

Financial Engineering and Economic Development

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- ▶ Typical story:
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 2. But eventually most engineering is repackaging and this has ambiguous effect on the same variables
- ▶ Our goal: formalize and evaluate the second part of this story

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- ▶ Impact on capital formation and output is ambiguous
- ▶ It is small at best, if not negative outright

Literature

- ▶ King and Levine (1993), Rajan and Zingales (1998) ...
- ▶ Amaral and Quintin (2010), Midrigan and Xu (2014), Moll (2014) ...
- ▶ Berkes, Panizza and Arcand (2012), Gennaioli, Shleifer and Vishny (2012)
- ▶ Allen and Gale (1989, 1991), Corbae and Quintin (2016)

▶ Other related papers

The environment

- ▶ Time is discrete and infinite
- ▶ Mass one of two-period lived households
- ▶ Supply one unit of labor when young, invest their earnings, consume when old
- ▶ Household type 1 is risk neutral
- ▶ Household type 2 is infinitely risk averse (only value the worst-case scenario)
- ▶ Large mass of one-period lived producers
- ▶ Stand-in intermediary

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- ▶ Risk-averse household lose fraction $\delta \in (0, 1)$ of their investment in transaction costs so that their net return is $(1 - \delta)R$

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- ▶ Once capital is installed, aggregate conditions are either good (G) or bad (B)
- ▶ Markov with transition T
- ▶ An active producer of talent $z \in \{z_B, z_G\}$ transforms labor n into the consumption good according to

$$z^{1-\alpha} n^\alpha$$

where $\alpha \in (0, 1)$

- ▶ Define:

$$\Pi(w; z) \equiv \max_{n>0} z^{1-\alpha} n^\alpha - nw$$

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- ▶ Intermediary purchases a project for price $\kappa(z_B, z_G)$
- ▶ It sells claims to the pool's output
- ▶ Selling securities to risk-neutral agents is free
- ▶ Selling securities to risk-averse agents carries a verification cost c

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- ▶ By assumption,

$$q^2 > q^1(B) + q^1(G)$$

Intermediary's problem

Intermediaries choose b to maximize:

$$q^2 b + q^1(G) \left(\Pi(w(G); z_G) - b \right) + q^1(B) \left(\Pi(w(B); z_B) - b \right) \\ - \kappa(z_B, z_G) - c 1_{\{b>0\}},$$

subject to:

$$b \leq \Pi(w(B); z_B).$$

Equilibrium

An equilibrium consists of project prices, wage rates, security menus, pricing kernels, and policies for all agents such that, at all dates and histories:

1. Old agents consume the payoff of their portfolio while young agents save their earnings
2. Security menus solve the intermediary's problem
3. Profits are zero for the intermediary
4. $R_t = \omega k_t^{\omega-1}$
5. Producers of type z are active if and only if $\kappa_t(z_B, z_G) \geq 1$
6. The market for labor clears
7. Pricing kernels satisfy:

$$7.1 \quad q_t^1(\eta) = \frac{T(\eta|\eta_{t-1})}{R_t} \text{ for each } \eta \in \{B, G\};$$

$$7.2 \quad q_t^2 = \frac{1}{(1-\delta)R_t}.$$

Financial policies

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In any equilibrium, the consumption of risk-averse agents is risk-free and they only purchase risk-free securities.

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Proposition

If the intermediary activates projects of type $z \equiv (z_B, z_G)$, then it also activates all projects of type $z' \geq z$. Furthermore, among active projects and μ -almost surely:

- 1. Either $b(z) = 0$ or $b(z) = \Pi(w(B); z_B)$*
- 2. $b(z_B, z_G)$ is monotonic in z_B in the sense that given z_G , $b(z'_B, z_G) \geq b(z_B, z_G)$ whenever $z'_B > z_B$, strictly so when $b(z_B, z_G) > 0$.*

Aggregation

Let K be the aggregate quantity of capital used to operate active projects. Then:

$$K = \int_{Z_{\Theta}} d\mu.$$

Futhermore,

$$F(\eta, K, N) = \bar{z}(\eta)^{1-\alpha} K^{1-\alpha} N^{\alpha},$$

where \bar{z} is the average productivity of active projects.

Existence and comparative statics

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An equilibrium exists. Furthermore, all equilibria feature strictly positive storage.

