Endogenous Property Rights Transaction Costs and Diversity.

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Property Rights: Misallocation Vs. Disincentives.

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– Yet, the tendency of markets to be frictionless and the risk of predation would imply that rights should be complete when the political process is inclusive enough (Acemoglu and Johnson, 2005; Besley and Ghatak, 2010).

– Nevertheless, the main challenges to private property come ubiquitously, and most surprisingly legally, from private parties whenever transaction costs are sizeable (Bouckaert and De Geest, 1995).

Guerriero (2017).

– I formalize the Calabresi and Melamed's (1972) intuition by devising a transaction cost-based theory of endogenous property rights for a production economy (Dari-Mattiacci and Guerriero, 2015; **Guerriero, 2016**; Bar-Gill and Persico, 2016; Segal and Whinston, 2016; AGZ, 2017) $\rightarrow$

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1. When potential buyers decide whether to buy or grab an asset, the original owners' property rights fall with market frictions and failures. Market failures, in turn, rise with the dispersion in the original owners' and potential buyers' valuations (Dari-Mattiacci, 2012; BHK, 2014).

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2. When the downstream firms decide whether to produce in-house through an old technology or to adopt a new more efficient one necessitating the upstream firms' input, the property rights on the input fall with asset specificities. Asset specificities, in turn, rise with the odds of a more productive technology (AAZ, 2006).

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→ Negative economic effect of weak property rights might be spurious.

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→ Original owners' rights trade-off exclusion from trade of middle valuation potential buyers and expropriation by low-valuation ones.

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→ show the inconsistency of predation-based proxies for property rights.

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Guerriero (2017): Property Rights, Transaction Costs, and the Limits of the Market.

Anecdotal . . .

– Frictions: the cost of eviction or the inability to provide a sufficient supply of housing because of regulatory requirements and speculative land-holding are the most recurring justifications to the tolerance towards the 40% of private lands invaded in developing countries and the two billion squatters estimated around the world (Brueckner and Selod, 2009).

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– Frictions: exhaustion of intellectual property rights has been mainly implemented in high-transaction costs developing countries (Ghosh, 2014).

– Frictions: Piazzesi et al. (2017) conclude that financial costs explain 14% of the price gap between first and secondary housing market segments.

Evidence and . . .

– Market power: Common access to the fishing harvest together with individual transferable quotas is more often observed in Nova Scotia and New Zealand where the fishermen's market power is the strongest (Croutzet and Lasserre, 2017). Similarly, Article 31 of the TRIPS agreement allows the participants to impose compulsory licensing if the commercial terms for a voluntary license are unreasonable (Bond and Saggi, 2017).

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– Incomplete contracting costs: stronger downstream firm's intellectual property rights—i.e., trade secrecy and copyright instead of patents—are granted when asset specificities are severe (Burk and Mc-Donnel, 2007).

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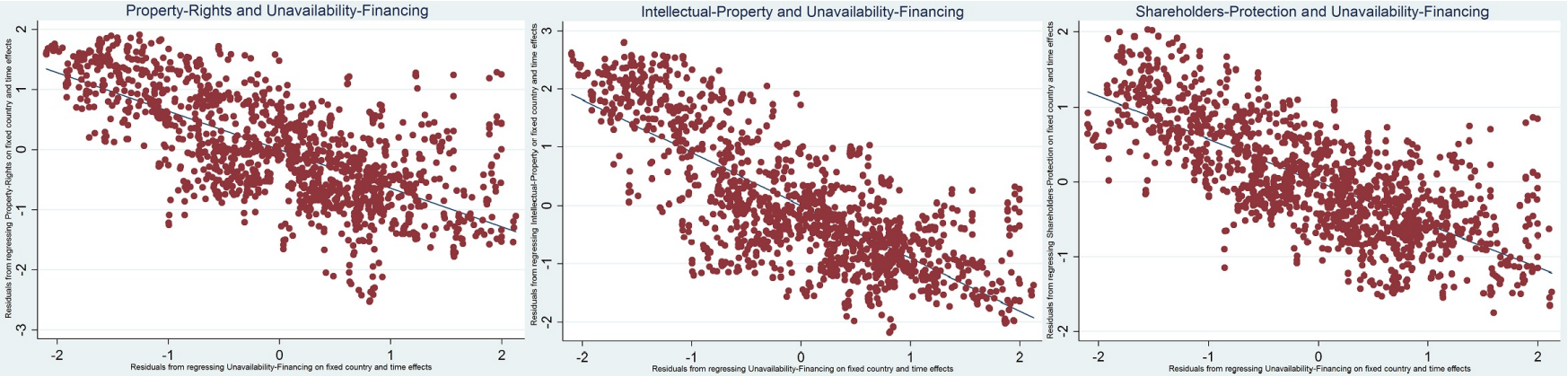
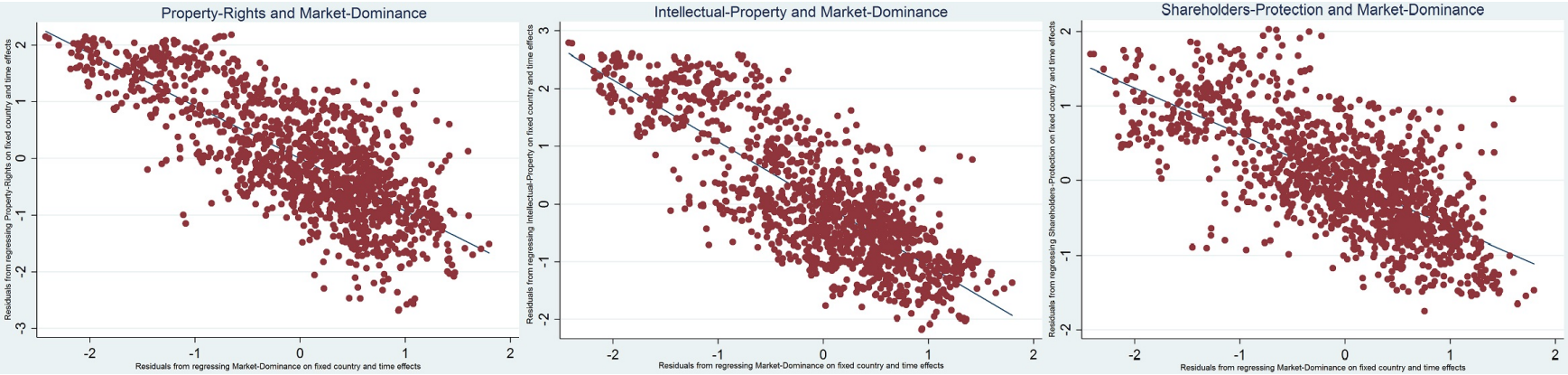
The evidence is similar when property rights are measured by the available objective proxies for horizontal property rights, i.e., length of adverse possession of personal property and the DBP investor protection index.

Property Rights and Financial Inefficiencies, . . .



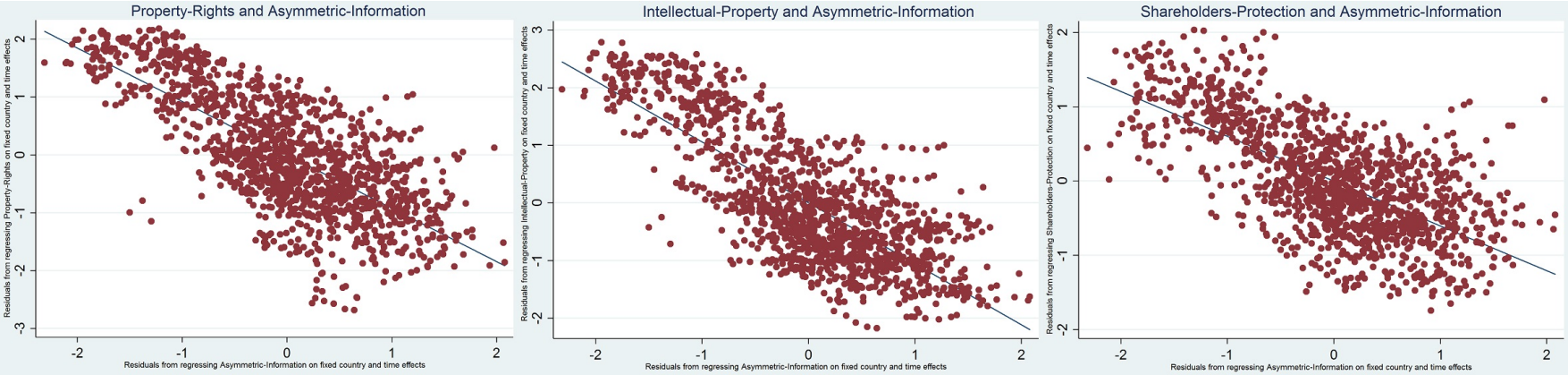
Unavailability-Financing: financial sector difficulties in providing products and services (1-to-7). *Panel of 135 countries spanning the 2006-2015 period* for which I observe all extra controls I use in the empirical exercise.

Private Rights and Market Power, . . .



