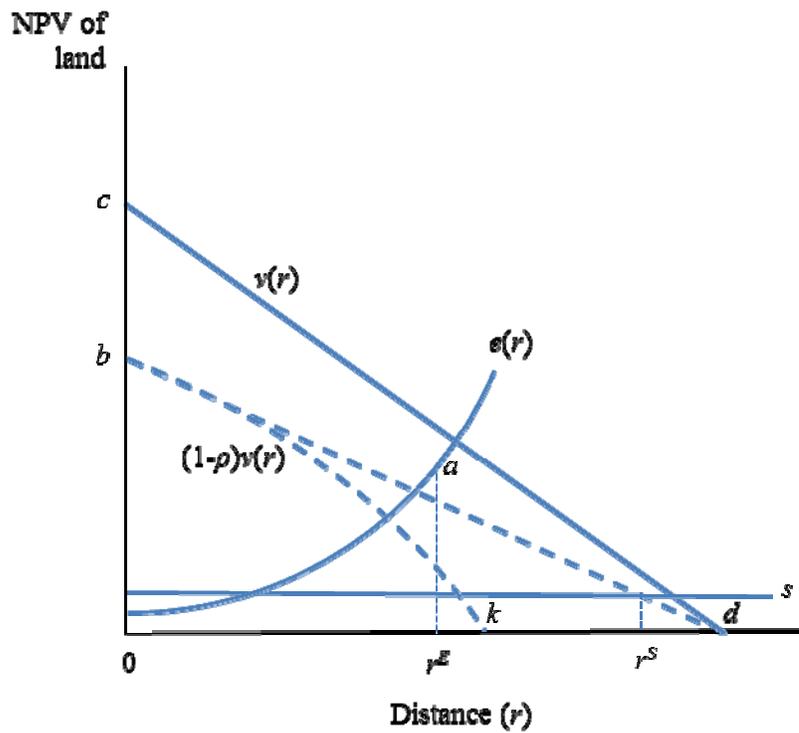
Notes: At the optimal r^E the length of ar^E is equal to

$e = \rho v + s + (\alpha - \beta)[(1 - \rho)v - s] + [t + \gamma(1 - t)]Y_{r^E} / F'$. The dotted curves *bd* and *bk*

represent two possible values of $(1 - \rho)v$, the latter drawn under the assumption that the risk

of violence rises as one moves farther out into the frontier.

Figure 2. Von Thünen Squatters' Band

Squatters' band

Official zone of
settlement

r^E

r^S

Population
center

Enforcement boundary where

$e = \rho v + s(\alpha - \beta)[(1 - \rho)v - s]$
$+ [t + \gamma(1 - t)]Y_{,\varepsilon} / F'$
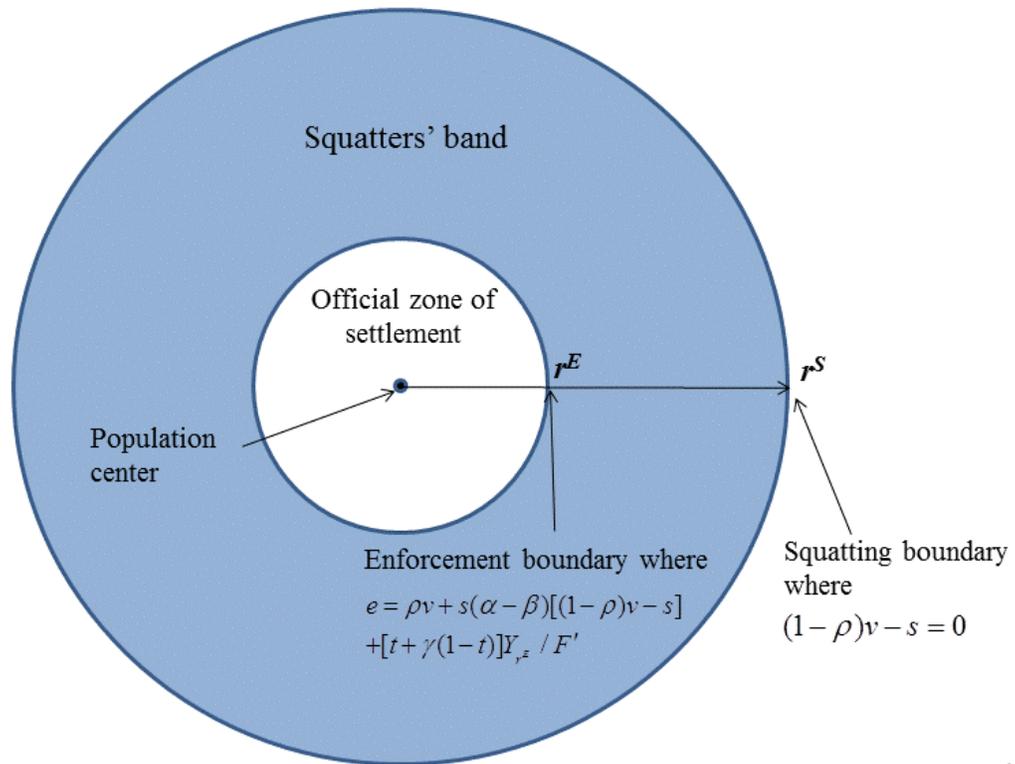
Squatting boundary
where
$(1 - \rho)v - s = 0$