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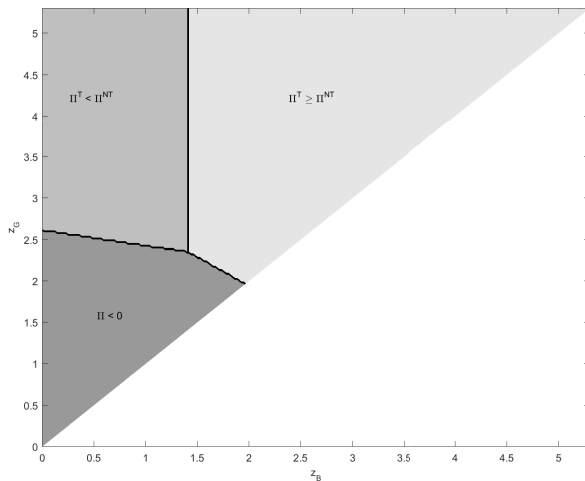
Assume that $\frac{z_G}{z_B}$ is μ -almost surely a constant. Assume that in a given economy and in a particular period, tranching costs suddenly fall. An equilibrium path exists in economy where gross investment (i.e. spending on securities) rises on impact.

Parametrization

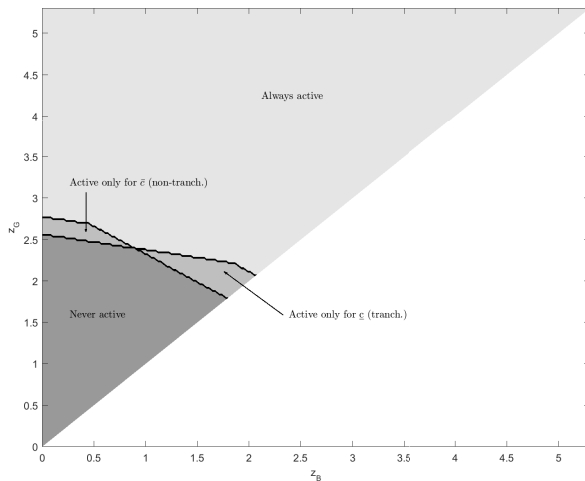
- ▶ One period= 25 years
- ▶ $\omega = .37$ which implies a yearly safe rate of return of 4%
- ▶ $\delta = 0.22$ which means that risk-averse agents are willing to pay 100 basis points premium on safe assets
- ▶ $T_{BB} = .2, T_{GG} = .8$
- ▶ μ is bivariate normal and is specified to imply:
 1. Average output difference of 1% a year between good and bad times
 2. A ratio of producer rents to value added of around 10%

▶ Algorithm

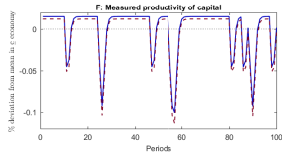
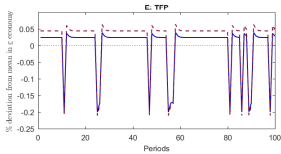
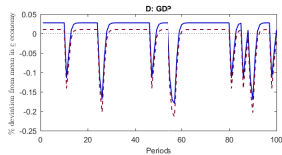
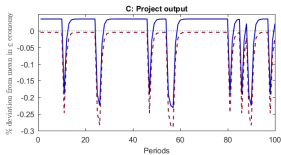
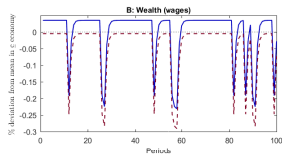
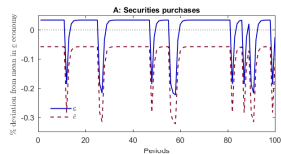
Producer/intermediary policies



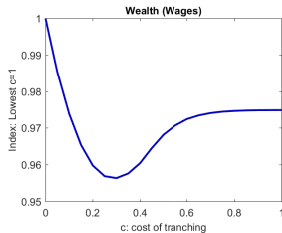
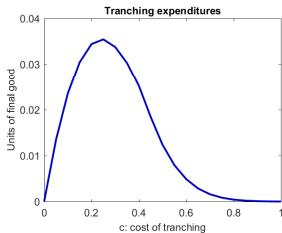
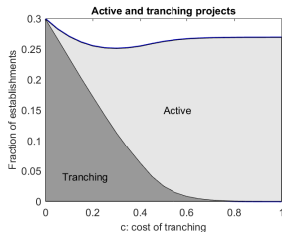
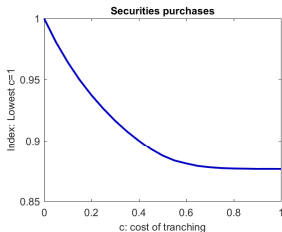
Changes in tranching costs



