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SEE FAR

EXECUTIVE SUMMARIES

Washington University in St. Louis
Olin Business School

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To obtain copies of the original research papers summarized here or to recommend your company for a future research project, please contact Jennifer Schmich, Wells Fargo Advisors Center for Finance and Accounting Research program manager, at schmich@wustl.edu or 314-935-4179.

A Message from the Director

I am pleased to continue our magazine, *SEE FAR*. Apart from the obvious attempt to "capitalize" on the WFA-CFAR name, the name also captures the essence of our research: looking to the future rather than concentrating exclusively on current events and thinking, and focusing on big-picture issues that have far-reaching consequences.

All the articles in *SEE FAR* are based on finance and accounting research that has been previously published in an academic journal or as a monograph, or is currently a working paper that will be published in the future. The original papers have been rewritten as executive summaries for *SEE FAR* so that they are accessible to a broad audience, rather than solely to those in academia. This is no small task. Taking a paper originally written for a highly technical academic audience and converting it into something more accessible takes a great deal of skill and hard work, as we discovered while putting together this issue and our past issues. But perhaps that is why the task is so worthwhile. I firmly believe that this will not only help us build a bridge between the research of Olin Business School faculty and those in the world of practice, but also will add to the knowledge people use on a daily basis. The intellectual capital generated by our faculty members' research is quite impressive—Olin consistently ranks among the top 10 schools in terms of our research output. For this reason, it is important that WFA-CFAR research is made available to as many of our stakeholders as possible.

This issue is dedicated to papers presented at a October 2017 conference on the Post-Crisis Evolution of Banks and Financial Markets on our campus. Hosted jointly by the center with the *Journal of Financial Intermediation*, the conference brought together academic researchers and policy makers from all over the world. I hope that you enjoy reading this issue. I would like to thank the contributors who participated in helping us create this issue by providing their papers and working with us to convert them into what you will read on the following pages. I look forward to any feedback you have to help us improve this magazine. Please contact WFA-CFAR Program Manager Jennifer Schmich at **schmich@wustl.edu** with your insights.

Sincerely yours,

Anjan Thakor

John E. Simon Professor of Finance, Director of Doctoral Programs, Director of the WFA Center for Finance and Accounting Research, Olin School of Business, Washington University in St. Louis

Post-Crisis Evolution of Banking and Financial Markets: Introduction

STUART I. GREENBAUM, Olin Business School, Washington University in St. Louis

The Wells Fargo Advisor's Center for Accounting and Finance sponsored an extraordinary academic conference at Washington University's Olin Business School on October 6th and 7th of 2017, celebrating Emeritus Professor Stuart I Greenbaum's 80th birthday.* The conference, entitled "Post-Crisis Evolution of Banking and Financial Markets," attracted scholars from Europe and Asia, as well as the U.S. Approximately 50 attendees included two Federal Reserve Bank presidents, two former Olin School of Business deans as well as the incumbent, together with a bevy of academic and public policy types. In addition, the *Journal of Financial Intermediation*, a co-sponsor of the conference, was represented by its managing coeditor, Murillo Campello. The conference is aptly described by its title.† The following paragraphs provide selected details and color.

Customer and Investors: A Framework for Understanding the Evolution of Financial Institutions

was presented by Richard Thakor (University of Minnesota) and co-written with Robert Merton (MIT, Sloan). The authors start with the premise that financial intermediaries ought to be evaluated on the basis of their economic functions rather than the arbitrary labels attached to them. The paper points out that banks' finance derives from two sources: (1) customers who provide funds in exchange for services, but do not wish to bear credit risk, and (2) investors willing to accept credit risk in return for an appropriate risk-adjusted return. In modeling this dyadic financing structure, the authors derive first- and second-best equilibrium outcomes, the latter leaving customers exposed to credit risk that generates "customer contract fulfillment costs." These costs may justify government guarantees and safety nets, even in the absence of bank runs. The authors further examine issues related to how contracts between banks and their financiers are structured and how risks are shared. Related issues addressed include efficient bank design, regulatory practices and the functional boundaries between banking and financial markets. This paper illuminates not only how financial intermediaries structure contracts with their customers and investors, but also how they should be regulated and how the interplay between banks and financial markets is likely to evolve *(page 12)*.

Understanding Informal Financing

was presented by Franklin Allen (Imperial College Business School, UK) and co-written with Meijun Qian (Australia National University) and Jing Xie (Hong Kong Polytechnic University). This paper empirically tests the predictions of an earlier theoretical framework developed by the authors. They find that trade finance and family borrowing are associated with "good" borrower performance in contrast to underground finance that relies on sketchier information but more vigorous (physical) collection technologies and that serves less successful borrowers. Informal financing co-exists with bank lending, but diminishes as bank lending becomes more pervasive. The paper points out the welfare-enhancing role that information financing can play, even in more developed economies *(page 18)*.

Collateral, Rehypothecation, and Efficiency

was presented by Charles Kahn and co-written with Hye Jin Park (both, University of Illinois, Urbana-Champaign). Rehypothecation refers to the practice whereby lenders use the collateral pledged by their clients for their own borrowing. This practice augments funds flowing into the system, but also creates a collateral chain that elevates the risk that the collateral may not be returned to the pledger that values it most highly. This theoretical study examines the allocational implications of collateral rehypothecation. The risk consequences imply that there may be deadweight costs that result from the practice and therefore government regulation may be justified *(page 28)*.

CLO Trading and Collateral Manager Bank Affiliation

was presented by João Santos and co-written with Stavros Peristiani (both, Federal Reserve Bank of New York). This paper asks whether the institutional affiliation of the CLO (collateralized lending obligation) manager affects the manager's access to information and its risk appetite. The behavior of banks and non-banks regarding the sale of distressed loans during 2007-11 is examined. Banks are found to sell distressed assets, especially those they have originated, more precipitously than non-bank originators. Bank-affiliated CLO managers appear more averse to holding their own arranged problem loans than holding distressed loans originated by unaffiliated institutions. The authors argue that banks may be especially concerned about reputational issues arising from their CLO holdings *(page 34)*.

Bank Culture

was presented by Fenghua Song (Pennsylvania State University), and coauthored with Anjan Thakor (Olin Business School, Washington University at St Louis). Culture, by virtue of its elusive intangibility, is difficult to model and this paper is among the first efforts in the academic banking literature. The model has the bank designing an employment contract to induce the desired allocation of managerial effort between bank "growth"

*See Greenbaum's comments appended hereto.

†See conference schedule on page 38.

and "safety." Competition among banks exacerbates a bias toward growth owing to assumed herding behavior among banks. When culture becomes a bank choice, the model matches bank owners and managers with similar beliefs, and it may also independently offset the bank's bias toward growth (away from safety). A safety-focused culture may be contagious among banks given herding behavior and this contagion tends to become more pronounced with more bank capital and weaker governmental safety nets. The paper is rich in regulatory policy implications for central banks that see bank culture as an aspect of prudential regulation *(page 40)*.

The five papers discussed in the previous pages appear in abbreviated form in the rest of this issue. I now discuss additional papers that were presented at the conference but do not appear in this issue.

Concentration of Control Rights in Leveraged Loan Syndicates

was presented by Mitchell Berlin (Federal Reserve Bank of Philadelphia) and co-written with Greg Nini (Drexel University) and Edison G. Yu (Federal Reserve Bank of Philadelphia). The authors empirically identify the distribution of control rights among loan syndicate participants and conclude that the concentration of control over negotiations provides improved lender monitoring and reduction of renegotiation costs.

Life Below Zero: Bank Lending Under Negative Policy Rates

was presented by Farzad Saidi (Stockholm School of Economics, Sweden) and co-written with Florian Heider and Glenn Schepens (both, European Central Bank). This paper describes empirical research that documents that negative policy rates transmit to the real sector in a somewhat unexpected way. Specifically, banks with more deposits concentrate their lending on riskier borrowers. The authors explain their novel results by positing that when policy rates become negative, the sign reversal produces adverse effects on net worth (in contrast to the effects of falling but still positive policy rates which produce net worth gains) and thus banks with larger deposit bases cut back their lending and seek riskier loans. This risk-taking behavior is more pronounced in low-capital banks, and the analysis points out the hazards of continuing easy-money central bank policies when rates are already low.

Unconventional Monetary Policy and Bank Lending Relationships

was presented by William Mullins (University of Maryland) and co-written with Christophe Cahn and Anne Duquerroy (both, Banque de France). This paper documents the change in bank lending behavior that follows from a form of non-traditional monetary policy. In particular, how do banks react to a change in the cost of funding selected types of loans, a policy adopted in France in 2012. The experiment they focus on is a change in collateral policy at the Banque de France that reduced the costs faced by banks in lending to some types of firms. They show that as a result of this policy favored banks saw deposits rise, defaults fell and credit rating downgrades declined as well. The results are interpreted to show that such a policy of selective cost reduction can ensure continued lending during financial crises, but only to the more creditworthy. Borrowers with a single bank relationship appear to be most sensitive to this type of monetary policy.

Bank Net Worth and Frustrated Monetary Policy

was authored and presented by Alexander K. Zentefis (Yale School of Management). The theoretical spatial model demonstrates that when banks are local monopolists, their reaction to monetary policy may depend upon whether they are well capitalized. With abundant capital, the bank will react to an expansionary monetary shock by competing at the periphery of their local market and thereby transmit the expansionary shock to their borrowers. When capital is low and the capital requirement constraint is binding, they will choose not to expand lending and will content themselves with whatever rewards can be obtained from the policy shock without augmented lending. Less well capitalized banks retreat competitively and more fully exploit customers in the heart of their market geography. This spatial framework establishes novel links between monetary policy, bank capitalization and competitive behavior. It shows that the bank lending channel of monetary policy will be effective only when banks are well capitalized.

Do SMEs Benefit From Unconventional Monetary Policy and How? Micro-Evidence from the Eurozone

was presented by Gregory Udell (Indiana University) and co-written with Annalisa Ferrando and Alexander Popov (both, European Central Bank). This paper seeks to trace the effects on bank lending of yet another unconventional monetary policy, i.e., the ECB's (European Central Bank) announced decision to purchase an unlimited quantity of impaired sovereign debt in 2012. Using a data set of more than 1200 smaller firms and their banks, the authors show that those banks holding a larger amount of impaired sovereign debt augment their lending more expansively following this kind of monetary policy shock than counterparts with smaller holdings of impaired sovereign debt. This again supports the idea that unconventional monetary policy can be effective, even if selectively.

Do Loan Officers Impact Lending Decisions? Evidence from the Corporate Loan Market

was presented by Janet Gao (Indiana University) and co-written with Joseph Pacelli (Indiana University) and Xiumin Martin (Washington University at St. Louis). Using a database of more than 7000 bank loan officers at major U.S. corporate lending departments from 1994 to 2012, this paper documents the influence of individual loan officers on loan spreads, covenants, maturity and loan performance. Surprisingly, they find that loan officer influence has not diminished over time despite technological innovations and individual officers appear to have greater influence as the size and complexity of their employer increases.

Nonbanks and Lending Standards in Mortgage Markets: The Spillovers from Liquidity Regulation

was presented by Pedro Gete (IE Business School) and co-written with Michael Reher (Harvard). The 2014 liquidity coverage ratio (LCR) gave preferenctial treatment to mortgage-backed securities (MBS), backed by "Ginnie Mae" (GNMA), as opposed to those backed by GSEs (government-sponsored enterprises such as "Fannie Mae" or "Freddie Mac.") This is shown to have created a liquidity premium for the GNMA securities. Thus, exploiting differences in

funding sources among lenders, the paper shows that the LCR differences led to a higher market share for nonbanks and lenders reliant on securitization. Increased supply of credit to risky lenders and tightened standards among loans eligible for GSE purchase were consequences. This paper sheds light on how changes in regulation can have unanticipated ripple effects.

Color and Credit: Race, Competition and the Quality of Financial Services

was presented by Taylor Begley, Washington University in St. Louis, and co-written with Amiyatosh K. Purnanandam, University of Michigan, Ross School. Allegedly inferior financial services provided in predominantly minority neighborhoods have prompted a wide variety of laws and regulations such as the Community Reinvestment Act. However, drivers of the quality of minority financial services, especially the underlying market imperfections that permit this exploitation to endure has not been carefully documented. This paper seeks to fill this void using a newly available dataset provided by the Consumer Financial Protection Bureau. The quality of financial services is measured by the frequency of consumer complaints against financial institutions for mortgage-related products. The data cover 160,000 complaints from 16,309 zip codes for 2012–16. Minority consumers are shown to receive significantly inferior financial services by this measure of quality and this phenomenon cannot be explained by differences in income and/or education. Surprisingly, minority outcomes are worse where banking competition is most intense.