1

Figure 3. New South Wales, showing the Nineteen Counties and the squatters' districts established by 1844

Elevation (meters)

VALUE

- 0 - 2.851
- 2.852 - 127.5
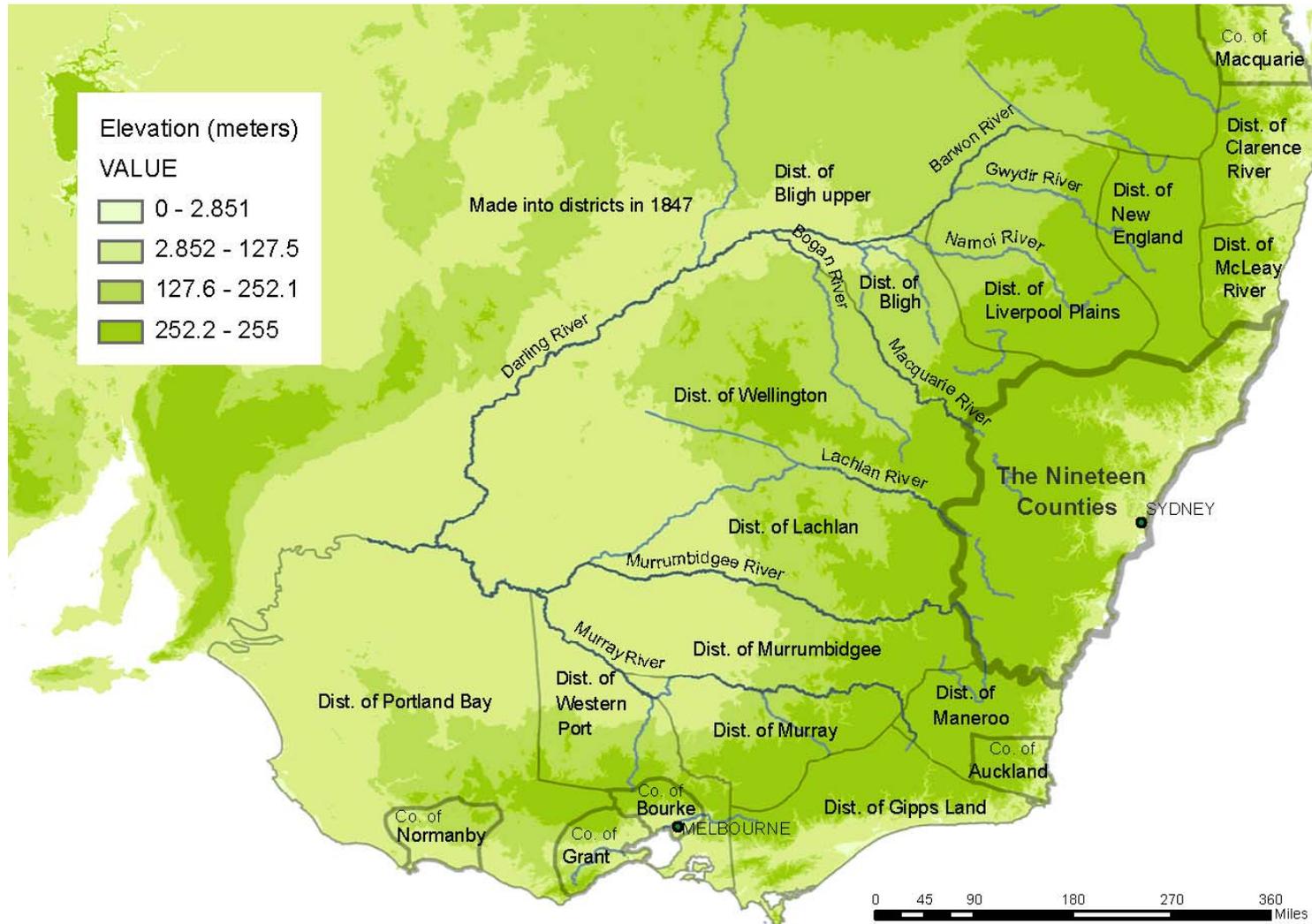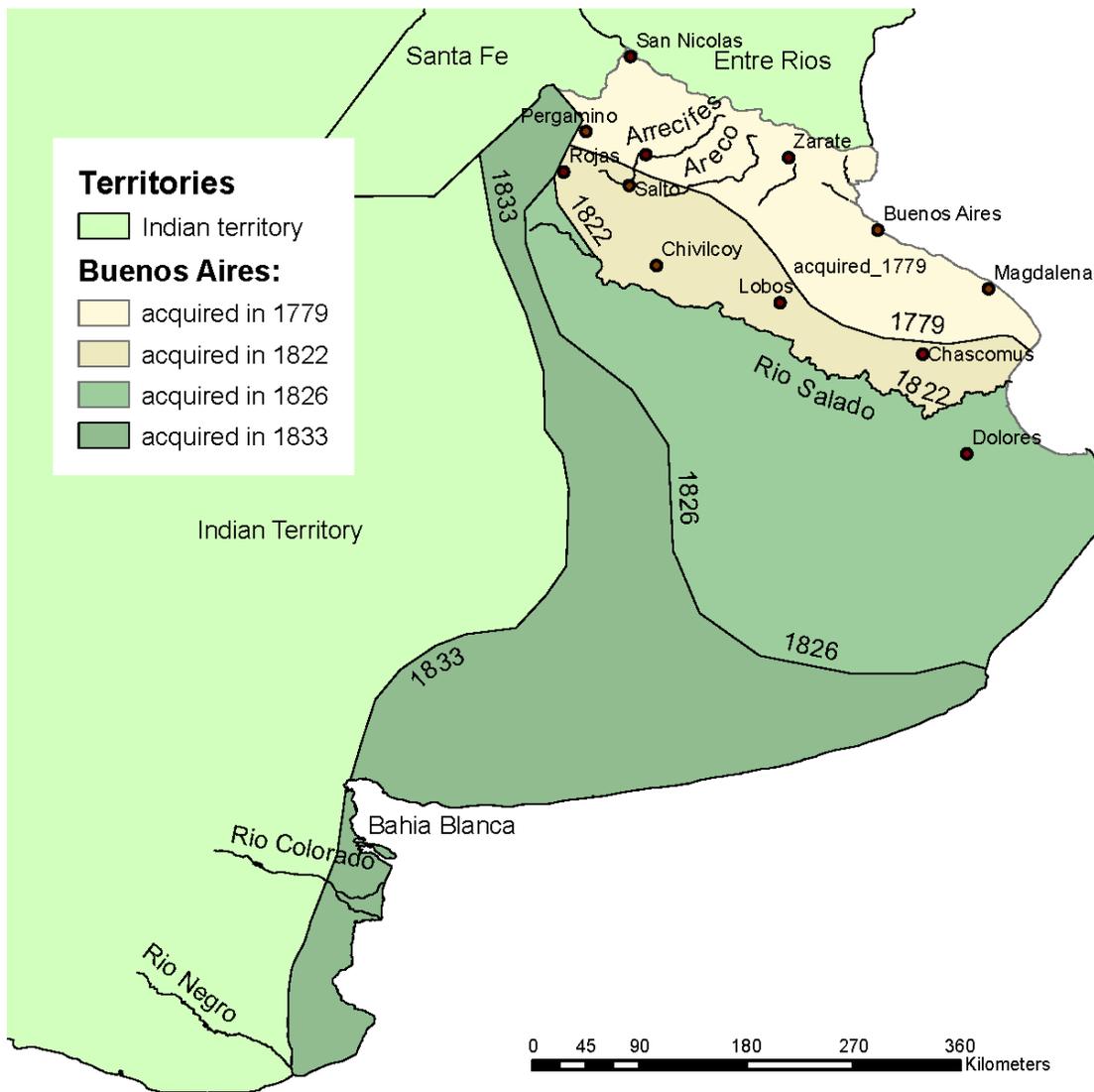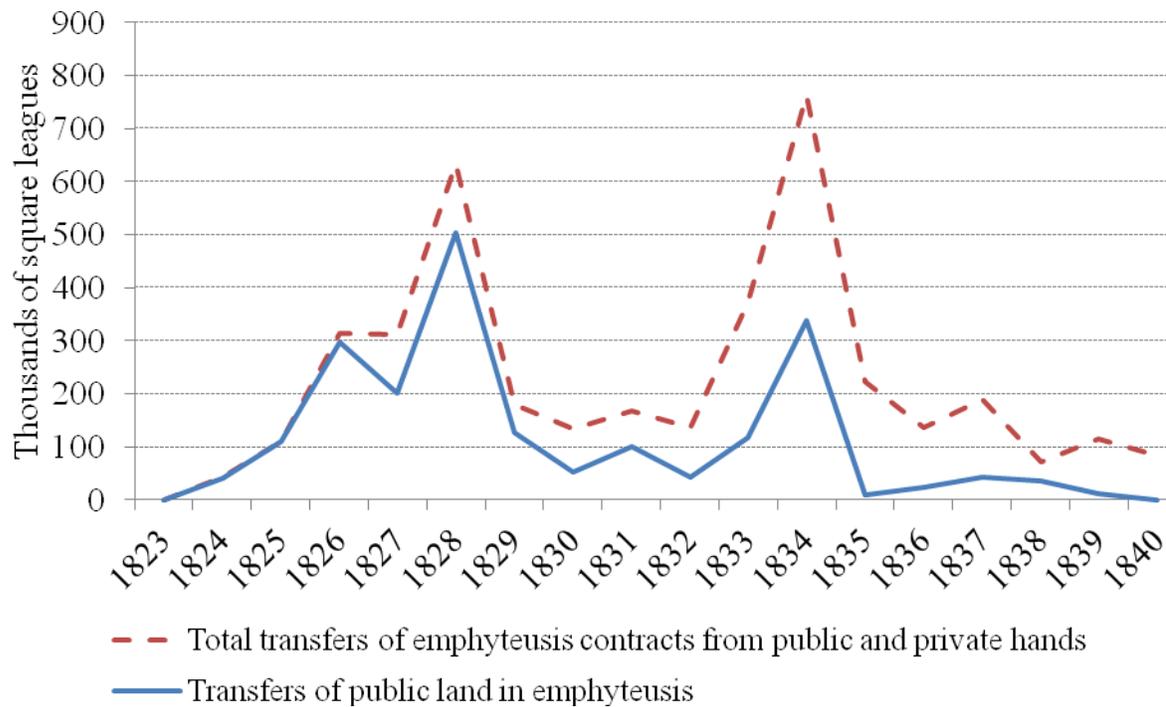- 127.6 - 252.1
- 252.2 - 255

