Motivation (I)

• Contrast:
  – technological innovation → continuous progress
  – institutional innovation → more volatile and subject to reversion

• Privatization: one of the most important institutional reforms
  – Widespread after the fall of communism
  – But now questioned and reverted
  – Historical evidence: back and forth between private and national regime
Motivation (II)

• This paper studies the cycles of privatization and nationalization in resource-rich economics as a prime instance of unstable institutional reform.

• In the process, we consider issues that have been central concerns in the literature,
  – The role of effort
  – The joint endogeneity of natural resource exploitation and institutions
  – The volatility of commodity prices and social disruption
Outline

• Evidence
  – Systematic patterns drawn from existing literature
  – Case studies: Bolivia, Venezuela, and Zambia

• Theory
  – Basic tradeoff: equality vs. efficiency
  – Ownership regime matters because of the incentives it provides for work effort
  – Static and dynamic
SYSTEMATIC PATTERNS
SF1: Nationalizations and privatizations are repeated, cyclical phenomena, which often come in waves common to several countries

- Kobrin (1984): expropriations grew in 1960s, peaked in 1970s, and declined afterwards
- Minor (1994) and Safik (1996): wave of privatization (95 countries) in late 1980s and 1990s
- Manzano and Monaldi (2008): nationalization in LAC
  - 1870s-1920s – Privatization
  - 1930s – Nationalization
  - After World War II – Privatization
  - 1960s-1980s – Nationalization
  - 1990s – Privatization
SF2: Nationalization and privatization cycles occur more often in the natural resources and utilities sectors

– Kobrin (1984): broad expropriations do occur but infrequently. Selective expropriations are more common.

– Chua (1995): utility and natural resource sectors are more prone to undergo property regime shifts
  • In LAC: oil sector, in particular
SF3: Nationalization of natural resources tends to occur when the price of the commodity is high

• Duncan (2006): probability of expropriation in 8 largest developing country exporters of 7 major minerals, 1960-2002
  – Price booms significantly increase prob. of exprop.
  – Stronger predictor than political or economic crisis
• Guriev et al. (2008): probability of nationalization of oil, large sample of countries, 1960-02
  – Oil price booms strong predictor of oil nationalization
SF4: Contracts are such that commodity price windfalls are mostly appropriated by private firms

• Which may explain why expropriations occur during commodity price booms

• Manzano and Monaldi (2008):
  – Oil sector is characterized by large rents and sunk costs
  – Tax regime is lacking consideration for price contingencies
  – Recent expropriations in LAC: Bolivia, Ecuador, Venezuela
Nationalization is more likely when inequality worsens

Chua (1995): In LAC and Southeast Asia since 1800s, expropriation was promoted against not only foreigners but also domestic residents who were perceived as unfairly privileged

- Southeast Asia: ownership shifts across ethnic lines
- LAC: anti-elitist and anti-foreign movements
SF6: Nationalization is more likely in countries with faulty public institutions, low human capital, and undiversified production structures

- Guriev et al. (2008): Study of oil nationalizations. They are more likely when,
  - Low quality of institutions (democracy)
  - Deficient human capital (adult literacy)
- Kobrin (1984) and Minor (1994): Large expropriations,
  - Economies heavily dependent on a few commodities
SF7: Once nationalized, firms abandon the practices that made them productive

- Schmitz and Teixeira (2008):
  - Privatization of Brazilian iron ore industry in late 1980s led to productivity gains in former SOEs and even others
  - SOEs had been less productive because,
    - Governments distribute gains to their constituency at SOE, distorting incentives for work effort
    - The presence of SOEs leads to less competition in the industry
- La Porta and Lopez de Silanes (1999): Mexico
- Boubakri et al. (2005): 32 developing countries
- Chong and Lopez de Silanes (2005): LAC
BOLIVIA
Bolivia and Hydrocarbons

Nationalization

1937: Colonel David Toro confiscated all of the Standard Oil Company's holdings.

1969: Alfredo Obando. YPFB became the sole supplier of natural gas.

2006: Evo Morales nationalized gas fields and oil industry.