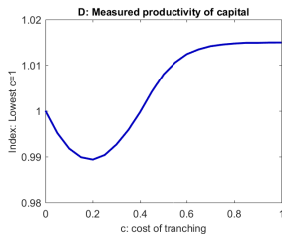
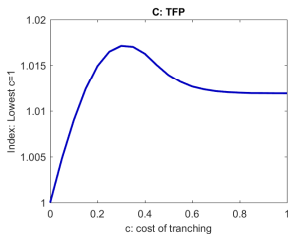
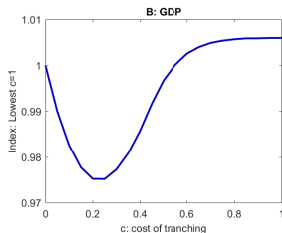
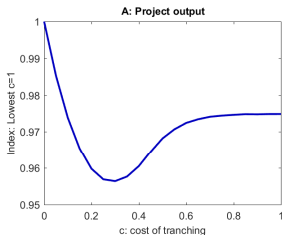
Stochastic steady state



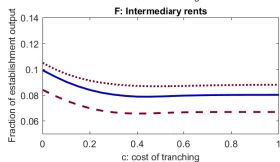
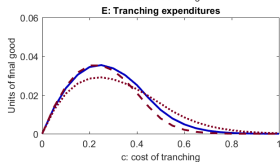
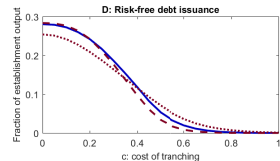
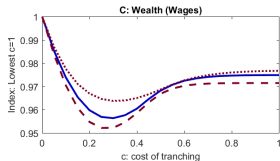
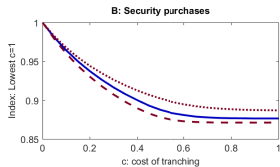
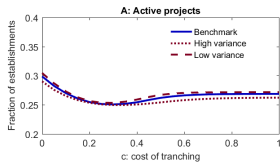
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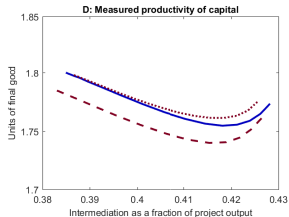
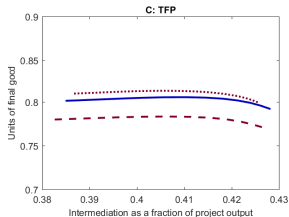
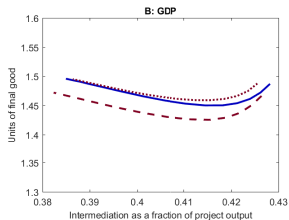
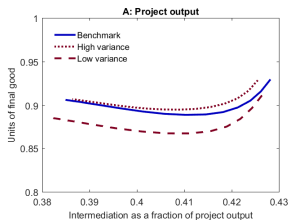
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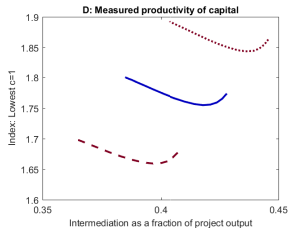
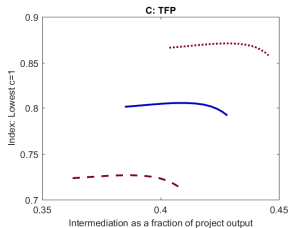
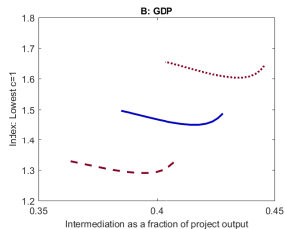
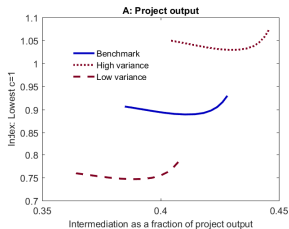
Sensitivity to talent dispersion



Financial engineering and economic development



Enterprise leads, finance follows



Conclusion

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 1. Initially, institutional gains enable constrained producers to become active and/or operate more effectively.
 2. In economies with already well functioning markets, financial innovation tends to take the form of repackaging
- ▶ First phase delivers potentially high output and TFP gains
- ▶ Second phase probably not so much

More papers

- ▶ Goldsmith (1969), McKinnon (1973) and Shaw (1973)
- ▶ Greenwood and Jovanovic (1990), Bencivenga and Smith (1991), Banerjee and Newman (1993), Khan (2001), Amaral and Quintin (2006)
- ▶ Erosa (2001), Jeong and Townsend (2007), Erosa and Cabrillana (2008), Quintin (2008), Buera, Kaboski, and Shin (2011), Buera and Shin (2013), Caselli and Gennaioli (2013)

▶ Go back

Algorithm

1. Given parameters, solve for household and intermediary policy functions for every possible aggregate state of the economy;
2. Draw a 1000-period sequence of aggregate shocks $\{\eta_t\}_{t=1}^{1000}$ using the Markov transition matrix T and record the value of all endogenous variables starting from an arbitrary value of aggregate wealth;
3. After dropping the first 100 periods, so that assumed initial conditions have at most a negligible effect on the value of endogenous variables, compute average values for all endogenous variables.

▶ Go back