Corruption, Firm Dynamics, and Distance to Frontier

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¹The views expressed in this paper are solely those of the author and may differ from official Bank of Canada views.
Motivation

- In May 2018, IMF published a new framework for “enhanced” engagement with countries on corruption.

- Judicial reforms that target corruption crucial to boost median run growth potential in developing countries.

- This paper studies the macroeconomic effects of corruption through its impacts on *firm dynamics*. 
Empirical finding

- Higher incidence of bribery is associated with lower firm growth volatility, faster growth of capital and labor, and lower growth in labor productivity.

A general equilibrium model of firm dynamics

- Corruption is an endogenous entry barrier that protects incumbents.
- In the presence of financial frictions, corruption can have positive growth effects if it helps entrepreneurs grow out of financial friction.

Extension with productivity growth and distance to frontier

- Corruption and productivity growth.
- Effects of corruption on innovation.
- Effectiveness of anti-corruption campaign.
Empirical Motivation
Measurement
corruption across provinces of mainland China

We measure corruption at the province-level in mainland China using the number of corruption cases (graft or bribery) during the anti-corruption campaign.

Source: China Judgements Online (2014-17)
## Corruption and firm growth

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Dependent variable: sales gr, employment gr, assets gr, lab. prod. gr, sales gr, employment gr, assets gr, lab. prod. gr
Sector FE: y, y, y, y, y, y, y, y
Firm type FE: y, y, y, y, y, y, y, y
N: 22821, 22861, 22848, 22815, 22696, 22696, 22695, 22693
AR2: 0.0857, 0.220, 0.123, 0.118, 0.167, 0.245, 0.167, 0.147

Higher incidence of bribery cases is associated with higher growth in input factors and lower growth in productivity.

Source: China Judgements Online (2014-17) and Annual Industrial Survey (1998-2007)

Note: Standard errors clustered at province-level.
Higher incidence of bribery is associated with lower growth volatility and higher firm growth in output and input factors. The correlation is more prominent for sectors that rely more on external financing.


Note: Standard errors clustered at province-level.
Model
Key ingredients

• Two-period OLG households, only work when they are young.

• Young individuals can be entrepreneurs or workers.

• A continuum of product markets. In each market, incumbent and entrant engage in Bertrand price competition.

• Search for formal financing is frictional. Entrepreneurs can self-finance when they have enough wealth.

• Entrants push out incumbents if they have a lower unit cost of production.

• (for now) Productivity is exogenously given. The economy is on the upward transition path towards steady state.
Household and timing

- **t**
  - young
  - work
  - 1) as manager of family firm
  - 2) or as a worker
  - consume, save

- **t+1**
  - old
  - hire young as manager
  - receive income to saving
  - consume

- **t+2**
  - young
  - work
  - 1) as manager of family firm
  - 2) or as a worker
  - consume, save
  - hire young as manager
  - receive income to saving
  - consume
Goods and production technology

- A continuum of intermediate goods, each is produced by an entrepreneur
  \[ y_i = z_i k_i^{\alpha} I_i^{1-\alpha}, \]

- Intermediate goods are aggregated into final good,
  \[ Y = \left( \int y_i^{\frac{\rho-1}{\rho}} \, di \right)^{\frac{\rho}{\rho-1}}. \]

- The unit cost of production is
  \[ \frac{1}{z_i} \left( \frac{R_i}{\alpha} \right)^{\alpha} \left( \frac{w}{1-\alpha} \right)^{1-\alpha}, \]
  which decreases with \( z_i \) and increases with \( R_i \).

- Productivity distribution \( z_i \sim G(z) \) is exogenously given.
Bertrand competition

• Each market has 1 incumbent and 1 potential entrant.

• The entrepreneur with lower unit cost wins and monopolizes the market.

• Productivity $z_i$ is good- or market-specific, the entrepreneur with lower interest rate cost $R_i$ wins.
Financial frictions

- A representative bank with a unit of 1 bankers making 0 profit.
- Entrepreneurs search for bankers.
- With probability $p$, search successful,
  - Formal financing, interest rate $R_i = r + \delta$.
- With probability $1 - p$, search fails,
  - Self-financing, (implicit) interest rate $R_i = r + \delta$.
  - Informal financing, $R_i = r + \epsilon + \delta$.
- Entrepreneurs can grow out of financial frictions (self-finance) by saving.
Timing within the period

I: Start of the period
II: death shock
draw entrants
III: Incumbents meet
entrants
IV: Search for financing
V: Competition
VI: Production

a measure 1 of entrepreneurs
prob. \eta
prob. 1-\eta
prob. 1/N*\eta
prob. 1-1/N*\eta

a measure N of workers

incumbents
(ac, z)

random match
(\ac, \z, \ae)

search for financing
(ac, ec, \z, \ae, ee)

Bertrand competition

win

lose

produce
Outcome

- Frequent entry/exit.
- Entrepreneurs can’t stay in the market long enough to grow out of financial frictions.
- Slow convergence to steady state.
Corruption

- Each market is governed by a corruptible official issuing an operation permit.

- Bribery to obtain permit is a bidding competition between incumbent and entrant.

- Bribery has to come out of the pocket $b(a) \in [0, m(a)]$, where $m(a)$ the available funds is an increasing function of $a$.

- The entrant wins the bid if $a^e > a^c$ and $\pi(a^e, z) - m(a^c) > w$. The size of the bid is $m(a^c)$. 
Outcome with corruption

• Less entry/exit.

• Only permit holders search for financing. Higher probability of finding formal financing.

• Incumbents stay in market longer. Easier to grow out of financial friction. Faster convergence to steady state.

• Higher inequality between incumbents and entrants.
Extension
A dynamic view

- The trade-off of corruption is capital accumulation v.s. productivity gain through firm entry.

- The former is more important at early stage of development.

- Corruption generates larger incumbents and smaller entrants, making firm entry more difficult over time.
Corruption and distance to frontier

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Dependent variable | sales gr | wkr gr | assets gr | sales gr | wkr gr | assets gr |
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Higher incidence of bribery is positively correlated with higher growth in output and input factors, but the correlation is lower for sectors that have higher initial labor productivity.


Note: Standard errors clustered at province- and sector-level. All regressions control for initial firm-level growth.
Higher incidence of bribery cases is positively correlated with higher probability of being granted a patent.


Note: Standard errors clustered at province-level.
Determinants of innovation activities

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</table>

Firms with higher initial operating profit and more asset are more likely to innovate. Corruption could results in more innovation if the major constraint of innovation is financial friction.


Note: Standard errors clustered at province- and sector-level.
Conclusion

- Corruption introduces static distortion, but, in the presence of financial frictions, could lead to a dynamic gain through faster capital accumulation.

- The effectiveness of anti-corruption campaign depends on 1) the stage of development and 2) financial capacity of non-corrupt firms.