Figure 4. Province of Buenos Aires, showing territory acquired between 1779 and 1852

Source: Infesta (2007), p. 16

Figure 5. Transfers of Land in Emphyteusis, Buenos Aires, 1823-40

Notes. The data in the figure include 83 percent of the transfers of public land into emphyteusis.

The date of filing was not available for the remainder of claims records.

Source: Infesta (2007), p. 52; compiled from the Escribanía General de Gobierno de la Provincia de

Buenos Aires.

Appendix: The Political Economy of Land Privatization

in Argentina and Australia, 1810-1850: A Puzzle

by

Alan Dye and Sumner La Croix

The model developed in this article offers an analytical framework for explaining

original conditions for settlement of the frontier. It is a one-shot model of the initial stage

of a multi-stage process of government involvement in property rights formation. In the

initial stage, the government is free to set the boundary unconstrained by existing *de facto*

claims because the land beyond the boundary is virtually unsettled land and no [or few] *de*

facto claims have been made. In subsequent stages, if settlers choose to squat beyond the

boundary and make *de facto* claims, the government is no longer free to set the boundary

without considering potential resistance from existing *de facto* claimants. If settlers squat

beyond the boundary and are not removed immediately, the government will face

additional political costs later when it tries to remove the squatters or claim a revenue

stream from them. This appendix considers whether political costs in later stages would

subsequently lead the government to alter the official settlement boundary, r^E, set in the

initial stage.

First, consider the case in which growing export demand and population lead to

increasing land values, $v(r)$. Government maximizes net revenues by pushing out the

official boundary, r^E. Figure A.1 depicts the equilibrium condition given by Equation (4)

for determining the initial settlement boundary, r_0^E, in the simplest, baseline case of $R = 0$.