Natural Gas and Investment

- Total FDI
- Total Investment in Energy Sector
- Natural Gas Production

Years: 1985 to 2007

Key Events:
- Privatization
- Nationalization

Natural Gas Production (Trillion Cubic Feet)

FDI, Investment in the Energy Sector (MM $)
THEORY
A Simple Static Model

Industry

**Private Ownership**
- Compensation depends on observed productivity
- Encourage workers to exert effort
- High productivity but no risk-sharing

**State Ownership**
- Compensation does not depend on productivity
- No incentives to exert effort
- Low productivity but perfect risk-sharing

**equity-efficiency trade-off**

Benevolent government maximize welfare
The worker’s problem

Ex-ante identical workers are subject to idiosyncratic labor endowments shocks: \( l_H > l_L \)

Probability of high labor endowment, \( \pi(a) \), depends on effort \( a \)

Utility cost of effort: \( \phi(a) \)

Given wages \( \{y_H, y_L\} \) and transfers \( T \), workers choose effort to maximize expected utility:

\[
\max_a \pi(a)u(y_H + T) + (1 - \pi(a))u(y_L + T) - \phi(a)
\]

\( a > 0 \iff y_H > y_L \)
State-ownership regime

Government maximizes sum of utilities (WLOG $T = 0$)

Choose wages after effort has been spent and productivities observed (no commitment)

Formally, given $\pi$, government solves:

$$\max_{y_H, y_L} \pi u(y_H) + (1 - \pi) u(y_L)$$

subject to

$$\pi y_H + (1 - \pi) y_L = pF(\pi l_H + (1 - \pi) l_L)$$
State-ownership regime

Solution implies perfect insurance: \( y_H = y_L \)

Knowing this, workers do not exert effort: \( a = 0 \)

Low labor productivity: \( L_S = \pi(0)l_H + (1 - \pi(0))l_L \)

Welfare: \( U_S(p) = u(pF(L_S)) - \phi(0) \)

Thus, state ownership implies

- Perfect risk-sharing (equity)
- Low productivity
Private-ownership regime
Firm’s problem

Large number of firms compete for workers

Market wages: \( \{y_H^*, y_L^*\} \)

Firm’s problem: max w.r.t. \( \{n, y_H, y_L, a\} \)

\[
(1 - \tau) \left\{ pF\left( n \left[ \pi(a)l_H + (1 - \pi(a))l_L \right] \right) - n[\pi(a)y_H + (1 - \pi(a))y_L] \right\}
\]

s.t. Incentive Compatibility and Individual Rationality:

\[
a \in \arg \max_a \left\{ \pi(a)u(y_H + T) + (1 - \pi(a))u(y_L + T) - \phi(a) \right\}
\]

\[
\pi(a)u(y_H + T) + (1 - \pi(a))u(y_L + T) - \phi(a) \geq U^*
\]
Private-ownership regime
Equilibrium

An allocation \( \{a^*, n^*, y_H^*, y_L^*, T^*\} \) such that

1. Firms maximize profits subject to incentive compatibility and individual rationality

2. Labor market clears: \( n = n^* = 1 \) and \( \{y_H, y_L\} = \{y_H^*, y_L^*\} \)

3. Government budget constraint is satisfied:

\[
T^* = \text{dividend taxes} + \text{sales taxes}
\]
Private-ownership regime

Positive effort \((a^* > 0)\) implies compensation that varies with observed productivity: \(y_H > y_L\)

Higher labor productivity: \(L_P(p) > L_S\)

Welfare: \(U_P(p)\)

Thus, private ownership implies

- No risk-sharing
- High productivity
Static Model
Numerical experiments

Functional forms:

\[ u(c) = e^{-\gamma c} / \gamma \]

\[ \phi(a) = \varphi a^2 / 2 \]

\[ F(L) = AL^\alpha \]

\[ \pi(a) = 1 - \delta e^{-\nu a} \]

Baseline parameters

<table>
<thead>
<tr>
<th>Description</th>
<th>Symbol</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk aversion</td>
<td>( \gamma )</td>
<td>2</td>
</tr>
<tr>
<td>Cost of effort</td>
<td>( \varphi )</td>
<td>1</td>
</tr>
<tr>
<td>Prob. param.</td>
<td>( \delta )</td>
<td>0.99</td>
</tr>
<tr>
<td>Prob. param.</td>
<td>( \nu )</td>
<td>2.5</td>
</tr>
<tr>
<td>Labor endowments</td>
<td>( l_L/l_H )</td>
<td>0.1</td>
</tr>
<tr>
<td>Technology</td>
<td>( A )</td>
<td>0.25</td>
</tr>
<tr>
<td>Technology</td>
<td>( \alpha )</td>
<td>0.66</td>
</tr>
<tr>
<td>Dividend tax</td>
<td>( \tau )</td>
<td>0.20</td>
</tr>
</tbody>
</table>
Optimal regime choice: threshold price