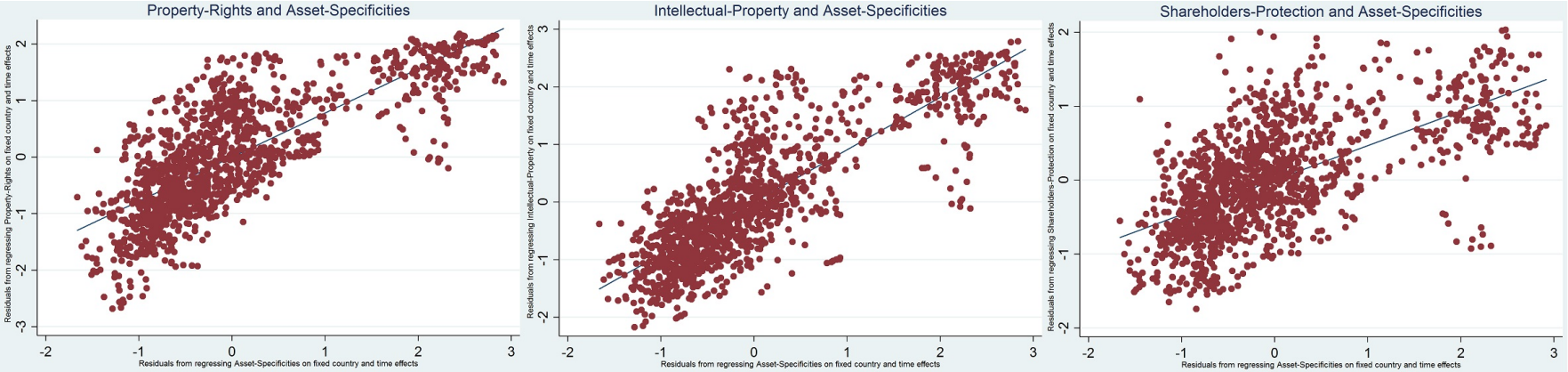
Market-Dominance: lack of competitiveness of corporate activity (1-to-7).

Private Rights and Lemons-type Distortions, . . .



Asymmetric-Information: falling with the information used by buyers to buy (1-to-7), e.g., 1 = sophisticated analysis of attributes; 7 = lowest price.

Private Rights and Incomplete Contracting Costs.



Asset-Specificities: competitive advantage in international markets (1-to-7), e.g., 1 = low cost labor/natural resources; 7 = unique products and processes. Property rights are assigned to the downstream firms, which provide the main productive resources [Burk and McDonnel 2007, p. 594].

Exogenous Transaction Costs: Preferences . . .

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While original owners value x at $v > 0$, potential buyers have a valuation λ uniformly distributed over $\left[\underline{\lambda}, \overline{\lambda}\right]$ with $l \equiv \overline{\lambda} - \underline{\lambda}$, $\overline{\lambda} > v > \underline{\lambda}$, and $\lambda_m \equiv \frac{\overline{\lambda}+\underline{\lambda}}{2}$.

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Each buyer can either expropriate her match at no cost or buy the good at v plus a transaction cost $0 < \alpha < \min\left\{v, \overline{\lambda} - v\right\}$ with no social value, e.g., bargaining and financial costs, costs of legalizing the transfer and due to excessive regulation and/or bribery, mark-up of a foreign intermediary.

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▸ Interpretation

Socially Optimal Property Rights: Solution and ...

A potential buyer buys (expropriates) if $\lambda - v - \alpha > (1-\gamma)\lambda \leftrightarrow \lambda \geq \hat{\lambda} \equiv \frac{v+\alpha}{\gamma}$ (otherwise). Hence, the optimal γ^* maximizes the concave function

$$\int_{\hat{\lambda}}^{\overline{\lambda}} \frac{\lambda-\alpha}{l} d\lambda + \int_{\underline{\lambda}}^{\hat{\lambda}} \frac{(1-\gamma)\lambda+\gamma v}{l} d\lambda,$$

for $\hat{\lambda} < \overline{\lambda}$ and $(1-\gamma)\lambda_m + \gamma v \equiv W^{FE}$ otherwise.

Comparative Statics.

If $v \geq \lambda_m$, $\gamma^* = 1$. If $v < \lambda_m$, an interior $\gamma^* \in \left(\frac{v+\alpha}{\overline{\lambda}}, 1\right]$ is defined by

$$(\gamma^*)^2 = \frac{v^2-\alpha^2}{\underline{\lambda}(2v-\underline{\lambda})},$$

and it is an equilibrium provided that the social welfare is higher at this value than it is at 0. The former is indeed the case for α sufficiently small.

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▸ Intuition : a rise in α has the marginal effect of inefficiently pushing some high-λ buyers to expropriate x and the infra-marginal effect of decreasing the social gain from the transfers that continue to be consensual.

▸ General Probability Density Functions

▸ Alternative Assumptions

Property Rights and Market Power.

α is a mark-up selected by original owners between t_1 and t_2 and maximizes

$$\frac{(v+\alpha)\left(\overline{\lambda}-\hat{\lambda}\right)}{l}+\gamma^* v\frac{\left(\hat{\lambda}-\underline{\lambda}\right)}{l},$$

for $\frac{v+\alpha}{\gamma^*}=\hat{\lambda}<\overline{\lambda}$. Then, $\alpha^*=\frac{\gamma^*\left(\overline{\lambda}+v\right)}{2}-v$ and $\frac{d\hat{\lambda}}{d\gamma^*}=0$. Society values the original owners' profits and thus maximizes $\int_{\hat{\lambda}}^{\overline{\lambda}}\frac{\lambda}{l}d\lambda+\int_{\underline{\lambda}}^{\hat{\lambda}}\frac{(1-\gamma)\lambda+\gamma v}{l}d\lambda\rightarrow$ for $v\geq\lambda_m\rightarrow\gamma^*=1$; for $v<\lambda_m$, γ^* jumps from 0 to 1 as α^* gets small.

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Proposition 2: γ^* weakly falls with the mark-up α^*, which in turn increases with the dispersion in the traders' valuations $\overline{\lambda}-v$.

Property Rights and Lemons-type Distortions.

– Original owners have private information on their valuation $v \sim U\left[0, \overline{\lambda}\right]$. v is correlated with λ. $1 - \Delta > 0$ potential buyers value x at αv, $\Delta/2$ have valuation θv, and the remainder gain v/θ with $\theta > 2 > \alpha > 1$.

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– At the exogenous p_L, potential buyers' gain $p_L/2$ and thus γ^* maximizes $\theta\lambda_m \frac{\Delta}{2} + (1-\Delta)\left[(1-\gamma)\,\alpha\lambda_m + \gamma\lambda_m\right] + \left[(1-\gamma)\,\frac{\lambda_m}{\theta} + \gamma\lambda_m\right]\frac{\Delta}{2}$, for $\gamma^* \geq \frac{2}{\theta}$ and $(1-\gamma)\left[(1-\Delta)\,\alpha + \frac{\theta^2+1}{\theta}\frac{\Delta}{2}\right]\lambda_m + \gamma\lambda_m$ otherwise. γ^* can jump from 0 to 1 when α and $1-\Delta$ become sufficiently small.

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Proposition 3: γ^* weakly falls with the lemon-type distortions α, which in turn rise with the dispersion in the traders' valuations.

Property Rights and Incomplete Contracting Costs: ...

Society is divided in a mass 1 of upstream firms and a mass 1 of downstream ones. The latter can employ two technologies to produce x, i.e., the

1. "old" one does not need any input from the upstream firm and produces $\delta\lambda$ with $\delta < 1$ and λ again uniformly distributed over $\left[\underline{\lambda}, \overline{\lambda}\right]$.

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1. "old" one does not need any input from the upstream firm and produces $\delta\lambda$ with $\delta < 1$ and λ again uniformly distributed over $\left[\underline{\lambda}, \overline{\lambda}\right]$.

2. "new" one delivers λ and requires first (then) a downstream (upstream) firm's input costing v (0 with odds $0 < \alpha < 1$ and $(1-\delta)\lambda$ o/w).
   - Costs and payoffs are unverifiable and ex ante non contractible. Only the input cost is ex post non contractible.

Set up and . . .

t_0 γ is the probability that in t_2 a court allows the upstream firm to charge the inflated cost after the lawsuit launched by the downstream firm (Gennaioli, 2013). γ again maximizes the social welfare.

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t_2 After the preliminary phase, the input cost is realized and the upstream firm makes his request. Next, the downstream firm either accepts, turns to the old technology, or exploits the available legal remedies.

Equilibrium.

$\gamma^* = 1 \rightarrow$ innovation fails because of a hold-up failure. For $\gamma^* < 1$ instead, the downstream firm innovates for $\lambda \geq \hat{\lambda} \equiv \frac{v}{(1-\delta)(1-\gamma)}$, the upstream one produces if $\gamma^* \geq 1 - \alpha$, and for $\hat{\lambda} < \overline{\lambda}$ society maximizes the function

$$\alpha \int_{\hat{\lambda}}^{\overline{\lambda}} \frac{\lambda - v}{l} d\lambda + (1-\alpha) \int_{\hat{\lambda}}^{\overline{\lambda}} \frac{\delta\lambda - v}{l} d\lambda + \int_{\underline{\lambda}}^{\hat{\lambda}} \frac{\delta\lambda}{l} d\lambda,$$

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Proposition 4: γ^* fall with the incomplete contracting costs α, which in turn gage the likelihood that the new technology is more productive.

Robustness Checks.

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Model Implications.