The Taste of Peer-to-Peer Loans

was presented by Yuliya S. Demyanyk (Federal Reserve Bank of Cleveland) and co-written with Elena Loutskina (University of Virginia) and Daniel Kolliner (University of Maryland). This paper empirically examines popular assertions surrounding P2P (peer-to-peer) lending, a recent innovation disrupting institutional lending: (1) P2P lending provides enhanced access to the underserved, (2) P2P lending permits refinancing at more favorable interest rates, and (3) P2P lending enhances the credit ratings of marginal borrowers. None of these assertions are supported by the data. Moreover, P2P loans are found to resemble "predatory" loans in terms of their borrower characteristics and their effects on borrower financial stability.

Fintech, Regulatory Arbitrage, and the Rise of Shadow Banks

was presented by Greg Buchak (University of Chicago) and co-written with Gregor Matvos (University of Chicago Booth School of Business), Tomek Piskorski (Columbia Graduate School of Business) and Amit Seru (Stanford Graduate School of Business). This paper explores the rise of shadow banking in the residential lending markets. It distinguishes between so-called fintech (online) shadow banks and those employing more traditional lending techniques and compares the rapid growth among both types of shadow banks with the traditional bank lenders (those relying on deposit financing). The shift to shadow banks, independent of type, is attributed to regulatory arbitrage and the shift to fintech originators is associated with technological efficiencies. It is found that approximately 55 percent of shadow bank growth was attributable to increased regulatory costs following the Great Recession and 35 percent was owing to advances in technology, especially web-based. Moreover, shadow banks are more likely to be found in minority housing areas, but this is not true for online shadow banks. In contrast, prominence of FHA lending (lower income) predicts more fintech lenders. One of the interesting findings is that fintech lenders seem to be pricing residential loans more accurately than traditional banks in terms of price and credit risk, possibly due to better analytics related to big data.

Thinking Fast, Not Slow: Evidence from Peer-to-Peer Lending

was presented by Jun Yang (Indiana University), and co-written with Li Liao, Zengwei Wang, and Jia Xiang (all, Tsinghua University). This paper examines a Chinese P2P consumer credit intermediary (Renrendai) that induces lenders to make quick decisions on lending opportunities and examines biases that derive from decisions that follow. Lenders that decide with fragmentary information appear to choose sub-optimally receiving unnecessarily risky loans and diminished returns. However, the lending decisions improve as the frequency of lending increases. The database is unique and is mined for insights into the behavioral biases of lenders.

Window-Dressing and Trading Relationships in the Tri-Party Repo Market

was presented by Zeynep Senyuz and co-written with Sriya Anbil (both, the Federal Reserve Board). This paper documents that European money market participants engage in window-dressing in the triparty repo market (where the bulk of repo transactions occur) pursuant to the Basel III regulatory framework. This window-dressing took the form of European dealers reducing their repo borrowing by 18 percent to look more attractive to their regulators on financial reporting days. The substantial constricting effects on lending of this window-dressing were ameliorated by the Federal Reserve's introduction of the reverse repo facility.

The conference closed with comments by the organizers, Professors Anjan Thakor of Washington University in St. Louis and Arnoud Boot of the University of Amsterdam. Summarizing a summary of summaries seems a bit heroic, but this conference, unlike many, stuck to its initial vision of convening serious academic examinations of a variety of Finance issues that arose pursuant to the Great Recession, a cataclysm of enormous proportions that thoroughly disrupted financial institutions, markets and trading as well as governmental intervention in financial markets and economic stability as known before 2008. The presentations were edifying, important and great fun. Many thanks to the sponsors, organizers and participants.

Paper: “Clarifying the Roles of Customers and Investors in Financial Institutions”

Authors: Robert C. Merton, MIT, and Richard Thakor, University of Minnesota

Date: October 2017, Forthcoming *Journal of Financial Intermediation*

Clarifying the Roles of Customers and Investors in Financial Institutions

A framework for understanding the difference between customers and investors can help us better understand many financial institutions

ROBERT C. MERTON, Massachusetts Institute of Technology
RICHARD T. THAKOR, University of Minnesota

This paper reveals insights into the distinction between customer and investor roles in financial institutions and provides observations into how financial institutions might more efficiently structure customer contracts. It also provides a framework that can clarify the blurring boundaries between banks and financial markets, as banks engage in more market-related activities.

An important feature of financial institutions—banks, insurance companies, and the like—that distinguishes them from non-financials is that they receive financing from both investors and customers. Investors, such as stockholders or bondholders, provide financing as well as risk bearing—they expect the payoffs of their claims to be linked to the eventual fortunes of the intermediary.

Customers, on the other hand, who pay in advance for future payments and services, provide financing but do not want to have the payments and services they are to receive depend on the fortunes of the service provider. These customers are “credit-sensitive” customers (just “customers” henceforth), and the value they derive from the intermediary’s services is diminished by an increase in the intermediary’s credit risk. When faced by this, customers may even flee from the intermediary. An example is an investment bank that finds customers for its long-dated customized swap contracts fleeing the bank because it has started a merchant banking business. This has important implications since customers provide a significant amount of the total financing for a financial institution (e.g. bank deposits).

In our paper, we argue that the efficient contract ensures that the credit risk of the intermediary is borne by the right party, and that this is the investor, not the customer. Thus, the customer is optimally exposed only to the risk inherent in the contract terms—the risk that the contract itself has specified—and not to the credit risk of the intermediary itself. In other words, a customer may understand that the contract he/she purchases from an intermediary may have a risky payoff (for example, a mutual fund account that is indexed to the S&P 500). However, the customer does not want any uncertainty about receiving the promised payoff because the intermediary is insolvent.

This basic insight stemming from the distinction between customers and investors leads to numerous observations regarding how financial intermediaries should structure contracts with their customers, and can illuminate features of numerous observed real-world contracts, institutions, and regulatory practices. Furthermore, our framework can also shed light on the blurring boundary between banks and financial markets, as banks choose to engage in more market-related activities.

Why Is It Inefficient to Expose Customers to an Intermediary's Credit Risk?

In our paper, we provide a theoretical model that explains how exposing customers to an intermediary's credit risk will destroy economic surplus, whereas investors are not affected in the same way. The basic intuition behind the setup is that customers provide some financing upfront to an intermediary (for example, a depositor placing money in a checking account), and in exchange the intermediary then provides some services in the future to the customer. These services may include some cash flows (such as interest payments) or some other component which the customer values (such as safe-keeping services, investment advice, etc.). The figure below illustrates this representation.

Our analysis also reveals a number of additional insights related to marketplace competition between intermediaries. First, an intermediary that exposes customers to its credit risk will not be able to compete against an intermediary that insulates its customers. Thus, even adjusting the price of services will not be enough to overcome a customer's aversion to the intermediary's credit risk. This sheds light on some survey evidence. For example, Wakker, Thaler, and Tversky (1997) report that respondents in their surveys said they would pay 20% less for an insurance policy if the probability of default by the insurance company rose from 0% to 1%. Second, even if there is no competition and an intermediary is a monopolist, it will still prefer to insulate customers from its credit risk, because the intermediary will be able to extract more economic rents.

A natural question that arises is whether customers can do things to protect themselves against an intermediary's credit risk or offset the potential loss of service from the failure of the intermediary. If this is the case, then an intermediary would not necessarily face such adverse consequences from failing to protect customers. We argue that, while there are a number of ways in which a customer might potentially do so, they are all either infeasible or inefficient for a number of reasons. First, a customer may try to buy insurance against an intermediary failing; however, such a guarantee would need to be purchased by borrowing, which we prove would offset any gain. Second, a customer may try to diversify across many intermediaries (for example, having multiple life insurance policies); however, transaction costs would make this prohibitively expensive. Finally, a customer may try to replicate the services in the marketplace; however, often these claims are not separately traded in the market.

Is It Always Feasible for Intermediaries to Insulate Customers?

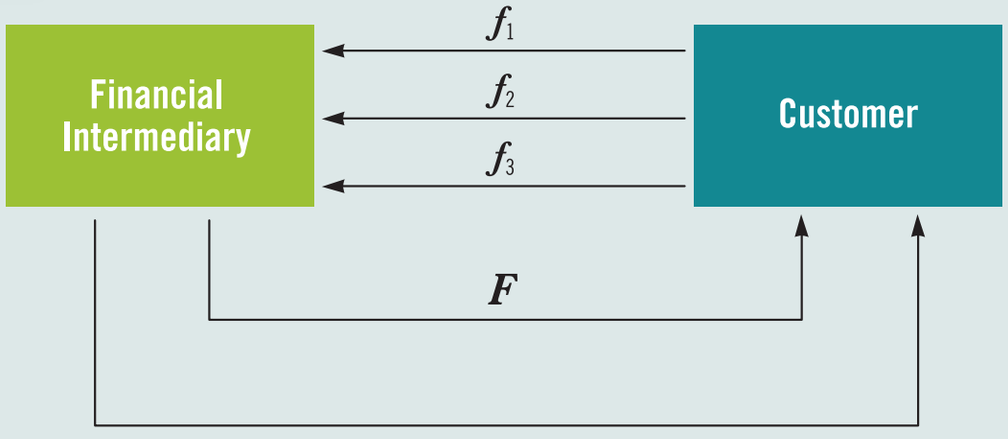
There are a number of ways for intermediaries to protect customers against their own credit risk. For example, they match their asset and liability payouts to reduce a maturity gap, increase the amount of equity capital on their balance sheets, or purchase a guarantee from a third-party. However, in reality each of these approaches may entail some costs. For example, maturity transformation is an important economic function served by many intermediaries. It can be expensive for intermediaries to increase the amount of equity they have on their balance sheets. And a guarantee may expose an intermediary to moral hazard (where an intermediary takes advantage of the guarantee and does things that are not optimal).

Thus, in a perfect world, all intermediaries will completely protect their customers from their credit risk. But in reality, it may be prohibitively costly for intermediaries to do so. Therefore, we may observe instances where customers are exposed to credit risk even though it is inefficient, because the intermediary is unable to protect them. We refer to this loss of efficiency as "customer contract fulfillment" (CCF) costs, and in this case the (constrained) optimal contract will trade off the CCF costs and the cost to the intermediary. The figure below illustrates this tradeoff between reducing CCF costs and the costs to the intermediary of doing so.

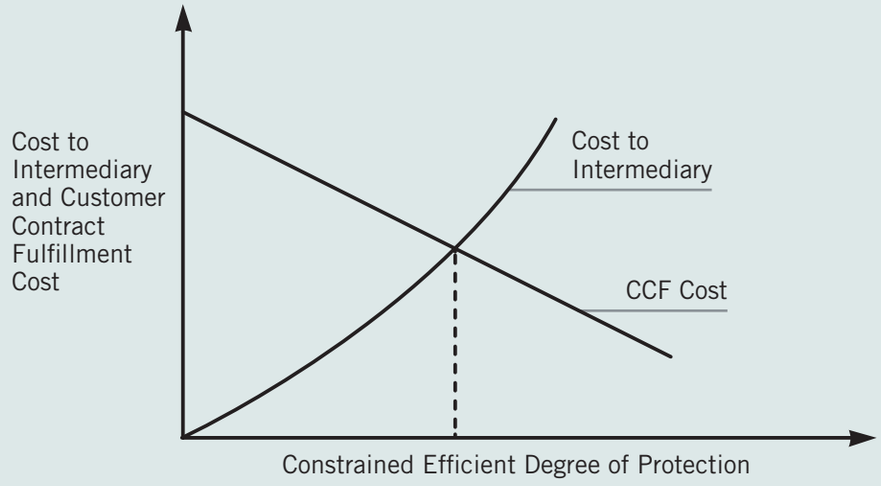
Examples of Customer Contracts

A variety of observed real-world customer contracts and institutions fit within our framework.

In terms of customer contracts, a bank depositor is an example of a customer who wants a sure payoff that is not exposed to the credit risk of the bank; those who guarantee these deposits in some way (like the shareholders and debt holders implicitly and the deposit insurer explicitly) are investors who bear the risks that depositors do not.



This figure illustrates the flows of values and costs between the financial intermediary and the customer. The f_i arrows represent the payments made by the customer to the intermediary. The F arrow represents the financial payoff made by the intermediary to the customer at a future date. The lower arrow represents the services provided by the intermediary to the customer, V_S, at a cost of k to the intermediary.



