Hierarchy of Bank Loan Approval and Loan Performance

Giorgio Calcagnini, *Università di Urbino Carlo Bo*
Rebel Cole, *Florida Atlantic University*
Germana Giombini, *Università di Urbino Carlo Bo*
Gloria Grandicelli, *Università di Urbino Carlo Bo*

International Conference on
Small Businesses, Banks, Finance, Innovation and Growth
DESP, Urbino 12-13 October, 2017

Motivation

- This paper aims at analyzing the relationship between who, within a bank, approves a loan and its performance
- An efficient allocation of funds to firms/investment projects improves the economy competitiveness and growth
- We have done some work on this topic and one of the results is shown in the following graph

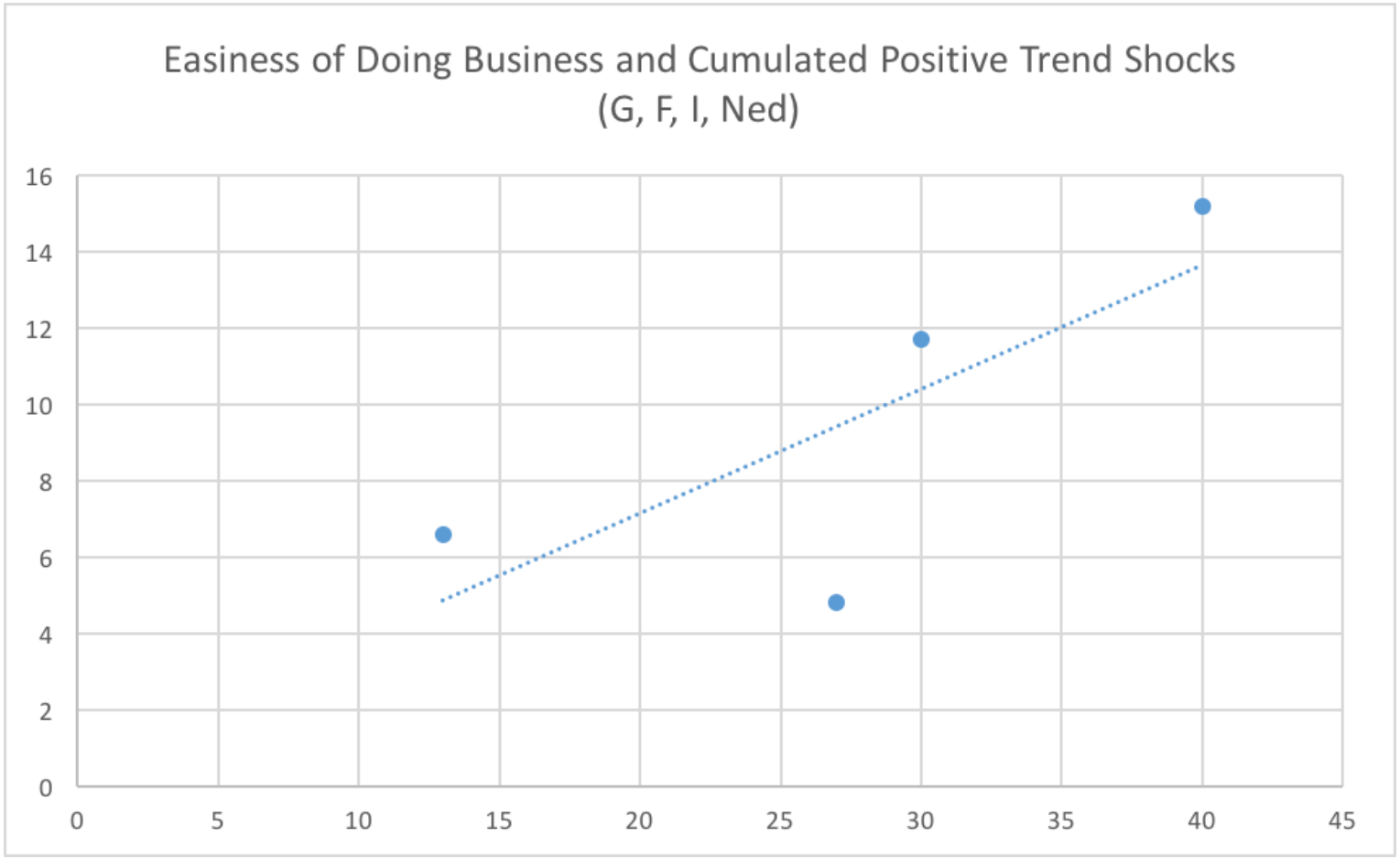

Figure: TFP Trend Shocks are on the vertical Axis

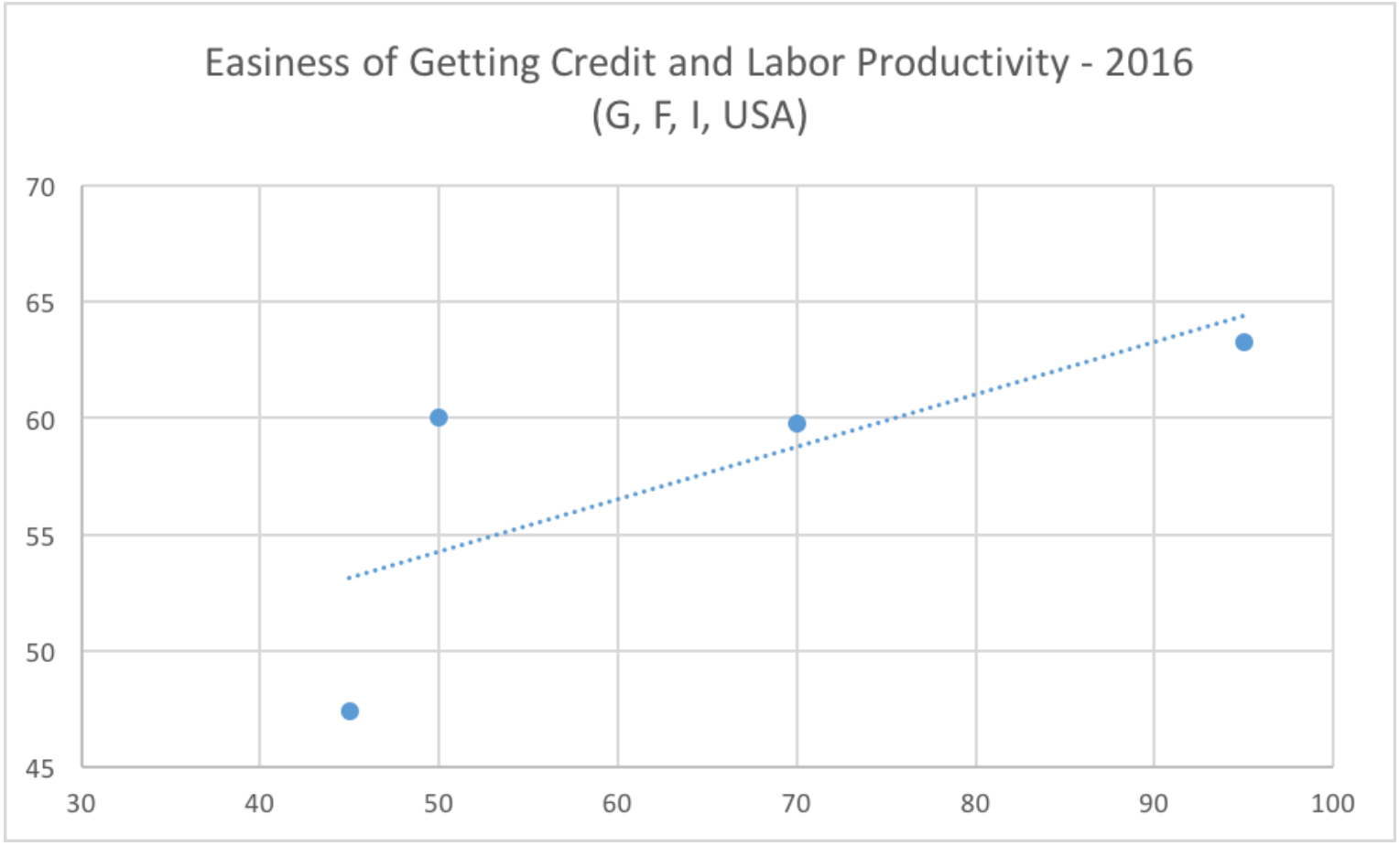

Figure: Labor productivity is shown on the vertical Axis

Motivation

- Therefore it is important to understand how banks allocate credit to firms
- Two lending technologies: relationship and transaction-based
- Transaction-based lending technologies are primarily based on borrowers' hard quantitative information (i.e., the strength of the financial statement or the value of their assets)
- Relationship lending technologies are primarily based on borrowers' soft qualitative information (i.e., the entrepreneurs' characteristics including skill and integrity) that is difficult to verify

Lending technologies

- There are pros and cons of Relationship lending technologies
- Pros: banks can extend loans at favorable contract terms and provide firms with better access to finance
- Cons: hold-up problems and the consequent extraction of rents from firms, soft information deteriorates as it is transmitted to others within the hierarchy of the lending institution
- As for default probabilities, Bolton et al.(2016) show that a firm financed by transaction-based lending technologies has a higher probability to go into default

Lending technologies

- Two issues on which we based our analysis
- First, we assume that the relationship lending technology is more important at the bank branch/loan officer level, while transaction-based lending technologies are used at higher levels of the bank hierarchy
- Second, banks are a combination of both technologies, with transaction-based lending technologies playing an increasing role in larger banks at higher levels of the bank hierarchy
- Consequently, better identification of lending technologies