Testable Predictions:

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2. Market power and lemons-type distortions rise with the traders' valuation dispersion, while the severity of asset specificities increases with the likelihood of a more productive technology.

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- transaction costs with either the burden of administrative requirements on firms—i.e., *Over-Regulation*—or the impact of non-tariff barriers on competitiveness of imported goods, i.e., *Trade-Barriers*.

Measurement.

– The gist of the empirical exercise is the same when I proxy:

- transaction costs with either the burden of administrative requirements on firms—i.e., *Over-Regulation*—or the impact of non-tariff barriers on competitiveness of imported goods, i.e., *Trade-Barriers*.
- market frictions and failures (asset specificities) with the necessity of bribery, firms' difficulty to obtain a bank loan, firms' hurdle to issue shares, or the lack of competitiveness of local markets (extent of production sophistication and of relationship-specificity).

Empirical Strategy: OLS, . . .

Table 3 OLS controlling only for fixed country and year effects entail that a one-sd rise in *Unavailability-Financing*, *Market-Dominance*, or *Asymmetric-Information* (*Asset-Specificities*), which is 1 (0.9), implies a 0.3(0.4)-sd—i.e., 1—fall (rise) in the strength of property rights.

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Endogeneity? OLS estimates may be capturing reverse causality, may be driven by the confounding effect of relevant omitted variables, or may be attenuated by the error in the measurement of transaction costs.

Controlling for Observables, and . . .

Table 4 OLS controlling contemporaneously for *Income*, *Democracy*, *Reserves*, *Conflict-External*, *Conflict-Internal*, and *Human-Capital* over and above fixed country and time effects. The extra controls also take into account preference diversity (Guerriero, 2016).

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- The Internet appendix (evidence available upon request) shows that analysis is robust to considering *Culture* and *Enforcement* to evaluate the incentives of intermediaries as in Dari-Mattiacci and Guerriero (2015) (including all proxies for transaction costs).

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Table 5 To attribute the entire estimates to unobservables, the influence of unobservables would have to be on average 60 times greater than that of all observables (Altonji, Elder, and Taber, 2005). ▸ Selection

2SLS.

Table 6 I document strong negative (positive) first-stages between the extent of market power and lemons-type distortions (asset specificities) and proxies for both the availability of the latest technology and the quality of math and science education (see Añón Higón et al., [2017]).

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- Conditional on all observables, 2SLS are similar to OLS estimates and the exclusion restriction is vindicated by under-identification test, test of overidentifying restrictions, and semi reduced-forms.

Directions for Future Research.

- Legal variation is relevant since special interests can distort the design of property rights away from optimality if not fully democratic.

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- Weak property rights are society's response to sizable market frictions and failures (asset specificities), which are driven by the dispersion in the traders' valuations (likelihood of innovation), and thus their negative correlation with outcomes might be—partly—spurious.

Guerriero (2016): Endogenous Property Rights.

Anecdotal and . . .

– Movables: local politicians in India have been defending the massive postwar condoning of power thefts by the rural population as an attempt to avoid that the homogeneous subsistence farming would be destroyed if electricity invoices were collected (Charnoz and Swain 2012).

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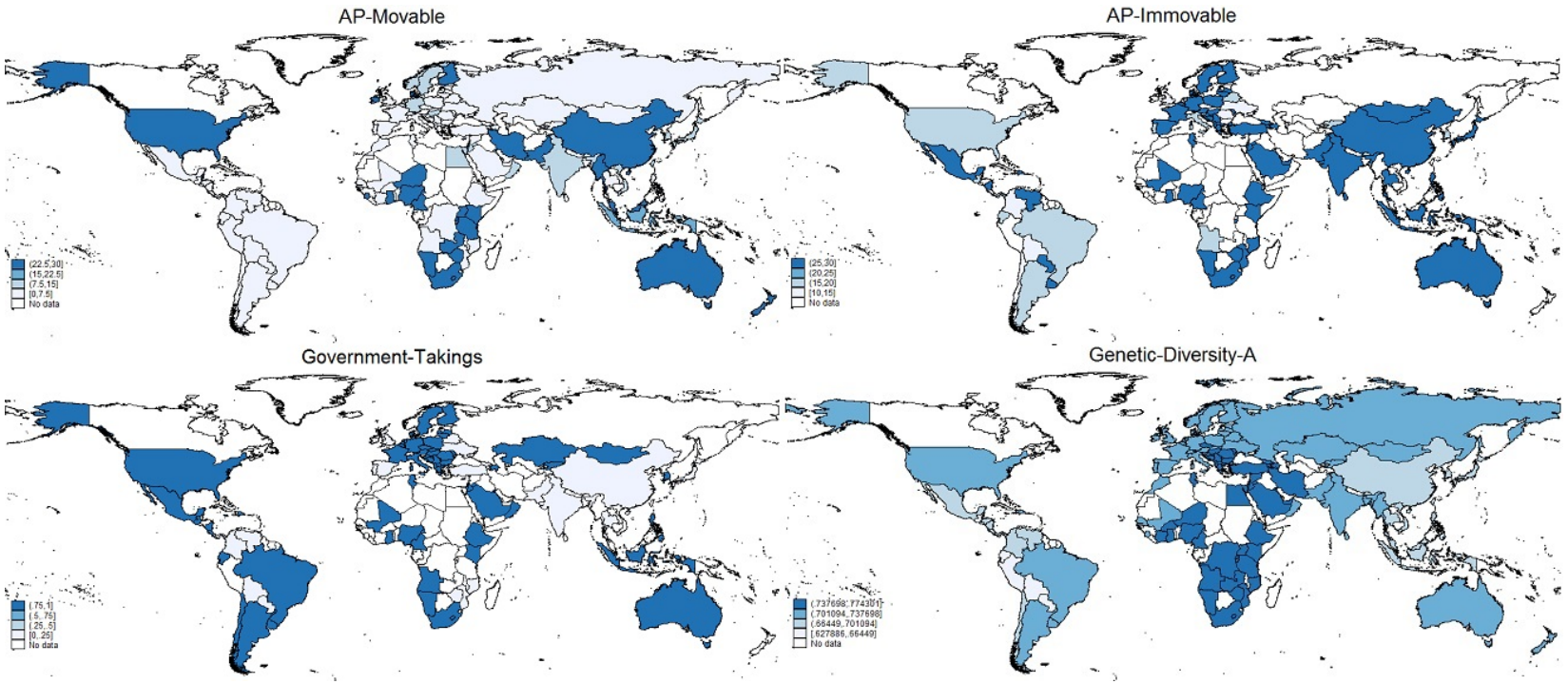
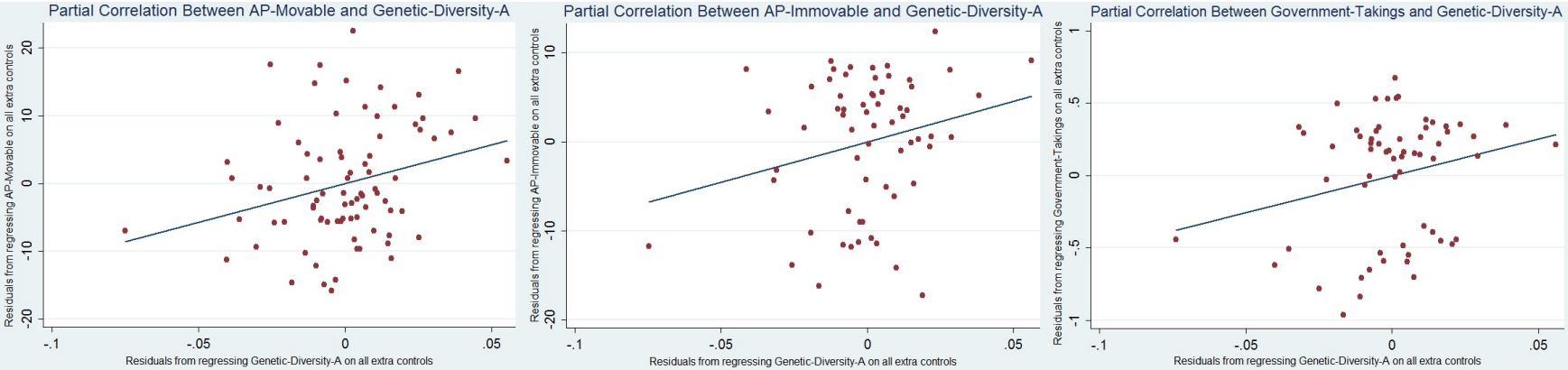
– Immovables: in the last two decades, the restitution of the lands confiscated by the communist regimes in the former Eastern Bloc has been more limited where farming was more homogeneous, e.g., Albania (Bejtja and Bejtja 2014). Here, present-day owners would bear large losses if dispossessed because of the huge transaction costs of acquiring new plots.

Empirical Evidence on Weak Property Rights …



and Genetic Diversity.



Set Up: Preferences . . .

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- a share $\Delta/2$ with $\Delta \in (0,1)$ values the good at $\underline{\lambda} > 0$;
- a share $\Delta/2$ at $\overline{\lambda} > v > \underline{\lambda}$;
- the remainder has a valuation λ uniformly distributed over $\left[\underline{\lambda}, \overline{\lambda}\right]$ with $l \equiv \overline{\lambda} - \underline{\lambda}$ and $\lambda_m \equiv \left(\overline{\lambda} + \underline{\lambda}\right)/2$ and thus a rise in Δ implies a mean-preserving spread of the λ distribution.