Degree of Customer's Protection Against Credit Risk

This figure illustrates the tradeoff between minimizing customer contract fulfillment (CCF) costs, and the cost to the intermediary of minimizing the CCF cost.

According to our theory, one reason is that bigger banks are more complex than smaller banks, with potentially greater intertwining of customers and investors. The bigger the bank, the more difficult it becomes to keep investors separate from customers.

Another example is an investor in a mutual fund—each customer is purchasing a service (the portfolio management service and the promise of some risky return), while also providing financing. In this case, the customer understands that the contract purchased from the mutual fund may have a risky payoff, for example, linked to the S&P 500. It is only the credit risk of the intermediary—say, due to unobserved risky investments with fund money or "tunneling"—which the customer wishes to be insulated from. Indeed, this is one reason why investors put their money in funds managed by reputable intermediaries like Vanguard, Fidelity, and the like.

Yet another example of a customer contract is someone who purchases life insurance. The policyholder does not wish to bear any risk of benefactors not receiving the promised payoff in the state of the world in which the insurance needs to pay off. Shareholders and those who purchase bonds in the insurance company are the investors and they are exposed to the risk in the overall payoffs of the insurance company.

An institution that can be understood through our framework is a futures exchange. A futures contract essentially guarantees the ability to sell or buy some commodity or security in the future at a price that is predetermined. A futures contract is traded on an exchange with liquidity and collateral provided daily, rather than being merely a bilateral arrangement between the bank and the customer that may not be collateralized. The exchange stands behind the execution of the contract. As a result, the customer is protected against counterparty risk. Thus, the use of futures contracts over forward contracts may be rationalized as a means of insulating customers against the credit risk of an intermediary.

Examples of Regulatory Practices

A number of regulatory practices can also be understood within the context of our framework. For example, Title VII of the Dodd-Frank Act states that all non-exempt swaps (i.e. "standardized" swaps) must be cleared and exchange traded. Mandatory clearing and exchange trading of swaps is already underway. Our analysis provides an economic rationale for this. By making swaps exchange-traded, counterparty credit risk is greatly reduced, moving the arrangement closer to being economically efficient. Thus, the customers who hold these swap contracts need not worry about the credit risk of the intermediary they are working with, provided that the exchange is bankruptcy remote. Thus, this requirement of Dodd-Frank serves the economic purpose of minimizing customer-specific contract fulfillment risk in swaps.

"Too Big to Fail" (TBTF) regulations, where the government protects the largest banks in an economy, may also be rationalized by our framework. According to our theory, one reason is that bigger banks are more complex than smaller banks, with potentially greater intertwining of customers and investors. The bigger the bank, the more difficult it becomes to keep investors separate from customers.

Beyond this, we view our framework as having broader implications about when the government should intervene in the financial sector. In general, our framework implies that the government should intervene when it is infeasible for intermediaries to shield customers from their credit risk, and in doing so generate large CCF costs. Deposits and insurance contracts would be at the top of the list in this regard. Mutual funds, repos, and futures exchanges would be at the bottom of the list—these are examples where market-mediated solutions are effective, making government intervention unnecessary. Swaps exchanges would be somewhere in the middle of the spectrum.

A Perspective on the Growing Integration of Banks and Financial Markets

Finally, our framework can also help to formally understand the recent increase in integration between markets and banks. The 2007-2009 financial crisis showed how integrated the depository institutions are with financial markets. This integration blurs the boundary between banks and markets and complicates bank regulation and the government's approach to crisis resolution. This integration has occurred in a variety of ways. These include loan originations by banks that end up creating asset-backed securities through securitization that are then sold to investors in the capital markets, including other banks; market-traded credit-default swap (CDS) contracts that insure against default by bank borrowers; the use of exchange-traded derivatives of various sorts that are used in conjunction with more customized non-traded derivatives created by banks to reallocate risks; and loan commitments sold by banks to borrowers as lines of credit to back up commercial paper issues sold in the market.

We come to the following main conclusions. First, although the deposit insurance safety net encourages a bank to take market integration risk, the sensitivity of the bank's customers to this risk provides a counterbalance. This means that a bank with depository customers will integrate less with the market than, say, a shadow bank that does not have depository customers. Second, a bank will only engage in capital market trading activities that have higher expected profit than lending. This provides a perspective on banks "chasing yields" through capital market activities. It also suggest that if the central bank's interest rate policy compresses net interest margins on lending for banks, they are more likely to pursue activities that integrate them more with capital markets. Some recent research has shown that when the central bank lowers interest rates through an easy-money monetary policy, it initially increases bank interest margins, but beyond a certain point, it has the opposite effect. So our analysis indicates that if the central bank wants to retard the rate at which depository institutions are integrating with the financial market, they should be wary of loosening monetary policy too much, i.e., the loosening should be reversed if it begins to compress net interest margins for banks. Regulatory costs can also play a role in how much banks choose to integrate with markets. For example, if regulatory costs go up significantly, banks may reduce the value of the services that they offer to customers, and choose to integrate further with markets as a result.

Paper: "The Power of Family and Trade Financing in Growing Wealth"

Authors: Franklin Allen, Imperial College London; Meijun Qian, Australian National University; and Jing Xie, Hong Kong Polytechnic University

Date: June 2017

The Power of Family and Trade Financing in Growing Wealth

How Family and Business Networks Can Help Solve the Low Wealth Accumulation and Poor Capital Market Trap

FRANKLIN ALLEN, Imperial College London
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The path of economic development suggests that informal financing based on social and business networks, such as family loans and trade credits, can play an essential role in supporting economic growth. However, there are some who claim that these sources are only second-best substitutes when capital market and financial institutions are not available and that these financing sources are too costly to help firms. A recent research paper, "Understanding Informal Financing," forthcoming in the *Journal of Financial Intermediation*, uses Chinese data to understand the different forms of informal financing and evaluate what and how each type of informal financing can support firm growth.

The role of financial intermediaries such as banks and direct financing through equity and bond markets is to bridge the gap between economic agents with a surplus and those with a deficit of capital. However, asymmetric information between banks/markets and firms may preclude financing for valuable projects. The asymmetric information problem is particularly severe for small firms, firms without bank relationships, during credit tightening periods, and in developing countries that usually have less developed financial systems, inadequate business laws, and insufficient intermediary service.

China provides a rich paradigm to study informal finance. The development of the financial system lags behind the fast-growing economy and the informal sector nurtured millions of small firms that are usually not lent to by banks and financial markets. Government policy is for banks to prioritize state-owned firms regarding credit allocation and empirical evidence shows that this is indeed the case. The rationale for bank policies that bias towards state-owned firms and against the private sector include the state ownership of banks, asymmetric information between banks and private firms, the lack of sound accounting practices and credit evaluation methods, and the problem of contract enforcement. To overcome financing constraints, private firms in China have widely adopted many alternative financing sources.

Do these financing sources turn out to be constructive for firms? We conjecture that for a financing channel to be effective, it needs to overcome adverse selection and moral hazard problems associated with asymmetric information and to deal with recourse in case of

Figure 1A: Funding sources for new investments

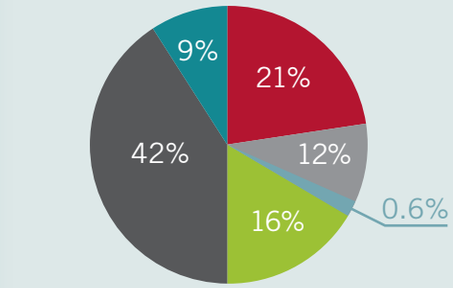
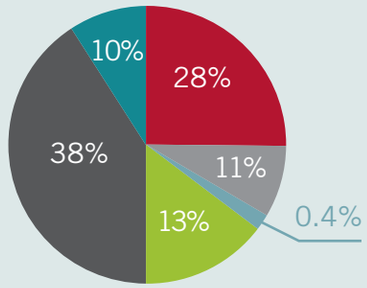


Figure 1B: Funding sources for working capital



default. Therefore, it is necessary to differentiate the information and enforcement mechanism utilized by each of type of informal financing. Only an in-depth understanding enables us to separate constructive informal financing from possibly destructive types. Such understanding, in turn, will provide relevant policy implications for regulating these financing activities.

The study finds that informal financing that relies on information advantages or an altruistic relationship is associated with good firm performance and that informal financing that uses violence for enforcement is not associated with good firm performance. Rather than a substitute, the constructive type of informal financing is prevalent in regions where access to bank loans is extensive, suggesting a complementary relation between formal and informal financing. Moreover, international comparisons show that China is not an outlier but rather average in terms of using informal financing.

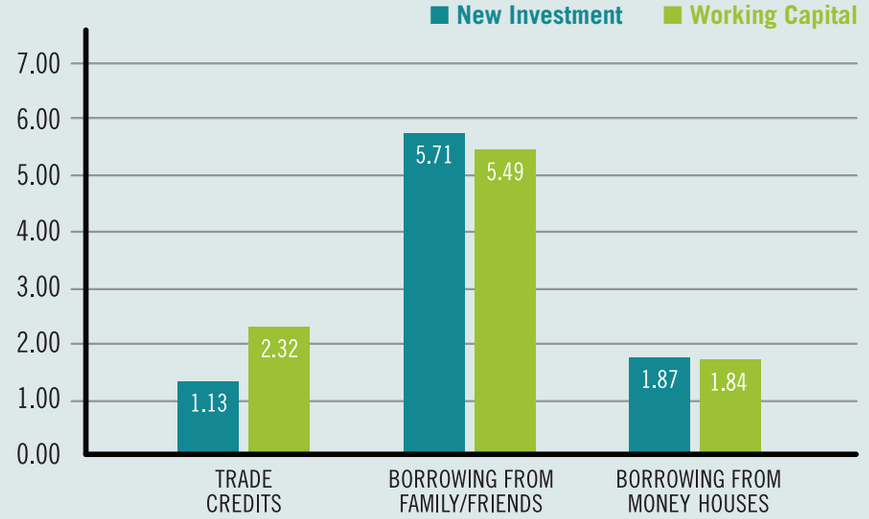
What Are the Informal Financing Sources Used by Chinese Firms?

A broad set of informal sources have been utilized by Chinese entrepreneurs: interpersonal lending, trade credits, money lenders, loan sharks, rotating savings, credit organization, pawnshops, indigenous banks, money houses, mutual assistance societies, and so forth. These sources charge a wide spectrum of interest rates and have a wide spectrum of legal standing in the country. At one end of the spectrum, family loans could come at a zero interest rate, while at the other end, money houses (practically loan sharks) charge ridiculously high interest rates and employ violence in collecting payment.

The study groups these sources into constructive ones and unconstructive ones. While the constructive ones derive their information and enforcement technology from business or social relationships and aim at supporting business operations, the unconstructive ones are often utilized for speculative activities, charge extremely high interest rates or fees, and employ violence rather than legal recourse to collect payments. The examples of the former are family loans and trade credits, and of the latter, loan shark money.

The World Bank's Investment Climate Survey covers small and medium Enterprises around the world. Specifically for China, the survey was conducted in 2003. Regarding financing sources, the survey explicitly asks about the funding contribution in a firm's new investment and working capital from trade credits, borrowing from family/friends, and borrowing from money houses, aside from the conventional bank loans, equities, government subsidiaries, retained earnings. Based on our criteria on information and enforcement mechanisms, the former two

Figure 2: Funding sources for working capital



(trade credits and borrowing from family and friends) could be viewed as constructive, and the latter (borrowing from money houses) as possibly destructive.

Based on this survey data, we find that informal financing accounts for 9%~10% of total funding for investment and working capital (Figure 1A and Figure 1B) in the surveyed Chinese firms. Among this informal financing, borrowing from family and friends is the largest component, more than twice or three times trade credit and borrowing from money houses, and accounts for 5%~6% of firms' total financing (Figure 2).

What Kind of Firms Use More Informal Financing?

The usage of informal financing differs among firms. As asymmetric information drives the SME financing gap with formal financial intermediaries, smaller firms and younger firms, with severe degree of information ambiguity will be more likely to use informal financing than larger and mature firms. Consistent with this conjecture, the study shows that early-start-ups are four times more likely to borrow from family and friends compared to established firms (Figure 3A).

