

INFORMATION AND INCENTIVES INSIDE THE FIRM: EVIDENCE FROM LOAN OFFICER ROTATION*

ANDREW HERTZBERG JOSE MARIA LIBERTI DANIEL PARAVISINI

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Abstract

We present evidence that reassigning tasks among agents can alleviate moral hazard in communication. A rotation policy that routinely reassigns loan officers to borrowers of a commercial bank affects the officers' reporting behavior. When an officer anticipates rotation, reports are more accurate and contain more bad news about the borrower's repayment prospects. We show that officers are less likely to report bad news when it reflects poorly on their own ability. The threat of rotation improves communication because self-reporting bad news has a smaller negative effect on career prospects than bad news exposed by a successor. Improved communication affects credit supply.

*Columbia Business School; DePaul University, and Columbia Business School and BREAD respectively. E-mails: ah2692@columbia.edu, jliberti@depaul.edu, and dp2239@columbia.edu. We wish to thank the following for helpful comments and suggestions: Patrick Bolton, Doug Diamond, Andrea Eisfeldt, Tom Hubbard, Ulrike Malmendier, David Matsa, Atif Mian, Thomas Philippon, Jonah Rockoff, Morten Sorensen, Scott Stern, Per Stromberg, Catherine Thomas, Jules van Binsbergen, and seminar participants at Berkeley Haas School of Business, Boston University, Chicago GSB, Columbia Business School, Duke Fuqua School of Business, Harvard/MIT Organizational Economics, LBS, LSE, MIT Sloan, Northwestern University Kellogg, NYU Stern, San Francisco Federal Reserve Bank and Stanford GSB; and participants at the CEPR European Summer Symposium in Financial Markets, European Finance Association Annual Meeting, CEPR Banking and Macroeconomy Conference, and NBER Corporate Finance Spring Meeting. We greatly appreciate the superb research assistance of Michael Niessner and Ronald Chan. We especially thank Germán Blanco for helping us to assemble this database. All errors are our own.

In many economic relationships, agents are responsible for self-reporting on the performance of their assigned tasks. Anecdotal and systematic evidence suggest that agents in such relationships hide information that reflects poorly on their own performance. For instance, Arthur Andersen, was indicted for obstruction of justice in 2002 for destroying documentation of its audit of Enron. Lakonishok et al. (1991) show that pension fund managers systematically sell losing stocks from their portfolio before their annual evaluation, and Musto (1999) shows that managers of retail money market funds switch into safe investments around disclosures.¹

It is common for agents who report on the performance of their own tasks to undergo mandated rotation.² The idea that rotation, or the routine reassignment of tasks among agents, may mitigate agency problems has been long discussed in economics. Holmstrom (1982: p. 338) suggests that rotation may provide “independent readings of the circumstances in which tasks are being carried out and thereby reduces moral hazard costs.” New laws that mandate compulsory rotation of audit partners in France, Germany, Italy, and the United States has spurred the policy debate over the effectiveness of rotation during the last decade (Enriques and Volpin (2007)). More recently, investor and regulatory pressure on rating agencies to reduce potential conflicts of interest led Moody’s and S&P to periodically rotate analysts.³ Despite widespread use of rotation policies, no empirical support exists for their effectiveness in providing incentives.

We present evidence that a rotation policy mitigates agency problems in communication. Our results show that an agent has reduced incentives to suppress bad news when the principal can compare her report with that issued by her successor. We use detailed internal records from the operations in Argentina of a large multinational US bank that uses a three year loan officer rotation rule. Each loan officer is assigned to multiple corporate borrowers. Officers

¹Outside finance, it has been documented that police downgrade offence classifications to understate crime incidence (Seidman and Couzens (1974)), and that school teachers cheat in standardized tests to improve student scores (Jacob and Levitt (2003)).

²Mandated monitor rotation exists for audit partners (e.g., Section 203 of Sarbanes Oxley Act of (2002)), boards of directors (Gregory (2001a, 2001b)), US State Government auditors (Schelker (2007)), Foreign Service Officers (Fisher (1966)), and House Committees (Groseclose and Stewart (1998)).

³Lucchetti, A., "S&P Plans Series of Moves to Counter Conflict Claims", *Wall Street Journal*, February 7 2008.

make lending recommendations based on their assessment of each firm's creditworthiness, and communicate their assessment by assigning monthly risk ratings. The rotation rule implies that at the end of the third year of a relationship between a loan officer and a firm, there is a sharp and temporary increase in the probability that the firm is reassigned to a different officer. The rule induces exogenous time series variation in the probability of rotation at the loan officer-firm relationship level that we exploit to identify the effect of rotation on communication.