Data

- Over 16,000 lending decisions and 3,000 firms between 2010 and 2012 provided by an Italian regional bank
- Our information set contains, among others, data on each loan status and who took the loan decision (no information on interest rates)
- Information on the physical distance between the bank and its customers
- Several firms' balance sheet items to control for information not fully captured by other bank variables, such as firm ratings

Table: Numbers of firms, loans and loan defaults

	Firms	Loans	Defaults	Total Defaults
2010	2,137	7,007	3 (0.14%)	726 (6.02% of Firms)
2011	1,980	5,311	10 (0.51% of Firms)	644 (5.84% of Firms)
2012	1,574	3,789	66 (4.20% of Firms)	1,269 (13.01 % of Firms)

Source: Our calculations on the regional bank data.

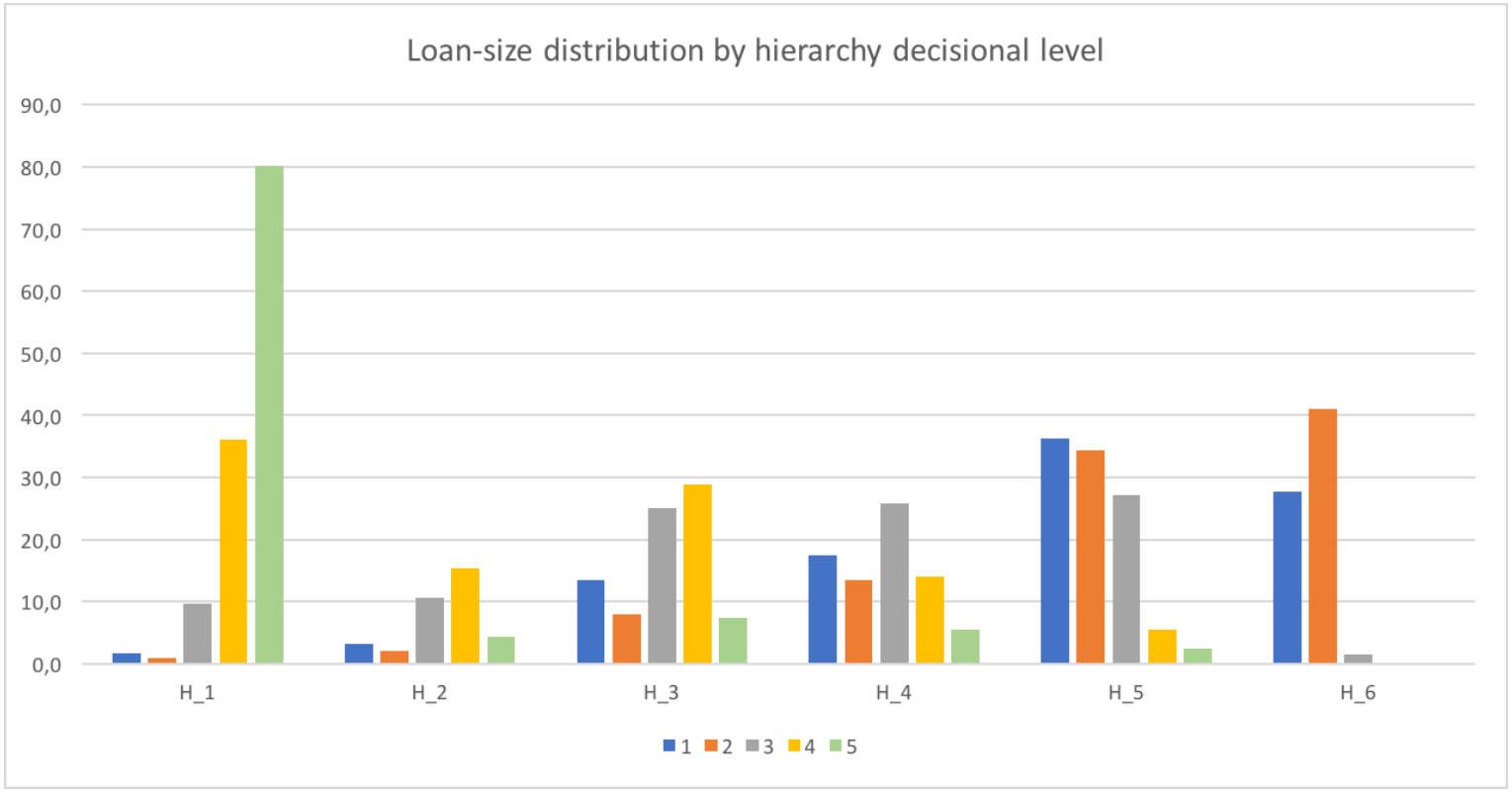

Figure: H1 is the highest hierarchy level

Empirical Models

$$pr_{ij} = Pr(Default_{ij} = 1|X) = \Phi(X^{'}\beta) \tag{1}$$

$$X^{'}\beta = \beta_0 + \sum_{k=1}^{5} \beta_k H_{ijk} + \sum_{m=6}^{8} \beta_m F_{ijm} + \sum_{h=9}^{13} \beta_h A_{ijh} + TFE + \epsilon_{ij}$$