Figure 3A: Informal financing usage by firm age

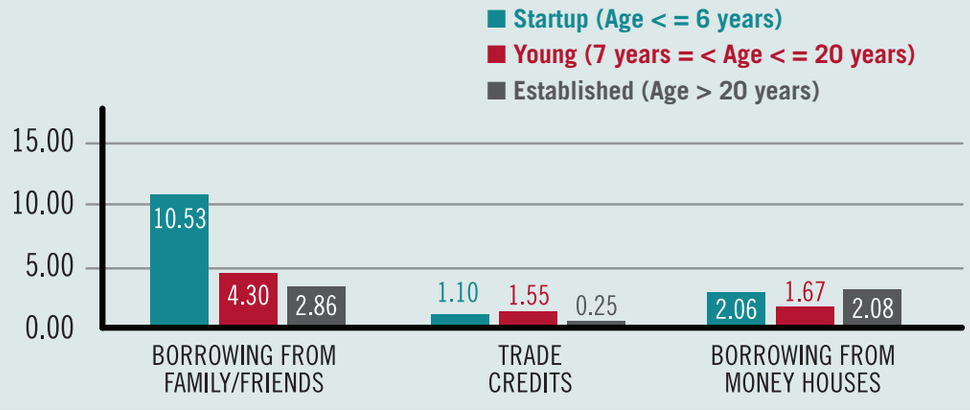


Figure 3B: Informal financing usage by firm size

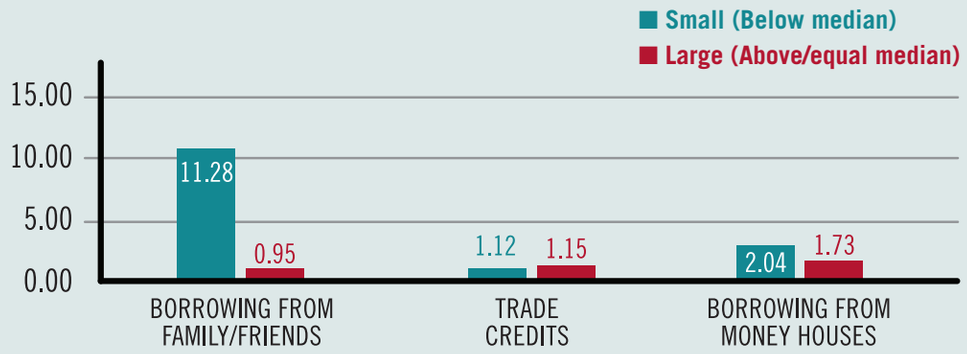
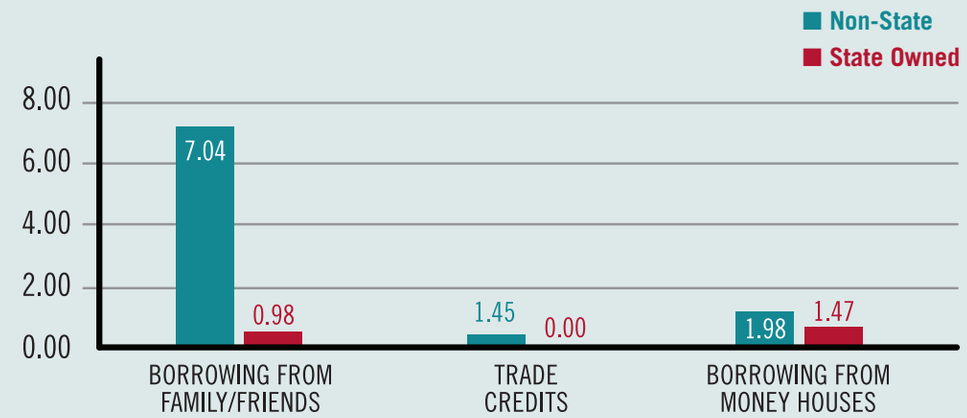


Figure 3C: Informal financing usage by state ownership



The study also shows that small firms (with total assets below the sample median) are 10 times more likely to borrow from family and friends than large firms (with total assets above the sample median) (Figure 3B).

Specifically in China, as SMEs are often private firms and banks are mostly state-owned, banks often give preferential treatment to state-owned firms and exclude or discriminate against private firms in providing funding. Consistent with the anecdotal evidence, the survey data show that non-state owned firms are seven times more likely than the state-owned firms to borrow from family and friends (Figure 3C).

Firms' tendency in offering or requesting trade credits from suppliers/customers are likely dependent on their market powers, which could be measured by the cost to replace the trading partners or be replaced. Firms with monopoly power, therefore, are more likely to request trade credits, while firms in a more competitive market with low bargaining power are more likely to offer trade credit. Consistent with this logic, the survey data show that firms in less competitive industries are more than twice as likely to receive trade credits as firms in more competitive industries. Correspondingly, firms in more competitive industries rely twice as much on borrowing from family and friends as firms in less competitive industries (Figure 3D).

Figure 3D: Informal financing usage by product market competition

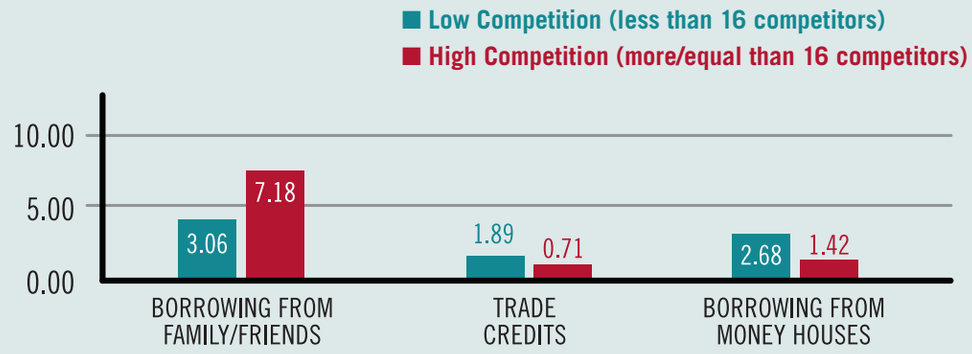


Figure 4A: Sales growth

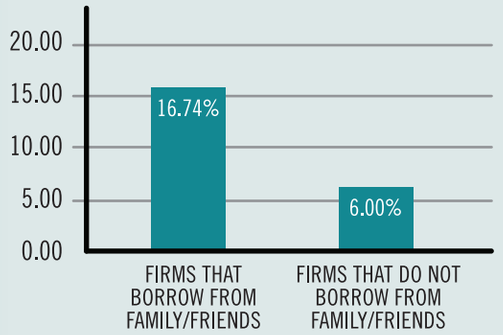
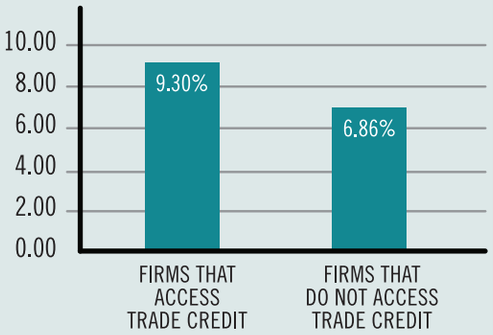


Figure 4B: Sales growth



The Relationship Between Informal Financing Usage and Firm Growth

Financing and growth have an endogenous relation. On the one hand, firms with access to finance can take investment opportunities and grow; on the other hand, firms that grow well will have easy access to finance. To be able to demonstrate that informal financing does or does not influence firm growth, a study should ideally use information on firms' usage of informal financing in the past to explain the subsequent firm growth. Constrained by data availability, the study groups firms based on their usage of informal financing over the year and compares across groups the growth over the same year. The results show that firms that borrow from family and friends grow more than twice as faster as firms that don't borrow from family/friends (Figure 4A) and that firms that access trade credit grow about 50% faster than firms that don't access trade credit (Figure 4B). However, we need to be cautious about drawing the implication that using these resources could lead to better growth because we do not know whether not using these informal sources of financing is due to no need or no access to do so. Nevertheless, firms that have growth opportunities and can rely on family borrowing are able to capture the growth. Therefore, what we can conclude is that access to these types of constructive informal financing is associated with better firm growth.

Moreover, firm characteristics could influence firms' decision to use informal financing and these characteristics could also be associated

Figure 5A: Sales growth in the matched sample

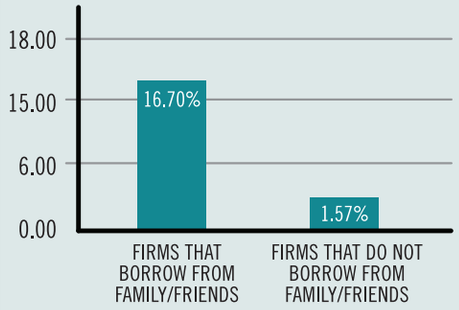


Figure 5B: Sales growth in the matched sample

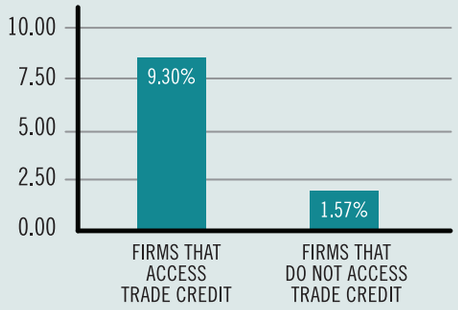


Figure 6A: Sales growth in the full sample

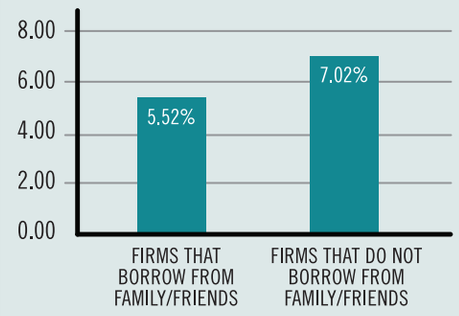
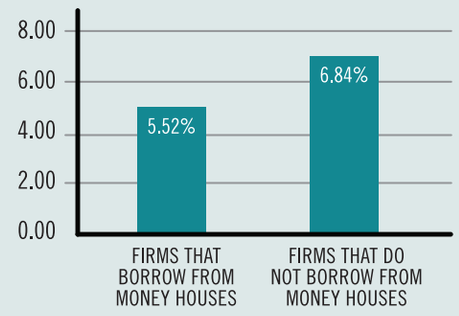


Figure 6B: Sales growth in the full sample



with firms' growth prospects. Therefore, comparing the growth of firms with similar characteristics and differing only in their usage of informal financing can offer more robust insights. To do so, the study develops a matched sample, which consists a set of treatment firms that use informal financing and a set of control firms that do not use informal financing. Each treatment firm is matched with one control firm that operates in the same industry, has a similar asset size, equity value, profitability, the same ownership type and a similar level of product market competition. The results show that, after controlling for the firm characteristics, the difference in sales growth across firm groups based on whether they use informal financing become even more striking. As Figure 5A and 5B show, firms that borrow from family/friends grow almost 10 times faster than firms that do not borrow from family or friends. Firms that access trade credit grow six times faster than firms that don't access trade credits.

While informal financing that relies on the informational advantage from monitoring and pricing is associated with better firm growth, informal financing that charges unreasonable interest rate and uses violence for the collection of payment does not have a positive influence on firms. First of all, as shown earlier, very few firms use them. Second, as Figure 6 shows, firms using such destructive financing sources often grow slightly more slowly than firms that do not.