As a framework for the empirical analysis, we model this environment as one where a loan officer performs a dual role: she is responsible for managing the relationship with a firm so as to maintain high repayment prospects (active monitoring) and obtaining and reporting information about the firm's repayment prospects (passive monitoring).⁴ A loan officer in this setting may suppress unfavorable information about repayment prospects because it will reflect poorly on how she has performed as an active monitor. Rotation can reduce this incentive to hide information by temporarily separating the active and passive monitoring roles. A newly assigned officer is more willing to immediately report bad news because it will not reflect poorly upon her performance. On the contrary, she demonstrates her ability to detect bad information. As a result, the threat of being uncovered by the newly assigned loan officer will reduce the incentive of an incumbent officer to conceal bad news.

We start our empirical analysis by considering two aspects of loan officers' reporting behavior: information content and bias. We measure information content as the ability of the reported internal risk ratings to discriminate between high and low default probability firms. For example, internal ratings are uninformative if firms with a risk rating of 1 (the lowest risk in a scale of 5) default with the same probability as firms with a rating of 2, after controlling for the external risk rating assigned to the same firms by other banks. Similarly, reporting bias is measured as the average level of internal risk ratings, relative to external ones. External ratings are obtained by name-matching every borrower with a Public Credit Registry in Argentina and are observed at the same monthly frequency as internal ratings. Controlling for external

⁴Although we borrow the terms active and passive monitoring from Tirole (2001), several other theoretical papers have explored the incentive problem that exists when agents perform such dual role. See for example Boot (1992), Levitt and Snyder (1997), Laux (2001), Inderst and Mueller (2006).

ratings allows us to further disentangle changes in officer reporting behavior from changes in firm creditworthiness or its predictability.

Our first set of results measures the causal effect of anticipated rotation on these two dimensions of communication. We find that the predictive power of internal ratings declines, and that ratings become more optimistic relative to external ones, during the first two years of a relationship. The optimistic bias disappears and ratings regain their predictive power when rotation becomes imminent. The magnitude of the time series variation in reporting behavior is economically significant. For example, if firms are classified with ratings assigned at the end of the second year of a relationship (when rotation is unlikely), the default probability of firms with a 2 rating is the same as those rated 1, after controlling for external ratings. When firms are classified with ratings assigned at the end of the third year of the relationship (when rotation is imminent), the difference is 28 percentage points. The same temporary changes in informativeness and bias are present in the subset of loan officer-firm relationships that are not reassigned during the third year. This provides strong evidence of the probabilistic nature of the rotation rule, and allows us to verify that the temporary changes in reporting behavior are induced by the ex ante threat of rotation. In addition, we show that the bank's lending decisions become increasingly responsive to changes in internal ratings. We verify that no such pattern exists in firm creditworthiness, demand for credit or the timing of loan terminations.

These results demonstrate that rotation affects the reporting behavior of loan officers, but cannot identify the underlying mechanism. Our stylized reputation concerns framework provides equilibrium predictions that we take to the data. We show that when an officer has overseen a firm for several years and bears some responsibility for its repayment prospects, downgrading the firm has a negative effect on her career. Downgrading a firm during the third year of a relationship results in a 15% decline in the number of firms under the officer's management. In contrast downgrades at the beginning of a relationship do not affect an officer's career, implying that newly assigned loan officers have no reputation incentives to withhold bad news. We show that having bad news exposed by a successor has an effect on assets under management that is two to four times larger than when the incumbent loan officer reveals bad

news herself before rotation. Consistent with career concerns, our results are stronger among younger loan officers, and officers who have played a significant active monitoring role through loan origination.

To our knowledge, this is the first paper to provide direct quantitative evidence that moral hazard limits the effectiveness of communication within the firm. Corporate decisions commonly rely on information produced and reported by privately informed agents. It is often presumed in finance and economics that this information flows without frictions within the boundaries of the firm. For example, Alchian (1969) and Williamson (1970) explain the prevalence of internal capital markets by arguing that these are not subject to the same informational problems that plague external markets. This view is challenged by theories which argue that agency problems constrain communication within a firm (for example, Aghion and Tirole (1997), Dessein (2002), Stein (2002)). However, systematic data on communications inside a firm is seldom available, and, when available, measurement of the amount or quality of information in communications is usually unfeasible. A key advantage in our empirical setting is that it is straightforward to quantify communication, measure its precision, and study its impact on investment. Prior to the present paper, the agency argument has found support indirectly through evidence on the investment activity of internal capital markets in conglomerates (surveyed in Stein (2003)), and the relationship between bank function and organizational design (Berger et. al. (2005), Liberti and Mian (2009), Mian (2006)).