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t_3 An expropriated x is given back to its original owner with probability γ, which encapsulates the strength of the remedies in the original owner's hands and of public enforcement and the length of adverse possession.

Socially Optimal Property Rights: Solution and ...

A potential buyer buys (expropriates) if $\lambda - v - \alpha > (1-\gamma)\lambda \leftrightarrow$ $\lambda \geq \hat{\lambda} \equiv \frac{v+\alpha}{\gamma}$ (otherwise). Therefore, the socially optimal γ^* maximizes

$$\left(\overline{\lambda} - \alpha\right)\frac{\Delta}{2} + (1-\Delta)\int_{\hat{\lambda}}^{\overline{\lambda}} \frac{\lambda-\alpha}{l} d\lambda + (1-\Delta)\int_{\underline{\lambda}}^{\hat{\lambda}} \frac{(1-\gamma)\lambda+\gamma v}{l} d\lambda + \frac{(1-\gamma)\underline{\lambda}+\gamma v}{2}\Delta,$$

if $\hat{\lambda} < \overline{\lambda}$, and $(1-\gamma)\lambda_m + \gamma v \equiv W^{FE}$ otherwise.

Comparative Statics.

If $v \geq \lambda_m$, $\gamma^* = 1$. If $v < \lambda_m$, the interior solution $\gamma^* \in \left(\frac{v+\alpha}{\overline{\lambda}}, 1\right]$ defined by

$$(\gamma^*)^2 = \left(v^2 - \alpha^2\right)\left[v\underline{\lambda} + (v - \underline{\lambda})\left(\underline{\lambda} - \frac{l\Delta}{1-\Delta}\right)\right]^{-1},$$

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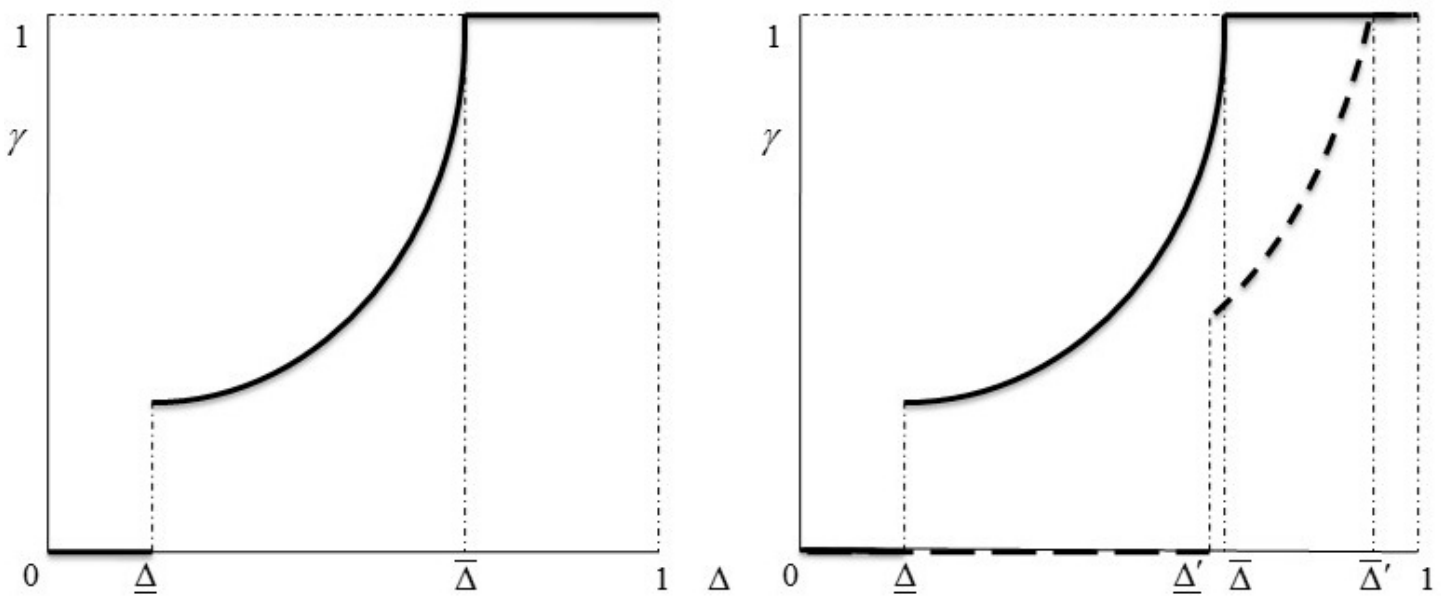
▸ General Probability Density Functions

▸ Heterogeneous original owners

▸ Private sales

▸ Costly expropriation

Socially Optimal Property Rights.



The Political Economy of Property Rights Protection.

A minority of "insiders" chooses γ^*. Focus on the group formed by the original owners and the buyers with $\lambda \in \left[\underline{\lambda} + \epsilon, \overline{\lambda}\right]$ and thus γ^* maximizes

$$\left(\overline{\lambda} - \alpha\right) \frac{\Delta}{2} + (1 - \Delta) \int_{\hat{\lambda}}^{\overline{\lambda}} \frac{\lambda - \alpha}{l} d\lambda + (1 - \Delta) \int_{\underline{\lambda}+\epsilon}^{\hat{\lambda}} \frac{(1-\gamma)\lambda + \gamma v}{l} d\lambda + \gamma v \left(\frac{\Delta}{2} + \frac{\epsilon}{l}\right),$$

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for $\hat{\lambda}<\overline{\lambda}$, and $W^{FE}-\frac{1-\gamma}{2}\left[(1-\Delta)\frac{\epsilon^2+2\epsilon\underline{\lambda}}{l}+\underline{\lambda}\Delta\right]$ otherwise.

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γ^* is still weakly increasing with Δ for ϵ not too small but is set inefficiently high by individuals who do not face uncertainty, e.g., Zamindari system of land taxation allowing Indian landowners to expropriate from evading tenants who are often more productive (Besley and Ghatak, 2010).

More General Market Structures.

$\alpha = \beta\delta$ where β is a mark up selected by original owners between t_1 and t_2 and δ an inverse measure of market competitiveness. β^* maximizes

$$(v+\beta\delta)\frac{\Delta}{2} + (1-\Delta)\frac{(v+\beta\delta)\left(\overline{\lambda}-\hat{\lambda}\right)}{l} + (1-\Delta)\gamma^* v\frac{\left(\hat{\lambda}-\underline{\lambda}\right)}{l} + \gamma^* v\frac{\Delta}{2},$$

for $\frac{v+\beta\delta}{\gamma^*} = \hat{\lambda} < \overline{\lambda}$ and $\gamma^* v$ otherwise. $\beta^*\delta = \frac{\gamma^* l\Delta}{4(1-\Delta)} + \frac{\gamma^*\overline{\lambda}}{2} - \frac{v(2-\gamma^*)}{2}$ for $\hat{\lambda} < \overline{\lambda}$ and 0 o/w. $\frac{d\hat{\lambda}}{d\gamma} = 0$ and society considers the original owners' profits.

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If $v \geq \lambda_m$, then $\gamma^* = 1$. If $v < \lambda_m$, then γ^* jumps from 0 to 1 for Δ large.

Market for Lemons (Hasen and McAdams, 1997).

Original owners have private information on their valuation v, which is drawn from an uniform distribution with support $\left[\underline{\lambda}, \overline{\lambda}\right]$ and correlated to the potential buyers' one. $1-\Delta$ potential buyers value x at $v+\mu$ with $0<\mu<(\theta-1)v$ and $\theta>2$, $\Delta/2$ value x at θv, and the remainder v/θ.

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The exogenously fixed price $p_L<2\mu$ implies that buyers infer that the expected value of x is $p_L/2$ since the owner sells only if $v \leq p$. γ^* maximizes

$$(1-\Delta)\left[(1-\gamma)\left(\frac{\underline{\lambda}+\overline{\lambda}}{2}+\mu\right)+\frac{\gamma\left(\underline{\lambda}+\overline{\lambda}\right)}{2}\right]+\left[(1-\gamma)\frac{\underline{\lambda}+\overline{\lambda}}{2\theta}+\frac{\gamma\left(\underline{\lambda}+\overline{\lambda}\right)}{2}\right]\frac{\Delta}{2},$$

for $\gamma^* \geq \frac{2}{\theta}$ and $(1-\gamma)\left[(1-\Delta)\left(\frac{\underline{\lambda}+\overline{\lambda}}{2}+\mu\right)+\frac{\theta^2+1}{\theta}\left(\frac{\underline{\lambda}+\overline{\lambda}}{2}\right)\frac{\Delta}{2}\right]+\gamma\frac{\underline{\lambda}+\overline{\lambda}}{2}$ otherwise. γ^* can jump from 0 to 1 when Δ is sufficiently large.

Property Vs. Liability Rules.

Buyers pay damages d to keep x when liabilities rules are applied. d equals $\underline{\lambda}$ with probability ϕ and v otherwise (Kaplow and Shavell, 1996).