Figure 7A: Financing sources for new investment

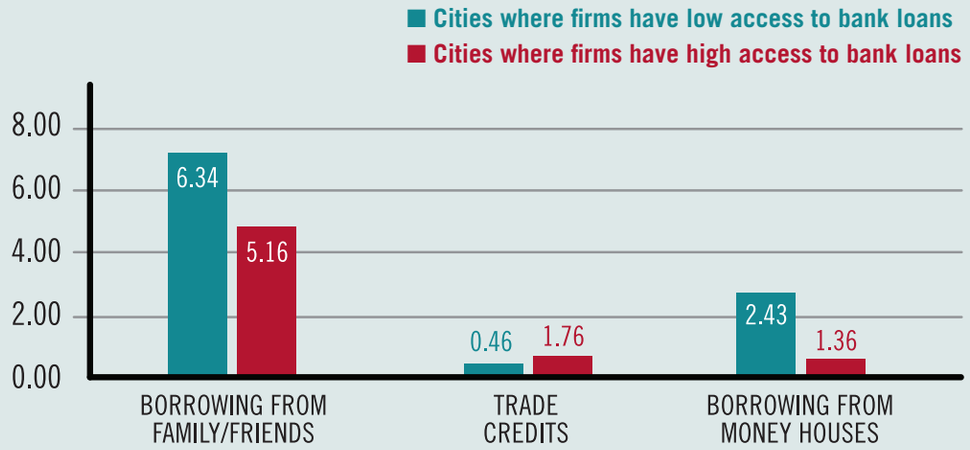
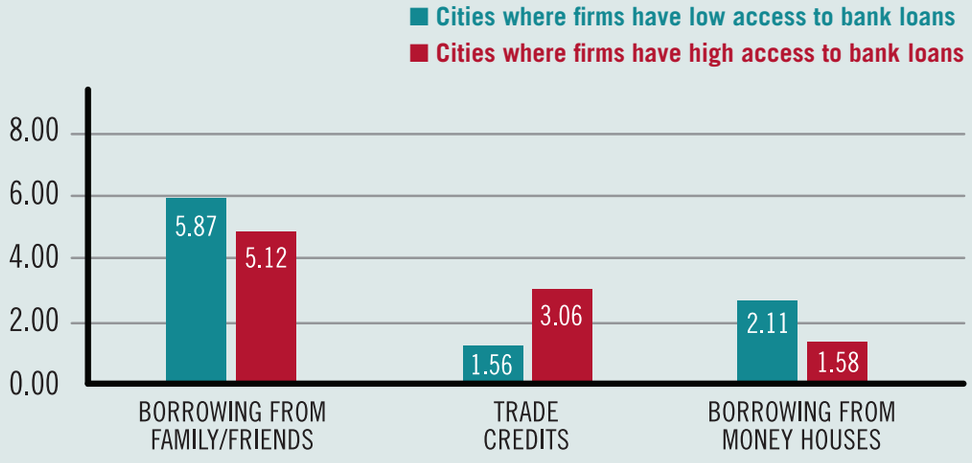


Figure 7B: Financing sources for working capital



Does Informal Financing Diminish When Banking Industry is More Developed?

If informal financing is merely a substitute when bank financing is unavailable, it should diminish when the banking industry becomes more developed. The study shows this is not the case. As Figures 7A and 7B show, although borrowing from family/friends or money houses are slightly lower in cities where firms have high access to bank loans, trade credit increases.

Figure 8A: Informal financing in working capital

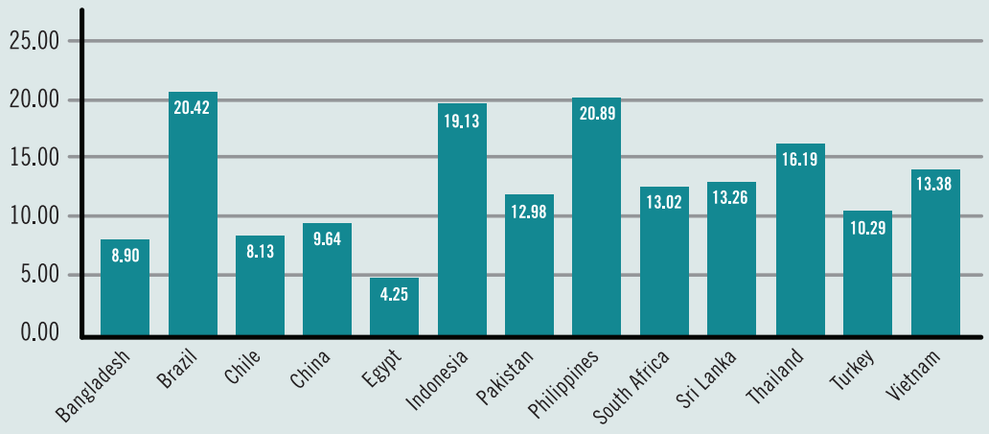
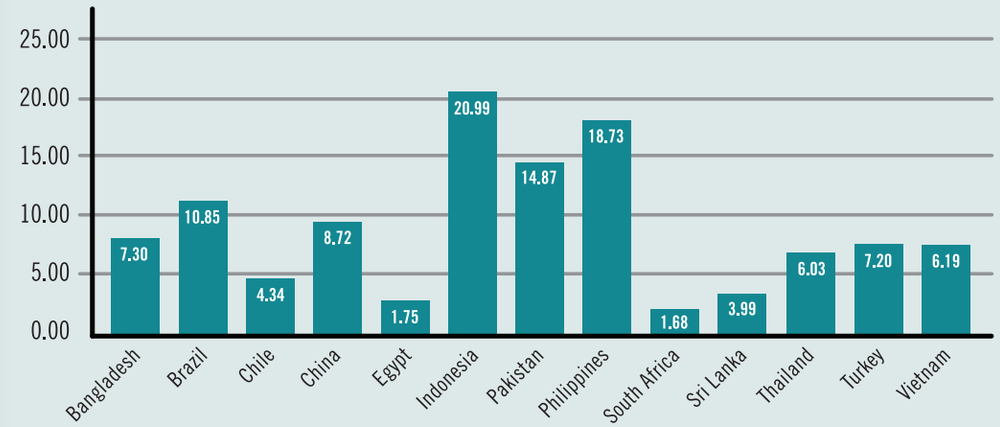


Figure 8B: Informal financing in new investment



China is Not An Outlier In Using Informal Financing

The study chooses Chinese firms as the primary sample because the literature's controversy regarding the role of informal financing is mainly based on evidence from Chinese data. There are also a variety of informal financing practices and large across region variations in China that makes the studies there potentially more interesting. The lesson that informal financing based on the informational advantage to overcome the SME financing gap, however, could be generic to all economies. The study uses an international sample to compare the informal financing usage among 13 of the largest emerging economies—the top 10 largest based on GDP and the top 10 largest based on population. As Figure 8A shows, informal financing counts for a wide range of percentages of working capital in these 13 countries, with the highest in the Philippines, 20.89% and the lowest in Egypt 4.25%. China, 9.64% is in the middle toward the low side. So is the new investment.

Concluding Remarks

Low wealth accumulation and poor capital market development have been long recognized as a development trap. However, borrowing within social network and business networks provides funds without an established capital market. When such pooling and financing contributes to growth, it potentially solves the problem. The claim that informal financing is merely a substitute when financing through banks and markets is not available undervalues the contribution of informal financing. Financing based on social and business networks can potentially lift emerging economies out of the trap of low-wealth and under-development of capital markets. In conclusion, the assertion of informal financing as a costly second-best choice largely deprecates its contribution to economic growth and capital market development.

Paper: “How Collateral Goes to Work in Today’s Economy”

Authors: Charles M. Kahn and Hyejin Park, University of Illinois, Urbana-Champaign

Date: April 2015

How Collateral Goes to Work in Today’s Economy

Examining the Economic Role of Rehypothecation[1]

CHARLES M. KAHN and **HYEJIN PARK,** University of Illinois, Urbana-Champaign

Collateral has come a long way from its roots in pawnshops and mortgage lending. It has become of central importance to financial contracting; nowadays it takes an enormous amount of high-quality collateral to maintain a financial system. Highly leveraged investors such as hedge funds are dependent on collateralized lending, sometimes through the repo market, sometimes through other arrangements with prime brokers. Centrally cleared trade in derivatives is also dependent on collateral. And high quality collateral does not come cheap.

Thus when institutions, such as brokerages, accumulate a lot of client collateral on their books, it is natural for them to be interested in finding a way to put these balances to work. For many decades, the solution has been “rehypothecation.” This is the process of passing a borrower’s collateral along to other agents—for a price, of course.

A standard use for rehypothecation is the refinancing of the loan made to the initial borrower. For example, under standard agreements, when a broker financed a securities purchase on margin for an investor, the investor would deposit the securities with the broker, and the broker could in turn hand the securities over to a bank to finance the loan just made. In recent decades, a second motivation has become more important for many institutions: the business of “securities lending.” A broker carries a variety of securities on his book, some of which are desired temporarily by customers for their own purposes—perhaps as part of a short-selling transaction or for particular temporary collateral needs of their own. Thus the broker is engaged in a variety of transactions. In some he delivers securities for cash and in others he delivers cash

[1]This non-technical paper is a summary of Park and Kahn (2017).

[2]Krishnamurthy and Vissing-Jorgensen (2012) estimate that liquidity and safety premium on U.S. Treasuries (the highest quality collateral) averaged 72 basis points a year for the period 1926 to 2008, and other authors have emphasized the premium on and scarcity of the highest quality collateral (see Singh and Aitken (2010), Singh (2011), and Greenwood Hansen and Stein (2012)).

for securities—and the ability to flexibly offer the widest possible range of inventory to potential customers is an important advantage.

From the point of view of the initial lender there are also advantages to allowing the broker the flexibility of reusing securities. In return for the ability to economize on the collateral on their books, brokers offer their customers more favorable terms for their transactions.

Rehypothecation is in fact one particular (and more formalized) version of the idea of a "collateral chain," in which financial agents in temporary possession of assets use them for further trade. In the economy as a whole, such activity can mean that a set of interrelations among financial institutions and individuals can expand considerably beyond the value of the underlying set of financial assets at the base.[3]

Rehypothecation was an extremely common practice up to the period of the recent financial crisis. However in the financial crisis customers also discovered the downside of rehypothecation—the possibility that a breakdown occurs and the collateral cannot be recovered. For example, when Lehman Brothers failed, many clients who had permitted rehypothecation discovered that their collateral had become tied up. As noted by Fleming and Sarkar (2014), these customers "did not know when their collateral would be returned to them, nor did they know how much they would recover given the deliberateness and unpredictability of the bankruptcy process." As a result, rehypothecation dropped significantly; according to Singh (2010, 2011), in 2007 the six largest US investment banks held $4.5 trillion in collateral for which clients permitted rehypothecation. By 2009 the value had fallen to $2 trillion.

Since the crisis, not only have customers become more cautious about rehypothecation, regulators and governments have also tightened standards in a variety of ways. For example, the Dodd-Frank act requires that collateral for most swap contracts be deposited with a central counterparty in a segregated account, thereby precluding its reuse. Meanwhile, researchers have begun to consider more carefully the implications of arrangements for economizing on collateral. In particular, what is the "right" level of rehypothecation? If the customers are reasonably sophisticated, will they make efficient decisions based on the risks involved? Or is there a justification for additional restrictions on rehypothecation above the requirements that the participants be fully informed of the potential consequences? Does rehypothecation confer social benefits beyond the private saving of collateral costs?

What Is the "Right" Level of Rehypothecation?

As a first step in answering some of these questions, we have developed some simple models of the process of rehypothecation, and used them to pinpoint the private costs and benefits of the process, and the points where economic inefficiencies can arise. In particular, we show that an important limitation to the efficiency of rehypothecation is the inability of customers to control their counterparties' decisions about what risks to take when collateral is rehypothecated. This inability becomes a problem when collateralized lending takes place with a "haircut" or "margin"—that is, when the value of the collateral no longer matches the value of the loan. In this case, the initial borrower and his counterparty will in general disagree about the acceptable level of risk to incur in rehypothecation.

In order to build structures in which rehypothecation can be analyzed, we have to begin by taking a stand on the economic purpose of collateral.[4] First, and most simply, it serves as a bond (in its absence, the borrower might just walk away from its obligations) or as insurance against credit risk (the lender knows that if the promised repayment is not forthcoming, he can at least recover some of the amount owed by selling the collateral). But collateral also plays a variety of more subtle roles: for example it can serve as a screening mechanism (those who are more likely to repay are more willing to post collateral) or change the bargaining power of the parties.

For the purposes of our study, on the borrower's side we build from another basic rationale for collateral: its use as an incentive device. From this perspective, collateral is a form of "skin in the game": the fear of losing it causes the borrower to work harder to reduce the riskiness of his activities, and ensure his ability to repay. When collateral serves as an incentive device, an important factor in the collateralized loan is the haircut, which is calibrated both to the borrower's riskiness and to the level of effort it is intended to induce in the borrower for adjustments in the risk taking behavior.

One innovation in our analysis of collateralized lending is to incorporate the fact that, when the collateral is held by the lender, the contract must take into account not only the risk of the borrower being unable to repay but also the risk of the lender being unable to return the collateral. Thus any arrangement between borrower and lender will be adjusted to balance incentives with the risks on both sides; we show how haircuts can be tailored in the contract to take this consideration into account.

In any trade, a prime broker can be the lender of the cash leg or the securities leg of any transaction. In principle, the analysis of the contract is similar whichever side the broker takes: the size of the haircut in either direction should depend on the relative riskiness of the two borrowers and the incentives the haircuts are intended to impose. While the trade is ongoing, each party is holding assets (cash or securities) of the other and the values need not be exactly offsetting; in general the "haircut" could go one way or the other.