The present paper is also directly related to research on the consequences of reputation concerns of agents responsible for financial information production and investment decisions. Reputational concerns can induce herding and an optimistic bias in analyst reports (Graham (1999); Hong, Kubik, and Solomon (2000); Hong and Kubik (2003)), conservatism among forecasters, mutual fund and hedge fund managers (Ehrbeck and Waldman (1996); Chevalier and Ellison (1997); Brown, Goetzman, and Park (2001); Lamont (2002)), and the continuation of bad projects by managers (Boot (1992), Rajan (1994)). Our results show that organizational design, and in particular rotation policies, can be effectively used to counter the agency problems caused by career concerns. The financial institution that we study applies the rotation policy

to all its loan officers and relationship managers throughout all its divisions in more than 50 countries including the U.S., suggesting that rotation can be valuable in many geographical and economic contexts. The increasingly commonplace use of rotation policies among auditors and analysts hints towards their applicability as an incentive device in a wide range of financial market institutions.

The rest of this paper proceeds as follows. Section I describes the empirical setting and provides a framework for understanding the effect of rotation upon loan officers' reporting decisions. Section II describes the data and the identification strategy. We also use this section to document our motivating fact, the bank's routine use of loan officer rotation, and show preliminary evidence that rotation affects loan officer reporting behavior. Section III presents the empirical results on the effect of rotation on loan officer reporting behavior, and Section IV shows that rotation affects the career incentives of loan officer to communicate. Section V concludes and discusses policy implications.

I. Environment and Theoretical Framework

A. Empirical Setting

We analyze the reporting behavior of loan officers in the small and medium business division of a large multinational US bank operating in Argentina (The Bank). Each corporate borrower in this division is assigned to a single loan officer, and each loan officer is responsible for monitoring multiple firms. All the officers in the small and medium business division are located in the same building. For each firm assigned to an officer, she performs two tasks: 1) recommends an amount of lending and 2) assesses the repayment prospects and communicates this assessment to The Bank by assigning an internal risk rating. The dual role served by loan officers makes this environment ideal for studying the incentive problem that arises when an agent is asked to communicate information that reflects on her own performance.

The scope for agency problems in communication is compounded by the fact that officers

collect private information about the firms they manage.⁵ The officer's assessment of the firm's repayment prospects is based on verifiable (i.e., value of collateral, cash flows, leverage) as well as non-verifiable (i.e., reliability of the financial statements, competence and trustworthiness of the firm's management) information. Both types of information are obtained through the officer's regular personal contact with the borrower and are communicated to The Bank monthly through two different ratings. The *internal risk rating*, assigned by the loan officer making use of all the information available to her. The non-verifiable component of information provides substantial latitude to officers in the assignment of this rating. And a *computer risk rating*, which results from feeding the verifiable information into a proprietary algorithm. The fact that verifiable information must be collected each month to produce this rating limits the officer's discretion over the effort and time she devotes to monitoring the firm.

The Bank uses the ratings reported by an officer for several purposes. At the time of origination, The Bank bases its approval on the history of risk ratings. Once a loan has been extended, rating changes can trigger bank action. A downgrade triggers more frequent monitoring from the officer who will work with the firm to address the identified problem. The Bank may also choose to assign a different officer after a downgrade. Loan covenants are also often contingent upon ratings and can allow The Bank to withdraw credit lines or seize collateral.

We obtained a description of loan officer pay contracts' basic features from the Internal Credit Policies (we do not have access to compensation data). Compensation consists of a fixed wage and a year-end bonus. The bonus amount is determined at The Bank's discretion. The Internal Policies imply that the expected bonus amount is increasing in the total revenue from firms managed by the loan officer, which creates incentives for the loan officer to originate lending. Officer compensation is not tied contractually to the accuracy of ratings. Absent explicit incentives, loan officers are likely to take into account the effect of their rating behavior on their reputation within The Bank and thus the size of the portfolio they will manage in the future.

⁵See for example Petersen and Rajan (1994), Stein (2002), Petersen (2004), and Berger et. al. (2005).