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$\hat{\lambda}_R \equiv \frac{v+\alpha-(1-\gamma)d}{\gamma}$, $d = \phi\underline{\lambda} + (1-\phi)\,v$, γ^* maximizes $\int_v^{\hat{\lambda}_R} \frac{(1-\gamma)\lambda+\gamma v}{l} d\lambda +$ $\int_{\hat{\lambda}_R}^{\overline{\lambda}} \frac{\lambda-\alpha}{l} d\lambda + \int_{\underline{\lambda}}^{v} \frac{(1-\gamma)\phi\lambda+[(1-\gamma)(1-\phi)+\gamma]v}{l} d\lambda + \frac{(1-\gamma)\phi\underline{\lambda}+[(1-\gamma)(1-\phi)+\gamma]v}{2(1-\Delta)}\Delta,$ if $\hat{\lambda} < \overline{\lambda}_R$, and $\int_v^{\overline{\lambda}} \frac{(1-\gamma)\lambda+\gamma v}{l} d\lambda + \int_{\underline{\lambda}}^{v} \frac{(1-\gamma)\phi\lambda+[(1-\gamma)(1-\phi)+\gamma]v}{l} d\lambda +$ $\frac{(1-\gamma)\phi\lambda_m+[(1-\gamma)(1-\phi)+\gamma]v}{(1-\Delta)}\Delta$ o/w. For $v \geq \lambda_m$ and both ϕ and Δ sufficiently large, γ^* can jump from 0 to 1 (see also Bar-Gill and Persico, [2012]).

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Production realizes if $v\frac{\Delta}{2} + \frac{(1-\Delta)v\left(\overline{\lambda}-\hat{\lambda}\right)}{l} + \frac{(1-\Delta)\gamma^* v\left(\hat{\lambda}-\underline{\lambda}\right)}{l} + \gamma^* v\frac{\Delta}{2} - \kappa \geq 0$, where $\kappa < v$ is the production cost. Since the original owner's payoff strictly rises with γ, there is a $\hat{\gamma}$, increasing with Δ for $\overline{\lambda}$ sufficiently high, such that production realizes iff $\gamma^* \geq \hat{\gamma}$. Being production valuable also for buyers,

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- society selects the maximum between $\hat{\gamma}$ and the solution prevailing without production. γ^* is raised to incentivate production and $\frac{d\gamma^*}{d\Delta} \geq 0$.

Investment.

Investment expenses

- raising v to $v(1+\rho)$ with $\rho < \frac{\overline{\lambda}-v-\alpha}{v}$ at the fixed cost $\zeta < v$;
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- allowing original owners to get a share ρ of α at the variable cost $\rho^2/2$.
  - The FOC equals that in the basic model except for a positive investment inducement term. For $v < \lambda_m$ then, γ^* can jump from 0 to a positive γ^* higher than that prevailing without investment and rising with Δ for Δ large enough. If $v \geq \lambda_m$, then $\gamma^* = 1$.

Measuring Property Rights.

GDM and I sent questionnaires to LEX-MUNDI and HG.org lawyers, and prominent law professors in 126 jurisdictions and obtained the variables:

- *AP-Movable*—Number of years after which a good-faith possessor of a movable good acquires ownership, max 30;

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- *Government-Takings*—Dummy equal to 1 if the state cannot take real property to transfer it to a private entity for private for-profit use.

Measuring Preference Heterogeneity: Rationale and . . .

Genetic-Diversity-A: contemporary heterozygosity as predicted by migratory distance from East Africa and post-1500 population flows. Why?

- Genetic diversity within indigenous settlements is a primitive metrics of the genealogical distance between populations with a common ancestor and, so, of the average differences in preferences transmitted across generations (Cavalli-Sforza, Menozzi, and Piazza, 1994). Accordingly, it drives contemporaneous heterogeneities across genetic, ethnic, and linguistic groups (Ashraf and Galor, 2013).

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- The exodus of the *Homo sapiens* out of East Africa occurred thousands of years ago in a series of stages such that new groups carried from initial colonies only a portion of their overall genetic diversity.

Robustness.

Table 7: The estimates are similar if I use instead of *Genetic-Diversity-A*:

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Empirical Strategy: OLS, . . .

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– Endogeneity? because of the primarily prehistoric origins of contemporary genetic pools, I can rule out reverse causation. Yet, the results might be driven by the confounding impact of the Europeans' colonization strategy and/or by other determinants of property rights associated with diversity.

Robustness, . . .

1. Table 3: control stepwise or all together for: *Pathogen-Load*, *Urbanization-1500*, *Colonization-Time*; *Population*, *Income*; *Neolithic*, *Democracy*; *Reserves*, *Conflict-E*, *Common-Law*; *Conflict-I*; *Land-Quality-SD*, *Ruggedness*, *Latitude*; and in the Internet appendix *Culture*, *Enforcement*, *Temperature*, and *Precipitation*. Many of these observables control also for transaction costs.

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1. Table 3: control stepwise or all together for: *Pathogen-Load*, *Urbanization-1500*, *Colonization-Time*; *Population*, *Income*; *Neolithic*, *Democracy*; *Reserves*, *Conflict-E*, *Common-Law*; *Conflict-I*; *Land-Quality-SD*, *Ruggedness*, *Latitude*; and in the Internet appendix *Culture*, *Enforcement*, *Temperature*, and *Precipitation*. Many of these observables control also for transaction costs.

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3. Table 5: to attribute the entire estimate to unobserved heterogeneity, selection on unobservables needs to be on average 12 times greater than selection on all observables (Altonji, Elder, and Taber, 2005).

2SLS (Table 6).

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- *Migratory-Distance*.— Migratory distance from Addis Ababa in thousands of kilometers (Ashraf and Galor, 2013).

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– 2SLS and OLS results are almost identical and I cannot reject that diversity is exogenous at a level lower than 5% when controlling for all observables.

Predation-based Measures of Property Rights.

– *Private-Property*: 1 to 5 discrete score gaging stronger protection of private property in 1997. Available at http://www.heritage.org/Index/

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– Table 8: Private-taking-based measures correlate weakly and possibly negatively with predation-based proxies for property rights.

Directions for Future Research.

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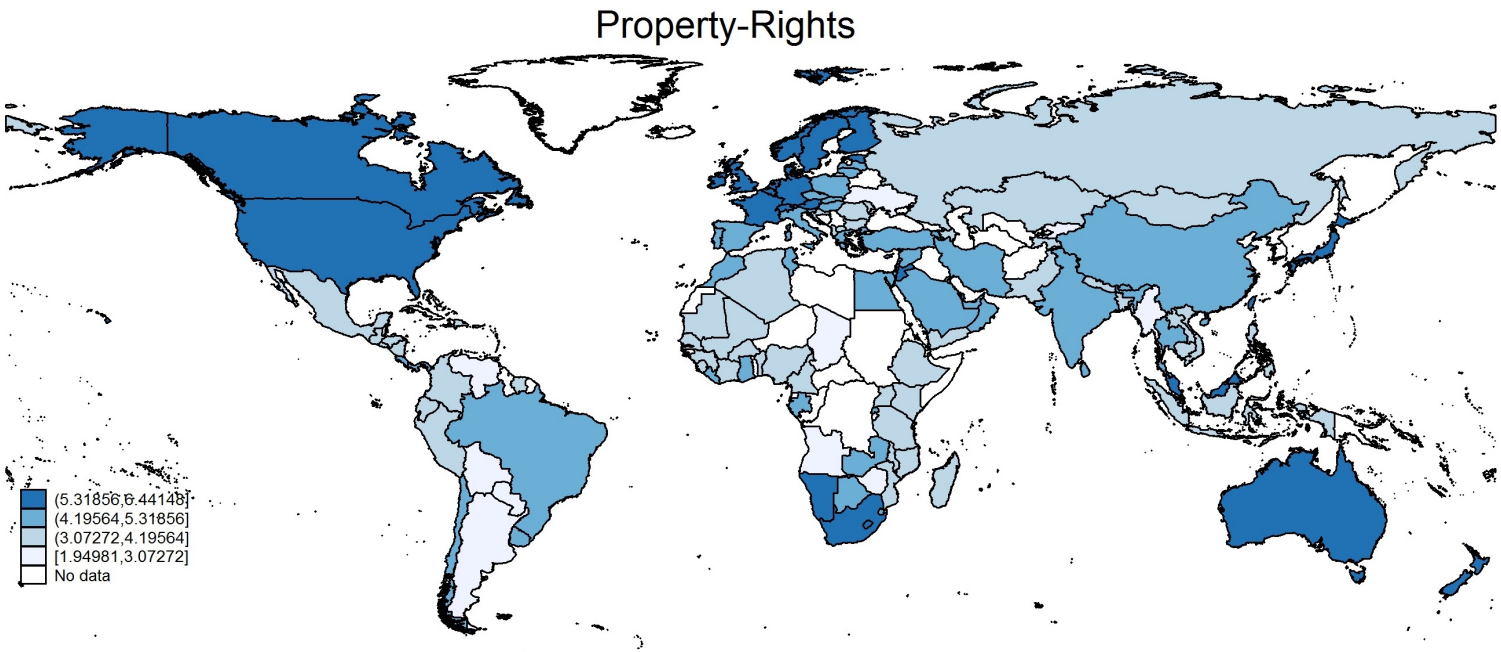
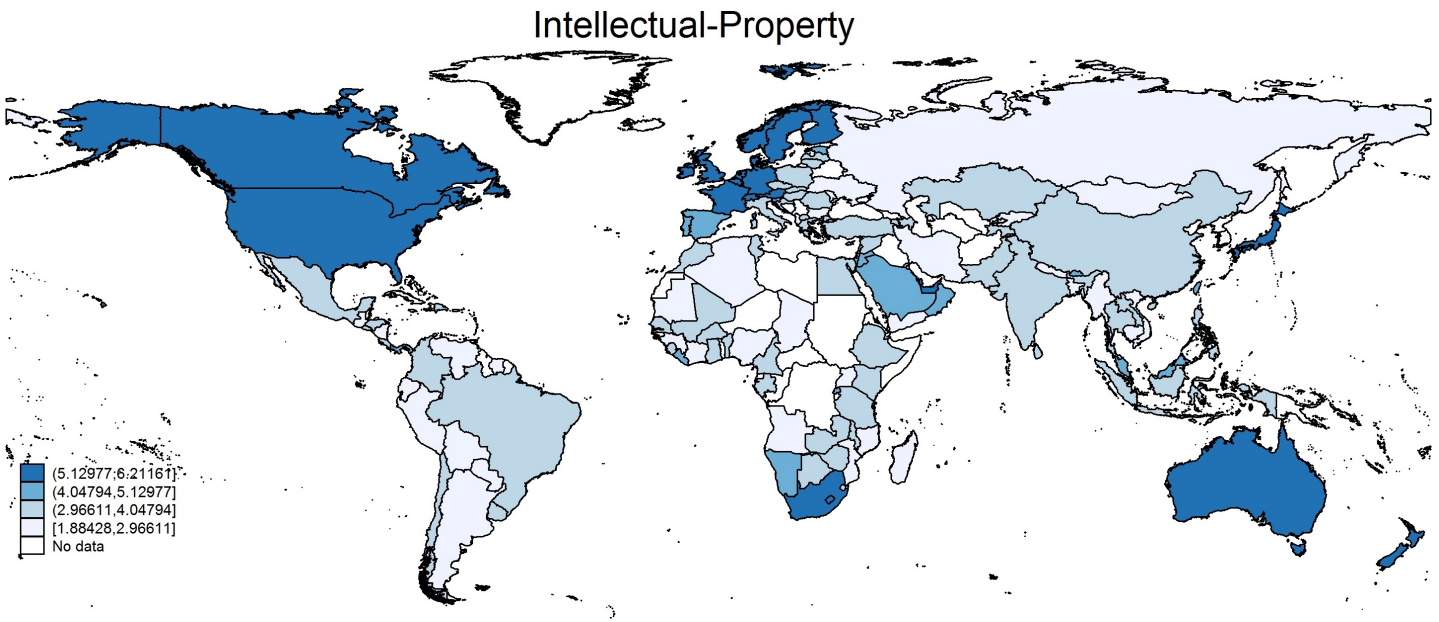
– Horizontal property rights, vertical property rights, and the economy.