But this means that from the point of view of the original customer, the riskiness of the broker depends on the deals that are being struck with other customers. This interdependence and the inability of any customer to effectively limit the broker's transactions with other customers means that borrowers may want to limit rehypothecation, by specifying that collateral not be made available for other uses, and instead be segregated in accounts remote from any failure by the broker. For instance, consider a situation where the borrower posts collateral whose value is greater than repayment promised ("overcollateralization")–as risk rises that the lender may fail to return collateral, rehypothecation will generally be less desirable.

In our framework, the economic value to rehypothecation arises from the collateral savings it allows, while the economic cost of rehypothecation arises from the possibility of misallocating collateral in the event of a failure of an intermediary—the possibility that the collateral ends up in the wrong hands. If the value of the collateral is much greater than the amount borrowed, then the temptations for overuse of collateral by the broker is greater—in effect the broker is playing with someone else's money—and the borrowers will be particularly likely to forbid rehypothecation.

Our analysis of the importance of rehypothecation depends on a couple of key assumptions: The first of these assumptions is that the borrower transfers the collateral to the intermediary at the beginning of the contract—this is the case, for example, in repurchase agreements, but it also tends to be the norm in other parts of the shadow banking system, where loans are short-term and large value, and seizing collateral after bankruptcy is difficult and time-consuming.

The second is that, although collateral is liquid, it is not perfectly liquid, in the sense that the collateral asset is of greater value to the initial owner than it is to other agents in the economy. This assumption is necessary for collateralized lending to be of economic value—otherwise, agents would be as well off from selling the asset to gain funds. Differences in the value of the asset can stem from differences in portfolio holdings, differences in expectations about future price movements, differences in future liquidity needs or even legal uncertainty. For there to be a cost to the misallocation of

[3] This idea is the analogy of the well-known notion in economics of the "money multiplier" by which the money supply in the economy as a whole can be greater than the size of the Federal Reserve accounts that form the base.

[4] The literature on the economic function of collateral is vast. Various aspects of the roles listed below are considered by, for example, Mills and Reed (2012); Aghion and Bolton (1997); Boot and Thakor (1994); Holmström and Tirole (1998, 2001; Boot, Thakor and Udell (1991); Berger, Frame and Ioannidou (2016); Agarwal, Green Rosenblatt and Yao (2015); Biais, Heider and Hoerova (2012); Bolton and Oehmke (2014); and Donaldson, Gromb and Piacentino (2017).

collateral, it must also be the case that different agents have better or worse access to the market for collateral assets. For example, prime brokers derive part of their profitability from their superior connections, as other agents prefer to trade through them rather than to find counterparties on their own. In Kahn and Park (2016), we examine the relationship between the value of rehypothecation and the costs of agents participating directly in a market for sale of collateral assets.

Our analysis throws light on several important issues. First of all, it shows how segregation of accounts can reduce, but not eliminate, the problems arising from rehypothecation—in part because the advantages of rehypothecation induce market participants to find work-arounds to segregation. Since the willingness to have one's assets rehypothecated depends on the trust the client has in the middleman, rehypothecation can act as an amplifier of cyclical fluctuations—loss of confidence leads borrowers to forbid rehypothecation, further reducing the liquidity of the market. In an extension, Park (2017) investigates macroeconomic implications, showing that while the decision to stop rehypoythecation worsens the immediacy of the crisis, it speeds recovery, by reducing the ultimate asset misallocation.

By providing a clearer understanding of the economic value of rehypothecation and the key sources of potential inefficiencies in the process, our work can lead to a better design of public policy dealing with rehypothecation, so as to reduce its dangers without destroying its usefulness.

Since the willingness to have ones assets rehypothecated depends on the trust the client has in the middleman, rehypothecation can act as an amplifier of cyclical fluctuations—loss of confidence leads borrowers to forbid rehypothecation, further reducing the liquidity of the market.

References

Agarwal, S., Green, R. K., Rosenblatt, E., and Yao, V. (2015). *Collateral Pledge, Sunk-Cost Fallacy and Mortgage Default, Journal of Financial Intermediation*, 24(4):636—652.

Aghion, P. and Bolton, P. (1997). *A Theory of Trickle-Down Growth and Development, The Review of Economic Studies*, 64(2):151—172.

Berger, A. N., Frame, W. S., and Ioannidou, V. (2016) *Reexamining the Empirical Relation Between Loan Risk and Collateral: Theories of Collateral Liquidity and Types, Journal of Financial Intermediation*, 26:28—46.

Biais, B., Heider, F., and Hoerova, M. (2012). *Risk Sharing or Risk-taking? Counterparty Risk, Incentives and Margins,* ECB working paper.

Bolton, P. and Oehmke, M. (2015). *Should Derivatives Be Privileged in Bankruptcy? The Journal of Finance*, 70(6):2353—2394.

Boot, A. W. and Thakor, A. V. (1994). *Moral Hazard and Secured Lending in an Infinitely Repeated Credit Market Game, International Economic Review*, pages 899—920.

Boot, A. W., Thakor, A. V., and Udell, G. F. (1991). *Secured Lending and Default Risk: Equilibrium Analysis, Policy Implications and Empirical Results, Economic Journal*, 101(406):458—72.

Donaldson, J. R., Gromb, D., and Piacentino, G.(2017). *The Paradox of Pledgeability.*

Greenwood, R. M., Hanson, S. G., and Stein, J. C. (2010). A *Comparative-Advantage Approach to Government Debt Maturity.* Harvard Business School Finance Working Paper, (1680604).

Holmström, B. and Tirole, J. (1998). *Private and Public Supply of Liquidity, Journal of Political Economy*, 106(1):1—40.

Kahn, C. M. and Park, H. (2016). *Collateral Chains and Incentives, The Journal of Financial Market Infrastructures*, 5(1).

Krishnamurthy, A. and Vissing-Jorgensen, A. (2013). *Short-term Debt and Financial Crises: What We Can Learn from U.S. Treasury Supply.* Technical report, Northwestern University.

Mills, D. C. and Reed, R. R. (2012). *Default Risk and Collateral In the Absence of Commitment.* Manuscript.

Park, H. (2017). *Rehypothecation, Collateral Mismatch and Financial Crises*. PhD thesis, University of Illinois.

Park, H. and Kahn, C. M. (2017). *Collateral, Rehypothecation and Efficiency. Journal of Financial Intermediation*, forthcoming.

Singh, M. and Aitken, J. (2010). *The (Sizable) Role of Rehypothecation in the Shadow Banking System,* IMF Working Papers.

Singh, M. (2011). *Velocity of Pledged Collateral: Analysis and Implications.* IMF Working Papers.

Paper: "Institutional Affiliation Does Matter"

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Institutional Affiliation Does Matter

The importance of CLO collateral managers' institutional affiliation*

STAVROS PERISTIANI and JOÃO A.C. SANTOS

Over the last two decades, banks have increasingly used collateralized loan obligations (CLOs) to advance their "originate to distribute" approach to lending. The volume of securitization came to a halt during the financial crisis with the collapse of the subprime MBS sector. However, in contrast with non-agency MBS, CLO issuance has gradually recovered and became a significant source of corporate credit funding.

Despite the considerable volume of corporate loans outstanding in CLOs, we still know very little about the way CLO managers administer their loan portfolios. In our paper, we investigate whether the institutional affiliation of a CLO manager influences the manager's risk appetite and access to information. Consider the case of CLO managers affiliated with banks. They may be more conservative because their parent organizations are subject to prudential regulation and supervision. They may also have access to unique information if their parent bank arranges loans in the syndicated loan market.

Are CLOs of Bank-Affiliated Managers Different?

The key player in a CLO structure is the *collateral manager* (or CLO manager), who is tasked with assembling the CLO portfolio and managing collateral throughout the life of the CLO. The collateral of a cash-flow CLO consists mainly of syndicated term loans, but it may include a small fraction of corporate bonds and other asset-backed securities.

During the buildup phase, the CLO manager enlists an underwriter (CLO underwriter), who takes on the traditional responsibilities of assessing investor interest, selling the securities (CLO notes and equity tranche), and providing liquidity support. The underwriter, in turn, engages a rating agency to determine the seniority tranche structure of the deal. The seniority guidelines of the CLO specify how proceeds from principal and interest payments are distributed among investors.

After the ramp-up period, the CLO enters the reinvestment phase, which is followed by amortization. During the reinvestment phase, which ranges from 3 to 5 years, CLO managers reinvest interest proceeds and principal

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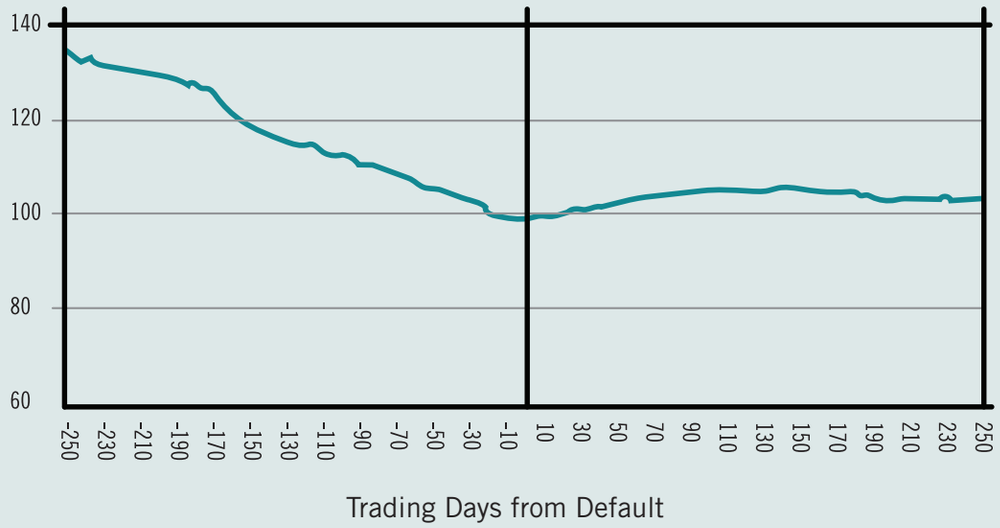
*This note summarizes our article, *CLO Trading and Collateral Manager Bank Affiliation*. The views expressed in this paper are those of the authors and do not necessarily reflect the views of the Federal Reserve Bank of New York or the Federal Reserve System.

Figure 1: Secondary loan trading prices before and after default



Notes: This figure plots the average secondary loan price before and after default. Prices are set at the time of default (t=0) equal to 100. Source: Loan Pricing Corporation.

repayments, and trade assets to take advantage of good investment opportunities or avoid credit risks. In the amortization period, the cash flows are used mainly to pay down the security notes.

CLO managers receive a fixed management fee plus a contingent fee paid only after the equity tranche achieves a certain hurdle rate. CLO managers are bound by a number of operational constraints. In general, they can trade only up to 20 percent of the portfolio's par value each year. They must also meet certain compliance tests (for instance, an overcollateralization asset-liability threshold) and covenants established to protect investors.

CLO managers are usually affiliated with a bank or a nonbank financial institution such as a hedge fund or private equity firm. Institutional affiliation is important because it can influence a manager's trading behavior. For example, the parent organization could face several perils from badly performing CLOs: litigation risks, regulatory risks, negative investor reaction, and loss of business from clients. These problems are likely exacerbated in the case of parent banks because they are subject to prudential regulation and supervision. It is therefore conceivable that CLO managers affiliated with banks have a lower risk-taking appetite.

The nature of the CLO managers' affiliation could also influence the information available to them. Consider the case of CLO managers affiliated with arrangers in the syndicated loan market. Loan arrangers are responsible for collecting financial information on borrowing firms and for monitoring their compliance with covenants, including their financial performance obligations and they are expected to regularly share that information with syndicate members. Arrangers also have access to "soft" information on borrowers that is difficult to transfer to other parties and therefore has the potential to create an informational wedge between them and syndicate participants.

The relationship between borrowers and lenders is bound by confidentiality agreements. However, the rapid growth of the secondary loan market over the past decade has attracted nonbank and unregulated investors and blurred the limits on the disclosure of private information. A 2011 report by Standard and Poor's highlighting a rise in loan price volatility in the secondary market supports anecdotal evidence that nonbank syndicate participants trade on private information. Further, several studies have documented that investors use the private information they gather from participating in the syndicated loan market to trade in other markets. Therefore, CLO managers affiliated with banks may have access to private information with regard to their investments in loans that were arranged by their affiliated bank.