The downward sloping curve, $\rho v_i(r) + s + tY_{r^E} / F'$, is the marginal opportunity cost of

squatting on a *de facto* claim, where $i = 0$ or 1, and $v_1(r) > v_0(r)$. The government

maximizes net revenues by setting the original official boundary, r_0^E, where the marginal

enforcement cost, $e(r)$, equals the marginal opportunity cost of squatting.

[Insert Figure A.1 about here]

In a world with zero [political] transaction costs, the government would

immediately replace the original boundary, r_0^E, with a new official boundary, r_1^E, farther

out on the frontier, $r_0^E < r_1^E$, and take possession of the land between r_0^E and r_1^E or specify

de jure rights for private settlers. But squatters' *de facto* rights acquire greater preemptive

legitimacy as they remain on the land and develop activities that add value to the local

economy. If the government should try to remove the squatters to reassert the public

claim, not only would incumbent squatters themselves resist, but also other constituent

groups with backward and forward linkages to squatter production, and potential

newcomers with desires to obtain similar *de facto* property rights, may choose to support

them politically. Therefore, when settlers choose to squat beyond the border, if the

government does not remove them immediately, it will find it more costly to remove them

later, or to reclaim rights to their land.

In the initial stage, we assume the marginal cost of enforcing *de jure* property

rights, $e(r)$, is the same regardless of whether it involves removing a squatter on a private

de jure claim inside r^E or a public claim outside r^E. But this equivalence vanishes in the

second stage. As squatters' *de facto* claims obtain preemptive legitimacy and the squatters

acquire additional wealth, the government faces an additional political cost to removing

squatters from their *de facto* claims. In the second stage, the cost of enforcing a *de jure*

claim inside r^E continues to be $e(r)$, but the cost of removing a squatter from his *de facto*

claim outside r^E is $e(r) + h$, where $h > 0$ represents the additional cost the government

must incur to remove squatters. Enforcement costs in the second stage, $e*(r)$, therefore, exhibit a stepwise increase at r^E. That is,

$$e*(r) = \begin{cases} e(r), & \text{if } r \leq r^E \\ e(r)+h, & \text{if } r > r^E \end{cases}$$

As Figure A.1 depicts, $e*(r)$ jumps at r^E because it is only beyond r^E where squatters have acquired politically legitimate *de facto* claims. The presence of the border introduces a nonconvexity into the government's costs of enforcement at r^E. While increases in $v(r)$ would push out r^E each period in a zero-political cost model, the nonconvexity induced by the border's presence leads the government to leave the settlement boundary unchanged between $v_0(r)$ and $v_1(r)$ (as long as $h \leq \rho[v_1(r^E) - v_0(r^E)]$). Furthermore, we know that h is a positive function of land value, $h = h[v(r)]$, since to defend their *de facto* rights, squatters are willing to incur expenses up to the full net present value of the rents that accrue to their properties, and these rents increase with $v(r)$. Therefore, as rising $v(r)$ increases the incentive of government to reassert its public land claims, it also increases squatters' incentives to defend their *de facto* claims.

The magnitude of h varies with a number of other factors. It depends on how effectively political institutions permit squatters or their allies to exercise their voice to influence land policies and, if efforts through these channels fail, on how effectively squatters can mount a resistance. It also depends on how aggressively the government acts to reassert its claims. For example, if the government attempts a general removal, squatters' incentive to resist is relatively large, but if the government takes action only against one, or a selective group, of squatters, the magnitude of h will depend on the

perceived general threat to squatters' *de facto* property rights. The political cost of shifting the entire boundary of official settlement outward to reclaim control of the settlement process beyond r^E is likely to be large, since it requires a general removal. If, instead, the government attempts to reclaim a right to a revenue stream, such as a rental payment for squatters' use of public lands, political costs, h, remain positive but may be reduced relative to a general removal. Partial attempts to reclaim a revenue stream are relevant to the NSW case, as we discuss below.

Therefore, even if nominally the government identifies r_1^E, in Figure A.1, as a new *preferred* official boundary, it will often be deterred by political costs h from taking action to implement it. It may be noted that this result is not dependent on the assumption that the cost of removing squatters at any r, in stage 1, is the same as the cost of providing them *de jure* property-rights protection. An alternative assumption, that the cost of removal is less than $e(r)$ but still rising in $v(r)$, gives qualitatively similar results.