$\Phi = (.)$ is a cumulative distribution function (CDF), which is assumed to be, alternatively, a linear function or a Normal distribution

Empirical Models: variables

- The vector H contains information on who deliberated the loan within the bank
- We grouped the bank decisional levels in six classes, from the highest to the lowest in the hierarchy, and created dummy variables for each decisional class:
- **Board, General Director/CEO, Vice CEO, Headquarter managers, Area managers, Branch managers**

Empirical Models: variables

- The vector F contains firm-specific characteristics
- Log(Sales), Municipality, Other services,

Empirical Models: variables

- Finally, the vector A contains loan-specific characteristics
- Initial ratings, Log(Initial Debt), Collateral, Personal guarantees, Collateral and Personal guarantees
- The model also includes time dummies, but no industry dummies

Portmanteau Hypothesis

- Our portmanteau hypothesis is:
- Relationship lending technologies are more efficient (i.e., the loan default probability is lower) at the bottom of the bank hierarchy, while Transaction-based lending technologies are more efficient at the top of the bank hierarchy

Empirical Models: results

	(1)	(2)	(3)
VARIABLES	Default	Default	Default
Firm-specific Chr	LPM	Probit	Av Marginal Effects (%)
Log(Sales)	-0.002***	-0.165***	-0.17***
	(0.001)	(0.034)	(0.0004)
Municipality	-0.003**	-0.235**	-0.25**
	(0.001)	(0.101)	(0.001)
Other Services	0.003***	0.168***	0.18***
	(0.001)	(0.042)	(0.0004)

Empirical Models: results

VARIABLES	(1) Default	(2) Default	(3) Default
Loan-specific Chr	LPM	Probit	Av Marginal Effects (%)
Collateral	-0.008***	-0.853***	-0.90***
	(0.002)	(0.297)	(0.003)
Personal Guarantees	-0.001	-0.028	-0.03
	(0.002)	(0.122)	(0.003)
Personal and Collateral	0.002	-0.074	-0.03
	(0.004)	(0.171)	(0.001)
Initial Rating	0.006***	0.506***	0.53***
	(0.001)	(0.059)	(0.001)
Log(Initial Debt)	0.002***	0.139***	0.15***

Empirical Models: results

VARIABLES Decisional level	(1) Default LPM	(2) Default Probit	(3) Default Av Marginal Effects (%)
Board	0.014***	0.548***	0.58***
	(0.005)	(0.185)	(0.002)
CEO	0.004	0.420*	0.44*
	(0.004)	(0.231)	(0.002)
Vice CEO	0.004**	0.340**	0.36**
	(0.002)	(0.153)	(0.002)
Headquarter managers	0.001	0.152	0.16
	(0.002)	(0.172)	(0.002)
Area managers	0.003***	0.328**	0.35**
	(0.001)	(0.147)	(0.002)

Conclusion

- First, both lending technologies are at work within the bank
- Second, the probability of default is lower when the decision to approve a loan application is taken by the loan officer at the bank branch level
- This result finds further strength by the fact that the default probability is also lower whenever the customer firm is located within the same municipality of the bank branch
- Third, the probability of default increases when the bank uses transaction-based technologies
- This result is not mitigated by the use of more information contained in the *Other services* variable that detects the presence of financial services, apart from lending, such as a securities account or insurances

Conclusion

- In transaction-based lending technologies, banks address the firm opacity problem by focusing on a subset of assets, which may be used as one source of repayment in the case of loan default (we already control for the presence of guarantees)
- In some cases the presence of a security account or insurances may be explained by the Italian bank practice that consists in asking firms to buy bank stocks and insurances sold by the same bank at the time of the loan application
- Therefore, the information content of the *Other services* variable is not consistent with the predictions of transaction-based technologies
- On average, firms that consent to this practice were, likely, also low quality customers with a higher default probability

Conclusion

- Overall, our results are favorable to relationship lending technologies, but they also show that transaction-based technologies were not effectively used by higher levels of the bank hierarchy
- Policy implications: the different response of default probabilities to relationship and transaction-based technologies support structural bank regulation proposals that favor a more clearcut separation between commercial and investment banking businesses
- Our results show that relationship lending technologies offer more business stability in exchange of less efficiency, while transaction-based technologies are associated with the provision of cheaper loans (at least in good times), but with higher business instability