Methodology and Data

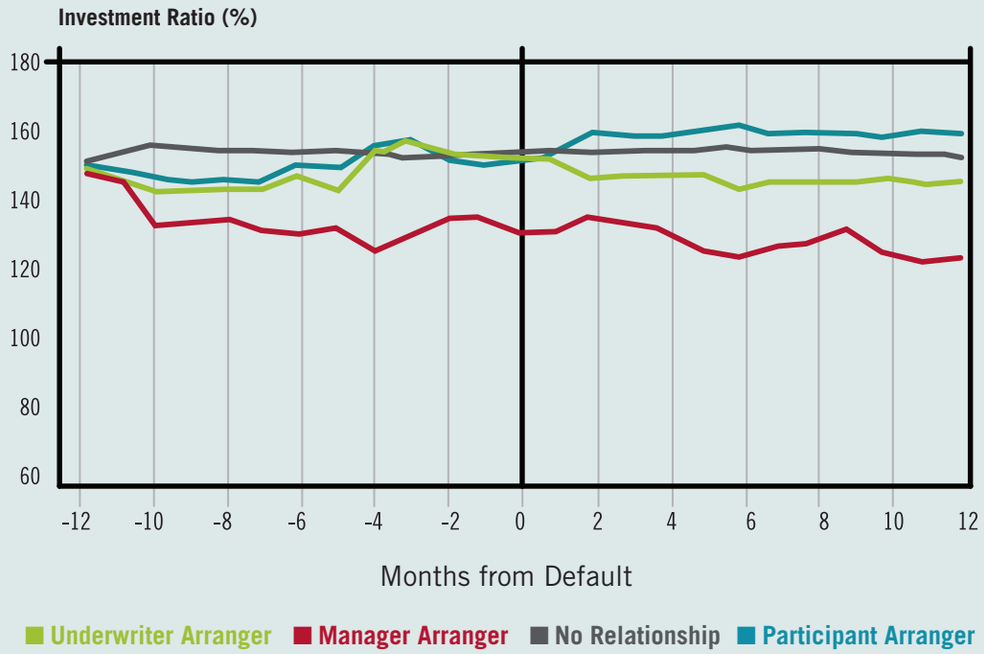
To investigate our hypotheses, we focus on CLOs' trading activity around the time of loan defaults. The default event is revealing because it is associated with an increase in risk and it triggers the release of important information on borrowers. As we can see from Figure 1, which documents the change in price for defaulted loans traded in the secondary loan market 250 trading days before and after default for a balanced sample, there is a monotonic decline in loan prices up until the event of default at which time prices appear to stabilize.

We rely on the measure of cumulative trading activity $R_{tij} = P_{tij} / P_{0ij}$, where P_{tij} and P_{0ij} denote CLO (j) holdings in loan (i) at month (t) and at month (0), respectively. We set the investment ratio at 100 percent at (t=0). Our analysis excludes the ramp-up phase of trading to avoid the unusual trading volatility of that period. We use a regression specification to analyze CLO managers' trading around the event of borrower default, which controls for a set of factors we believe can influence a CLO investment ratio in each security.

To ascertain whether the nature of the affiliation provides the CLO manager with unique information, we consider three possible sources of information: First, the CLO manager is affiliated with the arranger of the defaulting loan. Second, the CLO underwriter was the arranger of the defaulting loan. Third, the CLO underwriter or the CLO manager were participants in the syndicate of the defaulting loan at the time of the loan origination. Arguably, the first case captures the instances in which the CLO manager can obtain the most valuable information about the borrower. The two other possible relationships represent intermediate cases. Finally, we distinguish the cases where the CLO manager (and its bank underwriter)

It is therefore conceivable that CLO managers affiliated with banks have a lower risk-taking appetite.

Figure 2: Predicted investment ratio $\hat{R}_h^t$ before and after default by relationship type



Notes: The figure traces the regression predicted investment ratio around default by the manager-underwriter relationship types. The prediction traces the investment ratio for the sample average for each relationship type.

is neither affiliated with the arranger of the defaulting loan nor was a participant in the loan syndication. In this case, the CLO manager only receives the reports from an *unaffiliated* arranger after it starts its investment on the loan.

We rely on data from Moody's CDO Services database on the composition of CLO investment portfolios over time. We complement these data with information from Capital IQ and Dealscan to ascertain the nature of the relationship between the CLO manager and the members of the syndicate for each loan in the CLO portfolio of collateral.

Our sample consists of 239 CLOs originated between 2007 and 2011 that are arbitrage cash flow or small- to medium-market structures. Our CLOs are invested in more than 5,000 borrowers. Importantly for our purposes, 55 of the 239 CLO managers are affiliated with banks. Equally important, during our sample period (2007–11) marred by the financial crisis, more than 20 percent of the borrowers in the CLO portfolios experienced a default.

Results

Figure 2 depicts CLO managers' responses to borrower distress, that is, the in-sample regression investment-ratio predictions for the four types of CLO managers' information relationships described above. As we can see from that figure, CLO managers without relationships with defaulting borrowers do not appear to have a significant change in trading during the year leading up to the default. For CLO managers with an indirect relationship with defaulting loans, we observe only a small percent decline in distressed loans before default. However, when CLO managers are affiliated with the arranger of the defaulting loan, they gradually lower their investment ratio to distressed firms starting about one year before default. By the time of default, these managers have reduced their exposure by 14 percent.

The differences depicted in Figure 2, while consistent with the idea that CLO managers affiliated with loan arrangers have access to unique information, could also be influenced by other factors. For example, as we can see from that figure, CLO managers affiliated with the loan arranger continue to divest their investments in distressed loans after they default. Given that prices in the secondary loan market stabilize after default (Figure 1), and that these affiliations are predominantly with banks that are the dominant arrangers in the syndicated loan market, the continued sell-off suggests those CLO managers have a different risk appetite.

Indeed, we find evidence consistent with the idea that CLO managers affiliated with banks behave more prudently possibly to avoid adversely impacting their affiliated parent franchise value.

When we compare the pre-default trading of bank-affiliated and nonbank-affiliated CLO managers on loans that they have no relationships with, thus removing private-information biases, we find that bank-affiliated CLO managers are more active in selling distressed loans.

However, this does not appear to be the sole reason behind the trading differences depicted in Figure 2. The reason is that when we compare CLO managers' trading on distressed loans arranged by their affiliated bank with their trading on distressed loans arranged by other banks we find that CLO managers are more proactive in divesting their banks' arranged distressed loans than other unaffiliated arranged distressed positions. Although these results raise the possibility that loan arrangers, and by association their affiliated CLO managers, are more averse to holding their arranged problem loans, overall our analysis is consistent with the thesis that CLO managers affiliated with loan arrangers gain access to unique information on borrowers.

Paper: “Using Bank Culture to Strike a Balance Between Growth and Safety”

Authors: Fenghua Song, Pennsylvania State University and Anjan Thakor, Washington University in St. Louis

Date: December 2015

Using Bank Culture to Strike a Balance Between Growth and Safety

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In our recent research paper (Song and Thakor, 2017), we develop a formal economic framework of bank culture and use it to improve our understanding of how bank executives should think about culture from a growth strategy perspective and how regulators should approach culture from a micro-prudential regulation standpoint.

The issue of bank culture has been front and center in the minds of regulators since the 2007-2009 financial crisis. There are just far too many instances of reckless risk-taking and correlated failures across financial institutions that have imperiled financial stability and expanded the liability of the taxpayer-funded safety net for people to be sanguine about the prospect that history will not repeat itself in some unexpected form in the future. Many now believe that banking failures are not isolated events due to a few bad apples spoiling the barrel—a rogue trader here and there taking unsanctioned risks, for example—but rather they are attributable to *systematic* lapses and failures of organization culture in the financial services industry. The desire to explore culture as a way to achieve better behavioral outcomes arises in part from a recognition of the limitations of relying solely on monetary incentives like compensation contracts and prudential regulatory tools like capital requirements and portfolio restrictions to curb excessive risk-taking. Can culture help where these explicit mechanisms have failed? In a speech in October 2014 at the *Workshop on Reforming Culture and Behavior in the Financial Services Industry*, William Dudley, President of the Federal Reserve Bank of New York, said:

“Improving culture in the financial services industry is an imperative. This endeavor is important in order to ensure financial stability over time, but also to ensure the public trust in our financial system.”

But what is bank culture? In the same speech, William Dudley said:

“Culture reflects the prevailing attitudes and behaviors within a firm. It is how people react not only to black and white, but to all of the shades of grey. Like a gentle breeze, culture may be hard to see, but you can feel it.”

To many people, a firm’s culture is like an intangible asset: you may not see it, but you know it is there and you know it affects you. The recognition of its importance notwithstanding, culture is a nebulous concept—it means different things to different people, which makes it hard to “operationalize” and discuss in concrete terms. However, for formal economic analyses, we need a concrete framework of bank culture.

The framework: Three pillars of Bank Culture

01 Develop a growth-safety tradeoff: Our framework of bank culture rests on three important pillars. The first pillar is the modeling of a resource-allocation problem within the bank. Our view is that corporate culture is a strategic choice, and for banks the most pertinent choice of strategy is between growth and safety. We develop a model wherein a bank needs to motivate its manager to expend (personally costly) effort, and then allocate such effort between growing the business (growth) and lowering the risk (safety). A higher effort allocation to growth means that the manager devotes more of her effort to loan prospecting which increases the probability of making loans and positively affects the top line, and a higher effort allocation to safety results in more careful credit analysis and screening of loan applicants, which reduces default risk and positively affects the bottom line, for any given top line. Safety is thus enhanced by sacrificing growth, and vice versa, so the bank essentially faces a constrained resource-allocation problem in its choice of growth strategy and hence its culture. In our paper, the purpose of developing a particular culture is to increase the effectiveness with which a given growth strategy is implemented. We view this growth-safety tradeoff as an essential aspect of bank culture choice, as emphasized by Ernst & Young in a global survey of banks in 2014:

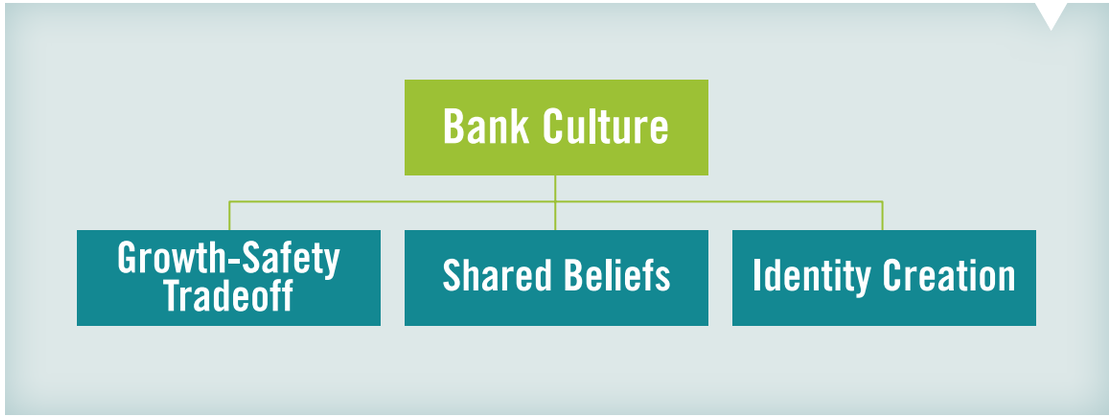
> "The new message this year is the almost universal focus on risk culture, with the emphasis on conduct… At the same time, the industry is trying to deal with a seismic shift in business models caused by the reluctance of investors to accept the lower ROEs resulting from Basel III."

What this means is that while the current bank cultural focus is shifting toward enhanced safety, there is also concern about possibly diminished growth and ROE. Indeed, the tension between growth and safety in banking shows up time and again. There is abundant empirical evidence showing that aggressive credit growth is related to a significant subsequent increase in bank risk.

02 Establish and reinforce beliefs: The second pillar of our framework is the manager a bank could hire and the bank itself may have different beliefs about the quality of the borrower pool. The notion that beliefs play a central role in culture is a familiar theme from earlier work in economics and management, where culture has been defined as shared beliefs or shared preferences. The idea that an important role of bank culture is to align employee beliefs with those that shape the organization's choice of culture is also well recognized by policymakers and regulators. For example, the Group of Thirty (2015) report states:

> "Banks should… develop programs for staff across all areas of the bank, tailored to the bank's circumstances that regularly reinforce what the desired values and conduct mean in practice. Changing behaviors is a developmental program… All employees and all levels of management should adhere to values, conduct, and behavioral expectations."