In the above discussion, the additional fixed cost h is interpreted, consistent with the NSW case, as the political cost associated with the squatters' capacity to resist government action. In Buenos Aires, we observe that the government did expand the boundary outward, but it did not occur continuously as $v(r)$ rose. Rather, it occurred when the government organized military campaigns to pacify targeted new territories. Since organizing a military campaign has a fixed cost, h, the discreteness of pacification efforts in Buenos Aires follows from the same logic, but was, instead, driven by the capacity of first peoples rather than squatters to resist government action.

Now consider questions of time consistency. The fact that government faces a different constraint in stage 2 introduces a question about the time consistency of its

decision in stage 1. Assuming the government is forward-looking and anticipates rising land values, $v(r)$, why would it be willing to draw any boundary, and effectively cede rights to squatters beyond it, knowing that it will want to redraw the boundary in the future and that the cost of doing so will be significantly higher?

More specifically, when a squatter makes a *de facto* claim, why does a forward-looking government not remove the squatter immediately if it knows it will want to reclaim the squatter's plot in the future? First, recall that equation (2) in the model expresses the sales price of a plot of public land, its value and its enforcement cost as the net present values of the expected streams of future values. That is, $v(r) = \sum_{t=0}^{N} v_t(r)\delta^t$, etc., where δ^t is a discount factor. This captures the forward-looking nature of government, since $v_t(r)$ for $t > 0$ reflects the anticipated increase in land values.

Consider what government must do if it wishes to maintain control of its claims to land beyond r^E in order to avoid the political costs h to claim a future positive net revenue stream. For a given *de facto* claim at distance $r^K > r^E$, there is a future time $t = k$ when rising land values cause the equilibrium condition in Equation (4) to hold exactly, that is $e(r^K) = \rho v(r^K) + s$. If land values rise monotonically over time, the government's future net revenue stream can be divided into two periods, one prior to $t = k$, and another beginning at $t = k$. The transformation of the decision horizon yields a two-period model. For the first period, define $e_0(r^K) = \sum_{t=0}^{k-1} e_t(r^K)\delta^t$, and $\rho v_0(r^K) + s = \sum_{t=0}^{k-1} [\rho v_t(r^K) + s]\delta^t$; and for the second period, $e_1(r^K) = \sum_{t=k}^{N} e_t(r^K)\delta^t$, and $\rho v_1(r^K) + s = \sum_{t=k}^{N} [\rho v_t(r^K) + s]\delta^t$.

By definition, $e_0(r^K) > \rho v_0(r^K) + s$, and $e_1(r^K) = \rho v_1(r^K) + s$. At time $t = k$, the government would prefer to extend the boundary to r^K. However, at time $t = 0$, if it wishes

to avoid the future political costs of challenging squatters' *de facto* claims, it must remove

them immediately and keep them from resettling during period 0, which requires incurring

the enforcement costs $e_0(r^K)$. It would only be willing to do this if

$e_0(r^K) + e_1(r^K) \leq \rho v_1(r^K) + s$, which cannot be true, since at r^K, $e_1(r^K) = \rho v_1(r^K) + s$ and

$e_0(r^K) > 0$.

For the intuition, consider this analogy: Why do urban planners build a highway

with a specified number of lanes, say four lanes, when they expect that, at some time in the

future, population growth may call for a wider highway? By discounting future benefits

and costs, planners build ahead of demand only to an extent, even if they anticipate that in

the more distant future the road may need to be widened. A similar situation holds for

small governments in settlement economies with vast claims of frontier lands that are

beyond their capacity to enforce. The government cannot postpone placing limits in some

fashion on the services it provides to enforce property rights. Our model assumes the limit

is in the form of an enforcement boundary and an official zone of settlement because it fits

our two cases, NSW and Buenos Aires. It also seems to fit the land policies of a number of

other neo-Europes, including British North America and South Africa.

The highway analogy may be extended further. When urban planners extend a new

highway into an undeveloped part of the city, they are relatively free to choose the optimal

number of lanes given the expected costs and benefits. However, when changing the width

of an existing highway, urban planners face additional political transaction costs to

widening the highway, if the land bordering the existing highway is owned by private

individuals. With zero transaction costs, the government and the land owners strike

Pareto-improving deals, while positive transaction costs often lead to the use of a more

costly process of land acquisition, such as eminent domain.