Rather than explicit incentives The Bank uses organizational design to limit the effect of agency problems on ratings. The Internal Credit Policies of The Bank, which apply to its lending operations in all countries and all divisions, state that “the maximum length of a business relationship for Account Managers (AM) is recommended to be 3 years.”⁶ When rotation occurs a borrower is taken from the portfolio of one loan officer and is reassigned to another. Since different firms are added to the loan officers’ portfolio at different calendar dates, rule-induced rotations are staggered for any given loan officer. As a result of the rotation policy an officer can anticipate the timing of rotation for each of the firms under her management. Our goal in this paper is measure the effect of rotation on loan officer reporting behavior. To do this we exploit the reassignments induced by The Bank’s rotation policy, which are plausibly unrelated to changes in firm characteristics.

B. Framework: Loan Officer Reporting Incentives and Rotation Rule

We present a stylized theoretical framework to study how loan officer career concerns will affect the timing and information content of their reporting decisions. We use this to show how rotation will impact an officer’s reporting behavior.⁷ Our goal is derive empirical predictions that will be tested in the paper.

B-1. Set-Up

There are three periods (denoted $t = 1, 2, 3$) and a single officer is assigned to monitor a borrower in each period. One of two officers (labelled x and y) can be assigned to the borrower. The same officer can be assigned each period, $\{x, x, x\}$; we refer to this as “no rotation.” Alternately, the borrower can be reassigned to a new officer at $t = 3$, $\{x, x, y\}$; we refer to this as “rotation.” We assume that x correctly anticipates if rotation will occur.

⁶To our knowledge, there is no prior account of an explicit loan officer rotation policy. Indirect evidence of frequent loan officer rotation exists, especially in small business lending. Scott and Dunkelberg (1999), using US data from the 1995 Credit, Banks, and Small Business Survey, document that respondents have seen an average of 1.7 loan officers in the last three years. Uchida, Udell, and Yamori (2006), using survey data of small and medium businesses in Japan, document that over 92% of the respondents had experienced at least one loan officer turnover during the last three years.

⁷Rotation has been studied in the context of the ratchet effect (see for example Prescott and Townsend (2006)). Also, Max Weber ([1922] 1968) points out that rotation facilitates monitoring within bureaucracies.

To capture the effect of career concerns we assume that each officer can be either of high or low type denoted by $i \in \{h, l\}$. Each officer and the bank share a common prior belief that an officer is of high or low type with equal probability. In our empirical setting an officer plays a dual role: active and passive monitoring (as per Tirole (2001)). Active monitoring captures the officer's role in recommending the amount of new lending to a borrower. We capture this by supposing that in each period the repayment prospects of the borrower can be either good or bad: $\theta^t \in \{\theta_g, \theta_b\}$. We model the effect of x 's skill on this task in a reduced form way by supposing that at $t = 1$ the borrower's true repayment prospects will be good θ_g with probability p if officer x is high type ($1 - p$ if low type) where $p > \frac{1}{2}$.

Passive monitoring captures the role of the officer acquiring information about the borrower's prospects. The borrower's true repayment prospects θ^t are not directly observed by either the officer or the bank. In each period the officer assigned to the loan privately observes a signal s^t of the true repayment prospects. If the borrowers repayment prospects are bad then the officer observes bad news, s_b , with probability q if she is high type ($1 - q$ if low type). Otherwise she observes nothing s_n . Assume $q > \frac{1}{2}$ to capture the fact that high type officers are better passive monitors.

To study the timing of an officer's reporting decisions, we assume that between period $t = 1$ and $t = 2$ the borrower's repayment prospects change with probability $\phi \in (0, \frac{1}{2})$ (for simplicity, we assume they cannot change between $t = 2$ and $t = 3$). If an officer has detected the true prospects of the loan at t she will continue to receive the bad signal as long as she is assigned to the borrower and the borrower's prospects remain the same. Similarly, if an officer fails to detect the borrower's prospects she will continue to receive no signal s_n while θ^t remains unchanged.

After $t = 1$ the repayment prospects of the borrower θ^t evolve randomly, which reflects the fact that the borrower may be affected by positive or negative shocks. In particular we assume that between period $t = 1$ and $t = 2$ the borrower's repayment prospects can change with probability $\phi \in (0, \frac{1}{2})$. For simplicity we assume that repayment prospects cannot change between $t = 2$ and $t = 3$. If an officer has detected the true prospects of the loan at t she will

continue to receive the bad signal as long as she is assigned to the borrower and the borrower's prospects remain the same. Similarly, if an officer fails to detect the borrower's prospects she will continue to receive no signal s_n while θ^t remains unchanged.