03 Create identity: The third pillar is the Akerlof and Kranton (2010) notion of "identity economics," based on which we view a firm's culture as creating an identity for its employees, so that a choice of (unverifiable) action by an employee that is not consonant with the firm's culture generates a disutility for the employee. In our framework, if the manager chooses an effort allocation that deviates from the bank's preferred allocation between growth and safety, she may suffer implicit (non-pecuniary) punishments such as denial of promotion or interesting/meaningful task assignments, social ostracism and so on. We can think of this as the bank shaping the manager's "identity." Such actions are ubiquitous in organizations. When an employee's behavior is consistent with the organization's culture, recognition and rewards like promotions follow; the converse is true when behaviors are inconsistent with the culture. This effect of culture essentially promotes "we thinking." A key is that these implicit rewards and punishments can rely on (noisily) observable signals of performance that are not verifiable (by a third party) for explicit contracting purposes (that is, they cannot be used to write compensation contracts), but nonetheless serve as useful indicators for internal implicit disciplining. To implement this, the bank can build an organization with a clear set of rules



and procedures that ensure these rules are followed, and fostering an environment that encourages and rewards internal flag-raising and whistleblowing that help detect managerial behaviors that are incompatible with the organization's culture.

Analysis Uncovers Findings

These three pillars constitute our basic framework of bank culture. Our analysis based on this framework leads to five main findings that we discuss below. The first three findings highlight the main challenges faced by banking regulators, the limitations of explicit economic tools to meet those challenges and, therefore, the need for culture. The last two findings show how bank culture may provide a solution to problems that cannot be fully solved by explicit governance mechanisms like wage contracting.

01 Excessive focus on growth in the banking sector: Our analysis shows that banks tend to focus too much on growth while too little on safety as compared to what is socially optimal. The idea is as follows. To motivate the manager to work hard to expend effort (which will then be allocated between growth and safety), the bank needs to design a managerial wage contract with high pay-for-performance sensitivity; otherwise, the manager would simply shirk. However, a wage contract with high pay-for-performance sensitivity inevitably induces the manager to shift her effort away from safety and toward growth. The high wage is paid only if the manager finds a loan in the first place and the loan does not default subsequently: if no loan is made, the bank cannot tell whether it is because the manager shirked (so no loan is found in the first place) or the manager worked but screened out a bad loan due to high safety standards being applied. Although allocating effort to safety lowers the probability of loan default, it also decreases the probability that the loan is found in the first place (thereby, lowering the chance for the manager to get paid with the high wage). Thus, a compensation contract with high incentive power, which is necessary to elicit managerial effort, also induces the manager to allocate too much effort to growth. This is consistent with the general perception that the banking sector focuses excessively on growth with inadequate safety controls. The novelty of our analysis is that we show that such excessive growth focus exists despite compensation contracts being optimally designed.

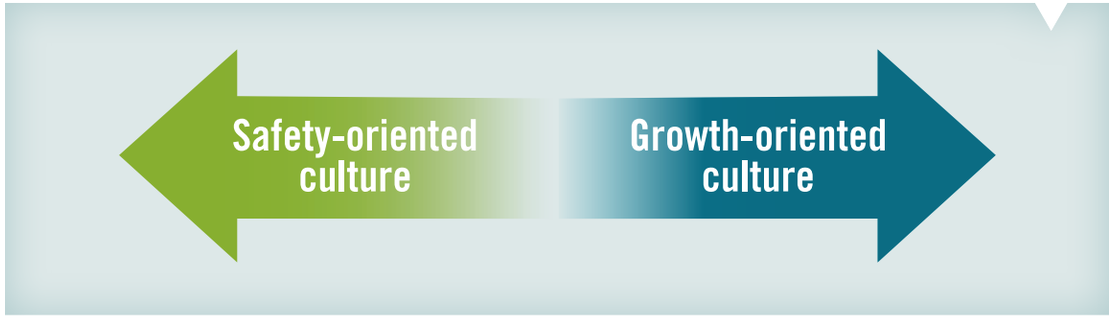
02 Interbank competition and safety nets exacerbate excessive growth focus: Interbank competition and bank safety nets (such as government bailout and risk-independent deposit insurance) exacerbate the aforementioned excessive focus on growth by banks. Competition for loans among banks causes each bank to engage more in growth but less in safety ("herding on growth") to counteract the effect of competition from the other banks. This leads to higher systemic risk in the banking sector. The result also implies that greater competition from non-banks, like shadow banks and P2P lending platforms, will potentially push banks to focus more on growth, which conforms to what is believed by many. In his letter to

JPMorgan Chase shareholders in 2013, Jamie Dimon described shadow banks as one main source of competition. He wrote:

"We really should not call them `shadow' banks—they do not operate in shadows. They are non-bank financial competitors, and there is a wide set of them. They range from money-market funds and asset managers, mortgage real-estate investment trusts and mortgage servicers and middle-market lending funds to PayPal and clearing houses. Many of these institutions are smart and sophisticated…Non-bank financial competitors will look at every product we price, and if they can do it cheaper with their set of capital providers, they will."

Bank safety nets such as risk-insensitive deposit insurance and government bailout funded by taxpayer money cause banks to not fully internalize the increased deposit funding cost associated with their growth inclination, thereby leading to an even stronger focus on growth (consequently, less focus on safety) in the banking sector.

03 Limitation of explicit compensation contracts The discussions above have shown that compensation contracts cannot eliminate distortions due to excessive focus on growth. Recall, the reason is that the pay-for-performance sensitivity built in a compensation contract, which is needed to motivate the manager to work hard, also induces the manager to allocate her effort away from safety and toward growth. To further develop this point, we consider a setting wherein the bank and the manager may have different beliefs about whether the bank should focus more on growth or safety. Suppose the manager is more optimistic about the borrower pool quality than the bank and, hence, is more inclined to pursue growth than what the bank would like. To curb the optimistic manager's (belief-induced) excessive growth tendency, the bank lowers the pay-for-performance sensitivity of the wage contract that it grants to the manager. However, importantly, what prevents the bank from fully undoing the manager's excessive growth tendency is that too low a pay-for-performance sensitivity also weakens the manager's incentive to exert effort, thereby lowering the probability for the bank to locate a loan opportunity in the first place. Thus, the bank is unable to fully undo the manager's growth propensity just with the wage contract, leaving room for culture to reduce this distortion.

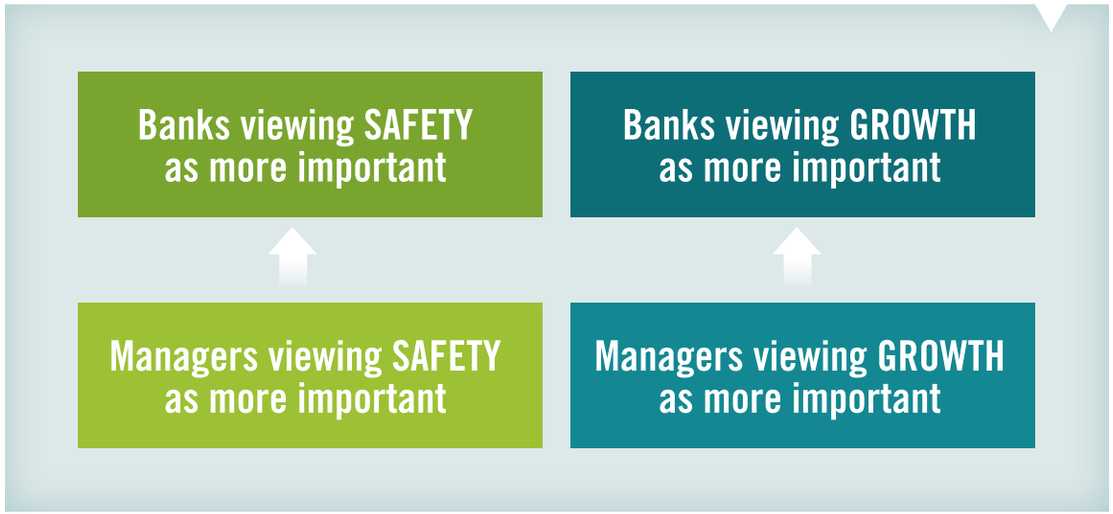


As mentioned earlier, our view is that culture is developed through reward and punishment linked to employee behavior. The bank sets a benchmark allocation of effort between growth and safety: if the benchmark allocation is more tilted toward safety, we call it a safety-oriented culture; if the benchmark is more tilted toward growth, we call it a growth-oriented culture. Then, the bank invests in culture by fostering an environment that encourages and rewards internal flag raising and whistleblowing that help detect managerial effort allocations that are incompatible with the benchmark. This view is consistent with how regulators characterize the role of bank culture. In his speech in October 2014, William Dudley stated:

"To maintain such a culture, senior leaders must promote effective self-policing…A firm's employees are its best monitors, but this only works well if they feel a shared responsibility to speak up, expect to be heard and their efforts supported by senior management."

In what follows, we describe how culture can help reduce the distortion due to the excessive focus on growth.

04 Culture facilitates stable assortative bank-manager matching Consider the previous setting wherein the bank and the manager that the bank could hire may have different views about whether growth or safety is more important for the bank. Obviously, a bank with the pessimistic belief about borrower quality perceives safety as being more important than growth; such a bank wants to hire a manager sharing the same belief. However, beliefs of job applicants for the managerial position are not observable to the bank. This is because in order to get the job, all applicants will claim that they share the bank's view of borrower pool quality. Of course, the bank could spend resources to screen the applicants one by one, but this can be very expensive. A better solution would be for the bank to invest in a strong safety-oriented culture. Such a culture ensures that only pessimistic managers who truly share the bank's belief actually apply for the managerial position, which eliminates the need for the bank to screen. The reason is as follow. Compared to a pessimistic manager, an optimistic manager's (optimistic-belief-induced) effort allocation deviates more from



the pessimistic bank's benchmark allocation with a safety-oriented culture. This means that the optimistic manager is more likely than her pessimistic counterpart to get punished from deviating from the safety-oriented bank's culture, and hence is less likely to apply. Thus, culture can be used as a screening device for the bank to attract only those applicants who share the bank's beliefs, leading to an organization with shared beliefs.

05 Culture is contagious Finally, we consider a setting with multiple banks. We show that a strong safety-oriented culture developed by a subset of banks reduces those banks' growth tendency, causing them to be less aggressive in the loan market. This, in turn, reduces the competition externality exerted on the rest of the banks in the sector, which then also reduces their focus on growth. This, in turn, reduces the competition externality exerted on the initial set of banks that choose to develop safety-oriented culture. This feedback effect among banks creates a virtuous loop, increasing the focus on safety for the entire banking sector, thereby lowering systemic risk and increasing financial stability. Bank culture is thus contagious—a safety-oriented culture developed by a few banks can spread to the other banks. However, the contagious nature of culture cuts both ways: if a few prominent large banks adopt aggressive risk-taking and growth-oriented culture (say, due to too-big-to-fail guarantees), then other banks may well follow suit, and a growth culture dominates the financial system, making the banking sector less stable.

Policy Implications

There are three regulatory policy implications of the analysis. First, if regulators would like banks to have stronger safety-oriented culture, then they should increase capital requirements and/or reduce safety nets (both explicit protections like risk-insensitive deposit insurance and implicit guarantees such as bailing out distressed banks). This means that familiar regulatory tools can be used to influence bank culture, without worrying about how to measure bank culture. Second, our analysis implies a tradeoff in the bank's choice of culture. In choosing a safety-oriented culture, the bank sacrifices growth. This is something for regulators to note. Third, the contagious nature of culture means that regulators need not seek to monitor culture at all banks. Rather, attention can be focused on a subset of highly visible banks.

References

Akerlof, George, and Rachel Kranton, 2010, *Identity Economics: How Our Identities Shape Our Work, Wages, and Well-Being, Princeton University Press*.

Group of Thirty, 2015, *Banking Conduct and Culture: A Call for Sustained and Comprehensive Reform*, Monograph, Washington, D.C. (July).

Song, Fenghua, and Anjan Thakor, 2017, *Bank Culture, Journal of Financial Intermediation*, forthcoming.

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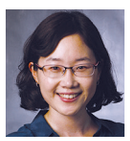

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