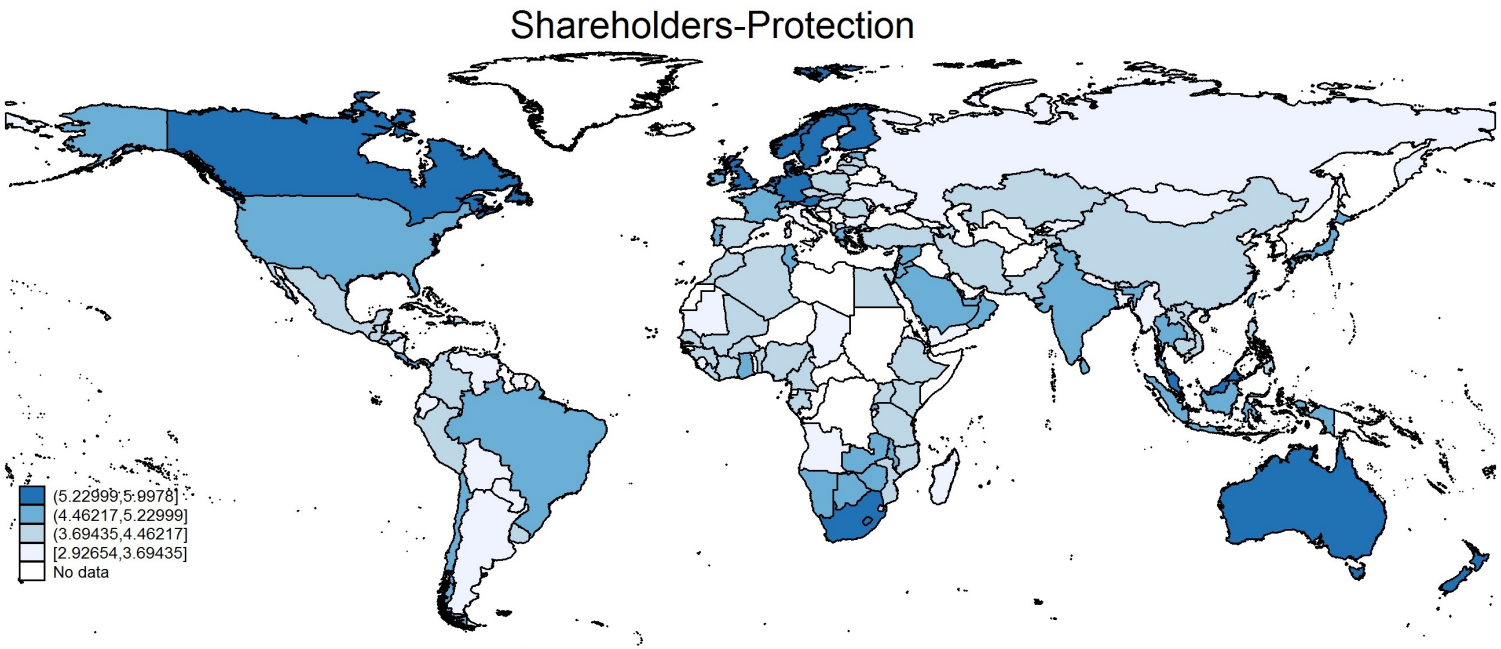
Generic Property Rights.



Intellectual Property Rights.



Shareholders Protection.



Return 1

Interpretation: Trade and . . .

– An intermediary (unauthorized agent) sells to a buyer in good-faith a good stolen (embezzled) from an original owner (the principal) at a low price.
More generally when the potential buyer directly steals x, only with probability γ the legal system forces her to hand it back.

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– A majority stockholder who "tunnels" creditors/minority shareholders' resources out of a firm through the management (Johnson et al., 2000).

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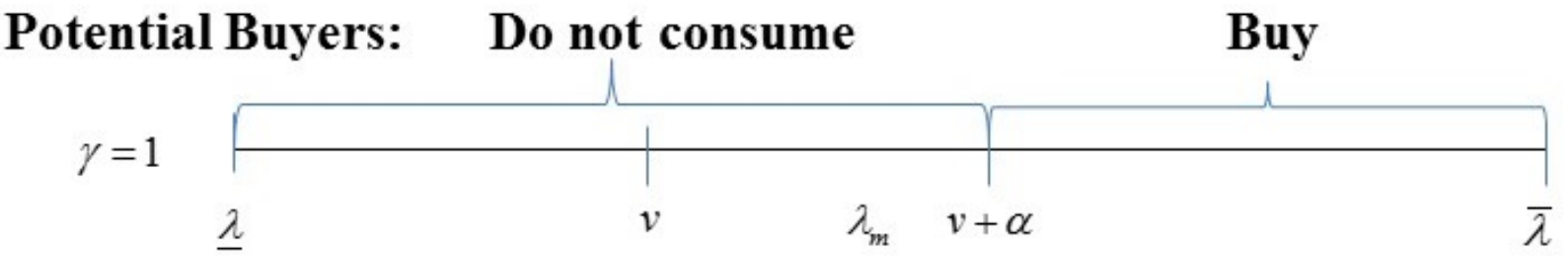
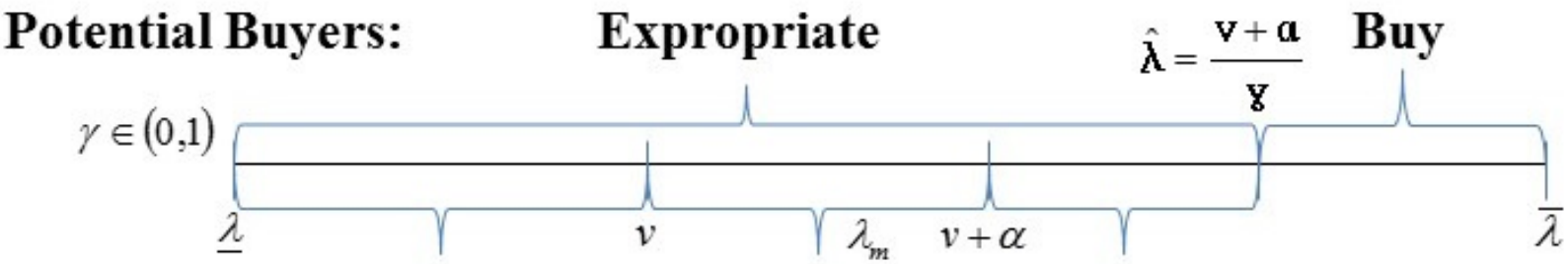
◂ Return 2