Squatters are also assumed to be forward-looking. Why would a squatter make a *de facto* claim outside r_0^E knowing that the government might later decide to push out the boundary and expropriate the *de facto* claim? Squatters may anticipate the possibility of a government attempt to reclaim public land sometime in the future. Such expectations are incorporated in the risk factor, ρ, which accounts for any risk of property loss, whether from the threat of indigenous violence, government expropriation, or land disputes or encroachment from competing settlers. Since the net present value of the land is

$v(r) = \sum_{t=0}^{N} v_t(r)\delta^t$, even if a squatter is certain that the government will expropriate him at some time $t = m$ in the future, he is willing to make a *de facto* claim to reap the temporary rents as long as $\sum_{t=0}^{m-1} [(1-\rho)v_t(r) - s_t]\delta^t \geq 0$. For both the BA and NSW cases, the capital invested in livestock is mobile and can be moved by the squatter at time $t = m$ to the next best location, possibly farther out on the frontier.

The above discussion does not depend on the assumption that increases in land values may not be fully anticipated. Yet it is highly unlikely that the wool boom was fully anticipated in New South Wales in 1829 or that the military successes of 1826 and 1833 in Buenos Aires were easy to predict in 1817. It is also unlikely that changes in enforcement costs, $e(r)$, discussed in the article, were fully anticipated. In the initial stage, the government makes an optimal decision using the best available forecast. As unanticipated increases in $v(r)$ are observed, the government will not have the incentive to shift the boundary outward as long as $e(r^E) + h[v(r^E)] > \rho v(r^E) + s$.

In the first phase of expansion, when the initial official boundary is set, the risk of

future expropriation by government is difficult for squatters to predict because the political economy of the transition from *de facto* to *de jure* property rights has several paths of equilibrium. Alston, Harris and Mueller (AHM, 2012) and Alston, Libecap and Mueller (1999a,b) examine the different paths of transition that property rights on frontiers may take. As land values rise on the frontier, disputes over land claims may arise between a variety of parties.

If the government should underestimate political costs, *h*, then disputes arise as *de facto* claimants resist government attempts to expropriate their land. Rising land values also increase the risk of disputes between squatters. In the earliest phase of settlement, land is not scarce, and squatters do not have to compete for it. As land values rise, potential entrants have a greater incentive to challenge incumbents' claims, which tend to be large and may be perceived as underutilized or inequitable. Increased competition for land creates an incentive for first possessors to develop strategies to minimize rent dissipation, including formation of informal second-party associations and institutions to mediate disputes and to coordinate against intrusion by newcomers. Since first-possessor associations often gain an advantage in the use of force against intruders, rent dissipation from disputes and violence may be reduced.

But the settlement of disputes between incumbents and government, and between incumbents and outside challengers, is inherently political, and the political economy offers multiple paths of transition to *de jure* property rights. On the one hand, if incumbent *de facto* claimants are politically strong, they may attempt to minimize rent dissipation by demanding conversion of their *de facto* rights into *de jure* rights with security of title and enforcement by the courts. On the other, if challengers seeking rights to land can muster

sufficient political influence, they may try to persuade the government to reassert the right to specify property rights and to deny incumbent *de facto* claims so as to reallocate land on the frontier more equitably. The Umbeck (1981) principle of "might makes rights" applies here. If both parties know in advance which party will win, there will be no contest. But if there is uncertainty, and either party thinks it has a chance to win, a struggle, either political or physical, is more likely.

Long-run outcomes may be more uncertain if the political balance can conceivably change. In New South Wales, squatters gained political influence. In 1844/45, they were unable to stop enactment of Governor Gipps' Occupation and Purchase Regulations. Yet by 1846, squatters had turned the tables politically, with support from English wool importers and manufacturers, to obtain Parliament's passage of the Australian Waste Lands Act, which granted *de jure* rights to squatters' *de facto* claims in the form of 14-year leases with preemptive purchase rights. In 1850, regulations of the Colonial Office strengthened the security of squatters' leases and their preemptive rights to convert larger sections of their *de facto* claims into *de jure* ownership (Alston *et al*., 2012, pp. 753-54).

The role of the NSW government changed as land values rose and the population density of the frontier increased. In the initial phase, government's actions were focused on plans to raise revenues from public land holdings and to prohibit settlement in remote districts in order to avoid especially costly property-rights protection and enforcement. This policy met little resistance initially because private stakes on the frontier were low, the settlement restriction was not enforced, the indigenous threat was not prohibitive, and land competition among settlers was not too intense. As the competition for land grew, the government had a new incentive to maintain a presence on the frontier—to maintain the

peace. This additional incentive is not explicit in equation (2), but its effect is to cause the new preferred boundary r_1^E to shift even farther out.