Private ownership

State ownership

$U_S(p)$

$U_P(p)$

Threshold price $p^*$
## Static Model
### Numerical experiments

<table>
<thead>
<tr>
<th>Description</th>
<th>Symbol</th>
<th>Value</th>
<th>( p^* )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline economy</td>
<td>—</td>
<td>—</td>
<td>29.5</td>
</tr>
<tr>
<td>Risk aversion</td>
<td>( \gamma )</td>
<td>3 ( (2) )</td>
<td>17.1</td>
</tr>
<tr>
<td>Dividend taxes</td>
<td>( \tau )</td>
<td>0.5 ( (0.20) )</td>
<td>36.0</td>
</tr>
</tbody>
</table>
Dynamic Model

- Workers cannot save or borrow
- Price follows a Markov process
- Nationalization entails a fiscal cost (reorganization, sanctions...)
- Privatization entails a fiscal benefit (revenue from privatization)
- Timing protocol:

  period $t$

  ownership status

  observe $p_t$

  choose ownership status

  production, consumption...
Private-ownership regime and nationalization threshold

\[ V_P(p) = U_P(p) + \beta \mathbb{E}_p \max(V_P(p'), V_S^0(p')) \]

\[ V_S^0(p) = U_S^0(p) + \beta \mathbb{E}_p \max(V_P^0(p'), V_S(p')) \]
State-ownership regime and privatization threshold

\[ V_S(p) = U_S(p) + \beta \mathbb{E}_p \max (V_P^0(p'), V_S(p')) \]
\[ V_P^0(p) = U_P^0(p) + \beta \mathbb{E}_p \max (V_P(p'), V_S^0(p')) \]
Optimal regime regions

Private ownership

History dependence

State ownership

$V_S(p)$

$V^0_S(p)$

$V_P(p)$

$V^0_P(p)$

Threshold prices

$p^{**}$

$p^*$
Numerical experiments

Price process

\[ \log\left(\frac{p_t}{\bar{p}}\right) = \rho \log\left(\frac{p_{t-1}}{\bar{p}}\right) + \varepsilon_t \]

\[ \varepsilon_t \sim N(0, \sigma^2) \]

<table>
<thead>
<tr>
<th>Description</th>
<th>Symbol</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistence (\log(p_t))</td>
<td>(\rho)</td>
<td>0.98</td>
</tr>
<tr>
<td>Volatility (\log(p_t))</td>
<td>(\sigma)</td>
<td>0.08</td>
</tr>
<tr>
<td>Nationalization cost</td>
<td>(c_S)</td>
<td>1.02</td>
</tr>
<tr>
<td>Privat. benefit</td>
<td>(\kappa)</td>
<td>0.25</td>
</tr>
<tr>
<td>Discount factor</td>
<td>(\beta)</td>
<td>0.95</td>
</tr>
</tbody>
</table>
## Numerical experiments

<table>
<thead>
<tr>
<th>Description</th>
<th>Symbol</th>
<th>Value</th>
<th>Thresholds $p^{**}$</th>
<th>$p^*$</th>
<th>Regime duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline economy</td>
<td>$-$</td>
<td>$-$</td>
<td>26.0</td>
<td>38.8</td>
<td>93</td>
</tr>
<tr>
<td>Risk aversion</td>
<td>$\gamma$</td>
<td>3</td>
<td>13.4</td>
<td>27.6</td>
<td>827</td>
</tr>
<tr>
<td>Dividend taxes</td>
<td>$\tau$</td>
<td>0.50</td>
<td>32.4</td>
<td>46.9</td>
<td>60</td>
</tr>
<tr>
<td>Nationalization cost</td>
<td>$c_S$</td>
<td>1.54</td>
<td>25.0</td>
<td>45.0</td>
<td>125</td>
</tr>
<tr>
<td>Price volatility (mean preserving)</td>
<td>$\sigma$</td>
<td>0.15</td>
<td>25.4</td>
<td>43.6</td>
<td>47</td>
</tr>
</tbody>
</table>
• Higher risk aversion (higher financial frictions?) increases duration of state ownership regime, and decrease duration of private ownership regime
  – Lack of risk sharing more costly

• Higher taxes increase duration of private ownership regime and decrease duration of state ownership regime
  – More transfers to workers

• Higher costs of nationalizing the industry increase duration of both regimes
  – Internalization of future costs in both regimes

• Higher price volatility reduces duration of both regimes
Concluding Remarks (I)

• We offer a theory where,
  – privatization/nationalization cycles are the resolution of an equity-efficiency tradeoff
  – using natural assumptions about efficiency, equity, financial markets, and government commitment
  – de-emphasizing other explanations, such as political conflict
Concluding Remarks (II)

• The theory can be extended,
  – to incorporate explicitly the role of financial frictions
    • now implicit in the absence of wage-risk pooling
  – to identify the policy implications of the theory
    • now potential policy instruments/institutions, such as capital market structure and nationalization costs, are treated exogenously
    • a more complete analysis would link them to the fundamentals of the economy