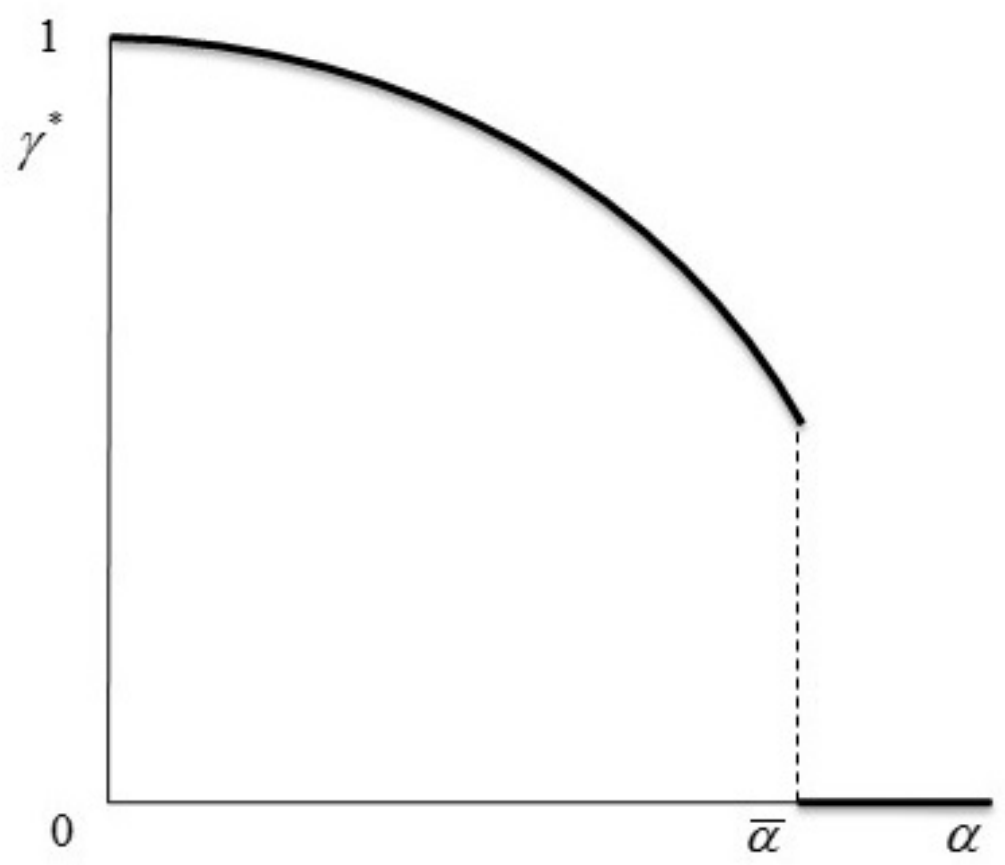
Equilibrium: Intuition.





$(1-\gamma)(\lambda - v) < 0$ $(1-\gamma)(\lambda - v) > 0$ $\alpha - \gamma(\lambda - v)$

Property Rights and Exogenous Transaction Costs.



Return 3

Log-concave (Any) f If Exogenous (Endogenous) α.

– Exogenous transaction costs: Society's objective function $\int_{\hat{\lambda}}^{\overline{\lambda}} (\lambda - \alpha)\, dF(\lambda) + \int_{\underline{\lambda}}^{\hat{\lambda}} [(1-\gamma)\lambda + \gamma v]\, dF(\lambda)$ for $\hat{\lambda} < \overline{\lambda}$ is sub-modular in γ and α when $\frac{f'(\hat{\lambda})}{f(\hat{\lambda})} < \frac{\alpha}{v(v+\alpha)} \frac{\gamma^*}{1-\gamma^*}$ or v sufficiently large being $\frac{f'}{f}$ decreasing and f unimodal (Dharmadhikari and Kumar, 1988).

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The Political Economy of Property Rights Protection.

This time, a group of "insiders" chooses γ^*:

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Production.

Differently from Jordan (2006), Piccione and Rubinstein (2007), Bar-Gill and Persico (2016), Segal and Whinston (2016), AZG (2017), incomplete property rights can be optimal even if original owners decide between t_1 and t_2 whether produce x at the cost $\kappa < v$. Since their utility rises with γ^*,

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USOABU (Altonji et al., 2005).

Focus on an index gauging how much stronger selection on unobservables, relative to selection on observables, must be to explain away the full estimated effect, i.e., absolute value of $\lambda^F/(\lambda^R - \lambda^F)$, where λ^F (λ^R) is the coefficient obtained from a regression with a full (restricted) set of controls.

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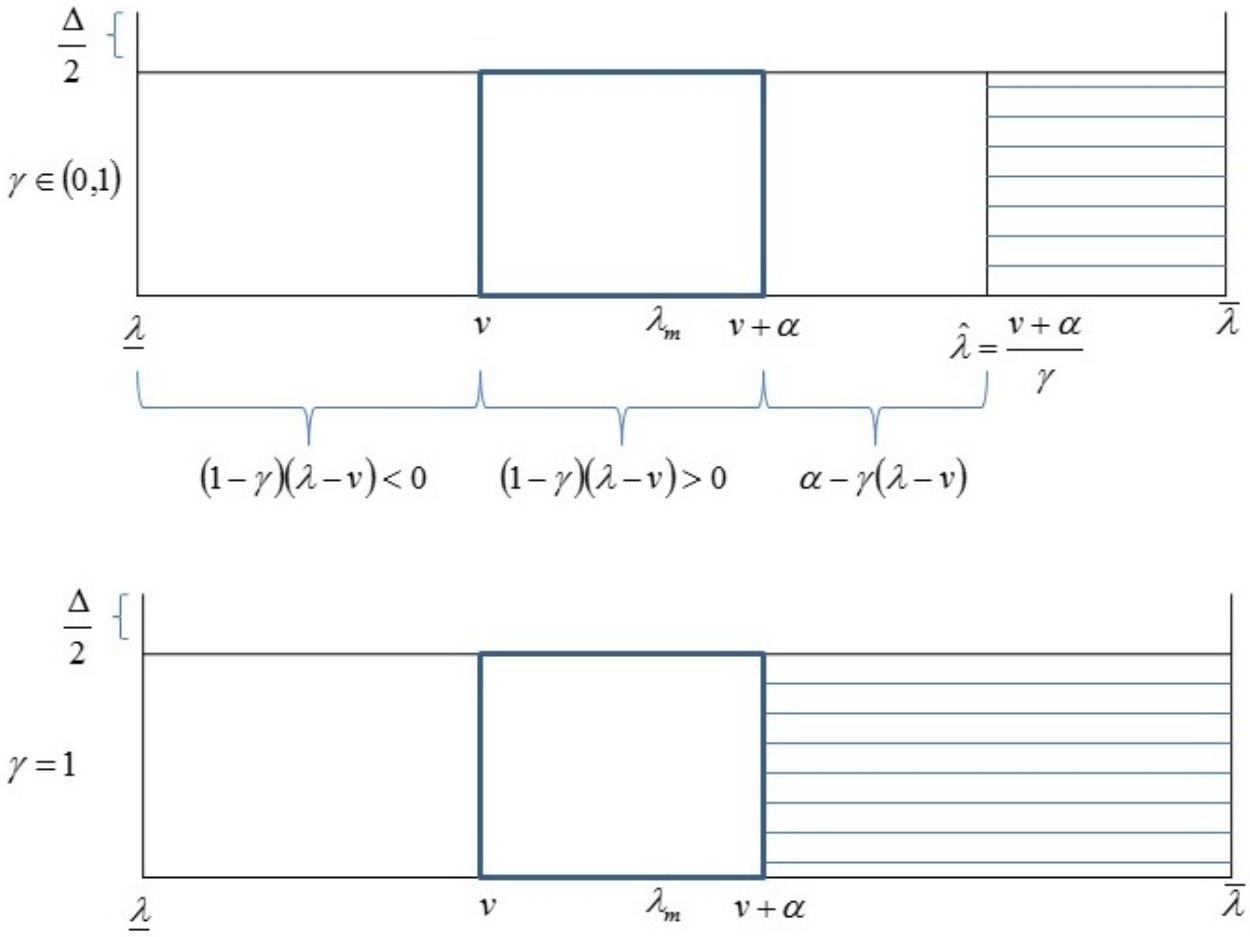
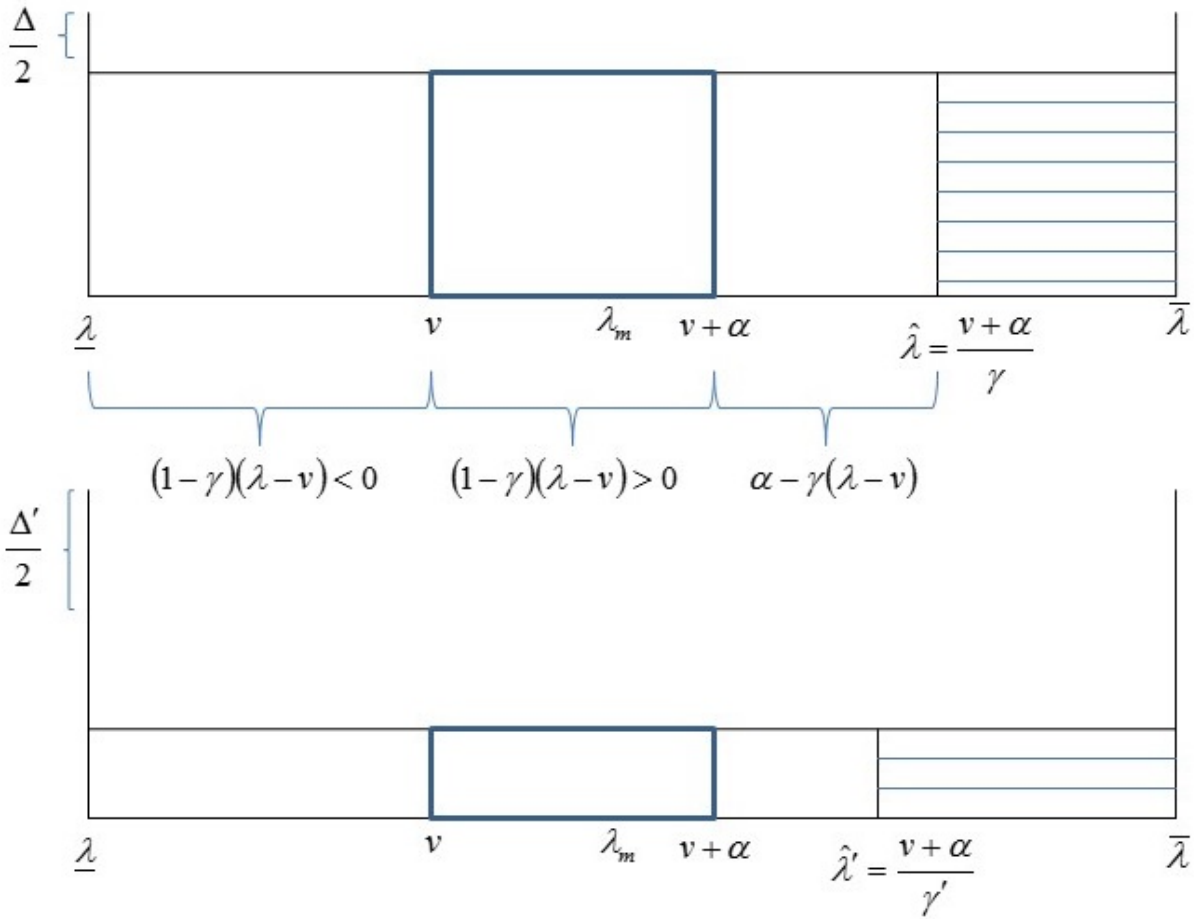
- λ^F large $\rightarrow$ effect that selection on unobservables must explain is big.