After the initial stage, therefore, existing property rights around r_0^E prevent the continual adjustment of the optimal settlement boundary, r^E, that the model would otherwise predict because political costs of challenging or removing *de facto* claims introduce inertia. Instead, the original official boundary, r_0^E, remains rigid. If officials fail to account explicitly for the political costs, h, the rightward shift of the optimal r^E appears as a perceived divergence in the government's preferred boundary or policy from its actual policy. The obstacles that government officials acknowledge as they try to redraw the boundary are a manifestation of the political costs they encounter. Political costs, of course, may take many forms other than lobbying or outright resistance.

Two additional factors are relevant for our model. First, governments may be reluctant to establish policies that discriminate between different *de facto* claimants in the same district. Consider a policy that authorizes the government to seize (or assert greater control over) the property of a *de facto* claimant just inside r_1^E but not his neighbor's *de facto* claim just outside r_1^E. Such a policy would be perceived as arbitrary and unfair, which could increase the political costs of the reform. Government officials may not take decisive action until policy reform for an entire district can be justified on grounds of fairness or impartiality.

Second, even if land values rise continuously, policy changes are not enacted continuously because legislative and regulatory processes incur negotiation costs and other transaction costs. There is an advantage to limiting the number of policy changes while trying to anticipate longer-run desired outcomes. Officials choose to hold off from

proposing a major reform until the benefits of the reform compensate for both the transaction costs of making the reform and any political costs from challenging existing *de facto* property rights.

Partial attempts to reclaim a revenue stream, which can reduce the political costs relative to a general removal of squatters, are relevant to the NSW case. To reassert its claims to land in the squatters' band, government has the option to unbundle property rights and reclaim a smaller bundle in order to lower its effective marginal cost of enforcement. For example, consider the NSW licensing policy adopted in the Squatting Act of 1836. It reasserted the government's right to receive a payment for the use of public land outside the Limits of Location by requiring grazers to purchase a license for a fixed annual fee. The Act did nothing to alter the existing *de facto* specification or to provide mechanisms to specify property rights; these were implicitly ceded to squatters. The Act committed to some costs of enforcement by establishing districts with commissioners to enforce purchase of licenses, keep the peace, and mediate disputes. It did not, however, commit to all the expenses necessary for government specification and enforcement of surveyed property rights in the squatter districts.

The lower marginal enforcement cost curve associated with the unbundled property right is depicted in Figure A.1 as $l(r)$. If land values increase to $v_1(r)$, an optimal enforcement boundary for the licensing policy is set at r_1^L. If squatters mount political resistance, h, to the new legislation, so that enforcement costs are $l(r)+h$ (not shown in Figure A.1), the new boundary falls somewhere between r_0^E and r_1^L, possibly r_1^E. The two zones created in NSW after 1836 are thus depicted: *de jure* property rights with government enforcement could be purchased in the zone 0 to r_0^E; *de facto* property rights

could be acquired in zone r_0^E to r_1^L with the purchase of a license, wherever incumbent squatters had not already claimed it. In remoter districts, beyond r_1^L, it may have been easier to evade purchase of the license.

The successive legislation in New South Wales is consistent with the dynamics of the model with these additional costs and constraints incorporated. As the perceived preferred public land policy diverged more and more from the initial 1829 Limits of Location policy, the NSW government took steps to reassert its claims over public lands beyond the boundary. The first steps were embodied in the Squatting Acts of 1836 and 1839, which unbundled the government's claim, introduced licensing, and gave the government greater powers to enforce the license policy and adjudicate disputes. When the NSW government took further steps in the mid-1840s to reclaim rights ceded to squatters in the 1836 and 1839 Acts, squatters had become powerful enough politically to not only resist the government's action but also to obtain additional accommodation— conversion of their *de facto* rights into 14-year *de jure* lease rights with partial preemptive purchase rights at the termination of the lease.

The successive military campaigns to pacify and claim new territory in Buenos Aires are also consistent with the dynamics of the model. As the organization of military campaigns into the desert incurred fixed costs, the government's attempts to claim new lands on the frontier for settlement took place in discrete campaigns (as observed). We note that discrete campaigns are consistent with either a continuous rise in frontier land values—as discussed above—or punctuated increases in values.

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Figure A.1

NPV

$e^*(r) = e(r) + h$

$e(r)$

$l(r)$

b

c

a

$\rho v_1(r) + s + t Y_{r^E} / F'$

$\rho v_0(r) + s + t Y_{r^E} / F'$

0   r_0^E r_1^E r_1^L Distance (r)