◂ Return 9

Basic Intuition: Solution ...



and Comparative Statics.



◂ Return 10

Heterogeneity Rises as in the Basic Model.

$\Delta/2$ potential buyers value the good at $\underline{\lambda} > 0$, $\Delta/2$ of them value x at $\overline{\lambda} > v > \underline{\lambda}$, and the remainder has a $\lambda \in \left[\underline{\lambda}, \overline{\lambda}\right]$ distributed according to the pdf f with cumulative distribution function F. For a rise in Δ to be a mean-preserving spread, $E(\lambda) = \lambda_m$. γ^* maximizes $\frac{(1-\gamma)\underline{\lambda}+\gamma v}{2}\Delta +$

$$(1-\Delta)\int_{\hat{\lambda}}^{\overline{\lambda}}(\lambda-\alpha)\,dF(\lambda)+(1-\Delta)\int_{\underline{\lambda}}^{\hat{\lambda}}[(1-\gamma)\lambda+\gamma v]\,dF(\lambda),$$

for $\hat{\lambda} < \overline{\lambda}$ and $(1-\gamma)\lambda_m + \gamma v$ o/w. $\frac{d\hat{\lambda}}{d\gamma^*}\left[\frac{1-\gamma^*}{\gamma^*}v\hat{\lambda}f'\left(\hat{\lambda}\right)+\frac{v-\alpha}{\gamma^*}f\left(\hat{\lambda}\right)\right] < 0$ assures strict concavity. An interior γ^* is implicitly defined by

$$\frac{1-\gamma^*}{\gamma^*}v\hat{\lambda}f\left(\hat{\lambda}\right)-\left(\hat{\lambda}-v\right)F\left(\hat{\lambda}\right)+\int_{\underline{\lambda}}^{\hat{\lambda}}F(\lambda)\,d\lambda+\frac{(v-\underline{\lambda})l\Delta}{1-\Delta}=0.$$

If $v \geq (<)\lambda_m$, then $\gamma^* = 1$ (γ^* weakly rises with Δ for α and v small being the objective function super-modular in γ and Δ by inspection).

Return 11

Heterogeneous Original Owners.

Original owners have heterogeneous valuations $v \in [\underline{v}, \overline{v}]$ with $l \equiv \overline{v} - \underline{v}$ and potential buyers the fixed $\lambda \in (\overline{v}, \underline{v})$. The latter can buy at $v + \alpha$. Those involved in $v \leq \gamma\lambda - \alpha \equiv \hat{v} < \overline{v}$ matches buy, and the others expropriate.

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Society maximizes $(1-\gamma)\lambda + \gamma v_m$ for $\underline{v} < \hat{v}$ and for $\underline{v} \geq \hat{v}$ maximizes $\frac{(1-\gamma)\lambda+\gamma\overline{v}}{2}\Delta + (1-\Delta)\int_{\hat{v}}^{\overline{v}} \frac{(1-\gamma)\lambda+\gamma v}{l} dv + (1-\Delta)\int_{\underline{v}}^{\hat{v}} \frac{\lambda-\alpha}{l} dv + (\lambda-\alpha)\frac{\Delta}{2}$.

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Society maximizes $(1-\gamma)\lambda + \gamma v_m$ for $\underline{v} < \hat{v}$ and for $\underline{v} \geq \hat{v}$ maximizes $\frac{(1-\gamma)\lambda+\gamma\overline{v}}{2}\Delta + (1-\Delta)\int_{\hat{v}}^{\overline{v}} \frac{(1-\gamma)\lambda+\gamma v}{l} dv + (1-\Delta)\int_{\underline{v}}^{\hat{v}} \frac{\lambda-\alpha}{l} dv + (\lambda-\alpha)\frac{\Delta}{2}$.

While γ^* can jump from 0 to the positive solution, which in turn weakly rises with Δ, for Δ sufficiently large and $v_m < \lambda$, $\gamma^* = 1$ for $v_m \geq \lambda$.

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◂ Return 12

Private Sales.

A potential buyer can make a take-or-leave offer $p_P < v$ to the original owner and consume always x if the offer is accepted. Thus, they make a $p_P = \gamma v$ offer for $\lambda \geq \hat{\lambda}_P \equiv v + \frac{\alpha}{\gamma}$ and expropriate otherwise. Society maximizes

$$\frac{(\overline{\lambda}-\alpha)\Delta}{2} + (1-\Delta)\int_{\hat{\lambda}_P}^{\overline{\lambda}} \frac{\lambda-\alpha}{l} d\lambda + (1-\Delta)\int_{\underline{\lambda}}^{\hat{\lambda}_P} \frac{(1-\gamma)\lambda+\gamma v}{l} d\lambda + \frac{(1-\gamma)\underline{\lambda}+\gamma v}{2}\Delta$$

for $\hat{\lambda}_P < \overline{\lambda}$, and W^{FE} otherwise. For $\hat{\lambda}_P < \overline{\lambda}$, society's problem is strictly convex. Therefore, γ^* is the either 1 or the corner solution 0 ($\frac{\alpha}{\overline{\lambda}-v}$) for $v < \lambda_m$ ($v \geq \lambda_m$) and the former is more likely the higher Δ is.

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Costly Expropriation.

Expropriation entails a $c > \min\{(1-\gamma)\underline{\lambda}, \alpha\}$ and γ^* maximizes

$$\frac{(\overline{\lambda}-\alpha)\Delta}{2} + (1-\Delta)\int_{\hat{\lambda}_C}^{\overline{\lambda}} \frac{\lambda-\alpha}{l} d\lambda +$$

$$(1-\Delta)\int_{\frac{c}{1-\gamma}}^{\hat{\lambda}_C} \frac{(1-\gamma)\lambda+\gamma v-c}{l} d\lambda + \left[\frac{1-\Delta}{l}\left(\frac{c}{1-\gamma}-\underline{\lambda}\right)+\frac{\Delta}{2}\right] v,$$

$$((1-\Delta)\int_{\frac{c}{1-\gamma}}^{\overline{\lambda}} \frac{(1-\gamma)\lambda+\gamma v-c}{l} d\lambda + \left[\frac{1-\Delta}{l}\frac{c-\underline{\lambda}(1-\gamma)}{1-\gamma}+\frac{\Delta}{2}\right] v + \frac{\left[(1-\gamma)\overline{\lambda}+\gamma v-c\right]\Delta}{2}).$$

for $\hat{\lambda}_C < \overline{\lambda}$ (o/w). For $\hat{\lambda}_C < \overline{\lambda}$, the social welfare function always increases with γ. For $\hat{\lambda}_C \geq \overline{\lambda}$ instead, society's problem is convex and therefore γ^* is either 0 or 1 with the latter more likely the larger Δ is for c not too small.

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