The officer's only decision in each period is whether to report to the bank any bad news she has detected. Following Stein (2002), we suppose that an officer who has privately observed bad news s_b can submit a verifiable report of r_b to her superiors. Conversely she can suppress this information and report nothing which we denote by r_n . If the officer observes no news (s_n), she can only report no news (r_n). A report of r_n is not verifiable and hence can be made falsely to conceal bad news. In contrast, officers face limitations in their ability to manufacture bad news. We assume that the officer's sole objective is to maximize the bank's expected assessment of her ability. Motivated by our empirical setting we rule out that an officer is compensated directly based on the reports she makes.

B-2. Equilibrium Reporting and Rotation

In the absence of rotation, career concerns can distort the officer's willingness to report bad news. If x observes the bad signal s_b at $t = 1$, there are two opposing forces that affect the officer's decision of whether to reveal or conceal bad news (reporting r_b or r_n). The officer has an incentive to hide bad news to avoid damaging her reputation as an active monitor. In contrast she has an incentive to report bad news to demonstrate her ability as a passive monitor.⁸ On balance she has incentives to conceal bad news when borrower's repayment prospects are more informative about an officer's type than her ability as a passive monitor ($p > q$). We focus the rest of the analysis on this case.

In the online Appendix, we demonstrate formally that when $p > q$, x will always conceal bad news in the first period to preserve her reputation. When q is low relative to p , the unique equilibrium is for x to always hide bad news.⁹ In this case, her role in affecting the borrower's repayment prospects is far more informative for her type than her ability to detect bad news.

⁸Holmstrom and Costa (1986), Li (2007), Prendergast and Stole (1996), Prat (2005), and Scharfstein and Stein (1990) all highlight a similar mechanism.

⁹Specifically when $q \in [\frac{1}{2}, \bar{q}^{NR}]$ where $\bar{q}^{NR} \equiv p - \phi(2p - 1) \in (\frac{1}{2}, p)$.

In contrast, when q is close to p , x has relatively stronger incentives to reveal bad news and the unique equilibrium is for x to reveal any bad news she detects at $t = 2$ and $t = 3$.¹⁰ She is willing to reveal bad news at $t = 2$ and not earlier (at $t = 1$), because the true repayment prospects of the borrower are less correlated with her type.

Rotation changes equilibrium reporting decisions. Consider first officer y , who is assigned to the borrower at $t = 3$. The borrower's repayment prospects are unrelated to officer y 's ability hence she will report any bad news she can detect. This changes x 's reporting incentives. When x observes bad news at $t = 2$ she knows that with probability $\frac{1}{2}$ officer y will also detect it next period and, if she does, will report that the borrower's repayment prospects are poor. Faced with the threat of exposure by her successor, x has stronger incentives to report bad news herself. By revealing bad news herself, x at least demonstrates her ability as a passive monitor and thus avoids the bank inferring that she has performed poorly in both her active and passive monitoring roles. We formally show in the Appendix that rotation reduces the parameter space for which it is an equilibrium for x to always conceal any bad news she detects at $t = 2$.¹¹ Rotation does not induce an officer to reveal at $t = 1$ because doing so destroys the option value of delaying the report. This option is valuable because with probability ϕ the borrower's repayment prospects will improve and the poor initial performance will never be observed by the bank.

B-3. Empirical Implications

The framework gives rise to two sets of empirical predictions. The first is related to the reporting behavior of the officer. Ratings will be poor predictors of default and will be systematically optimistic during the middle of a relationship when the officer bears significant responsibility for the state of the loan through her past active monitoring ($t = 1$). The ability

¹⁰This equilibrium holds when $q \in [\bar{q}^{NR}, p]$.

¹¹Formally, there exist cutoff values \bar{q}^{R1} and \bar{q}^{R2} such that: $p > \bar{q}^{NR} > \bar{q}^{R1} > \bar{q}^{R2} > \frac{1}{2}$. There exists an equilibrium in which x truthfully reveals any bad news she detects at $t = 2$ if and only if $q \in [\bar{q}^{R2}, p]$. It is an equilibrium for x to always conceal any bad news she detects if and only if $q \in [\frac{1}{2}, \bar{q}^{R1}]$. When $q \in [\bar{q}^{R1}, p]$ or $q \in [\frac{1}{2}, \bar{q}^{R2}]$ the equilibrium is unique. When $q \in [\bar{q}^{R2}, \bar{q}^{R1}]$ then both of these equilibria exist and no other equilibrium exists.

of internal risk ratings to predict default should increase, and the optimistic bias disappear, when the threat of rotation increases at the end of an assignment’s third year ($t = 2$). Following rotation ($t = 3$), the new officer should produce informative ratings without a bias, but the information content should begin to deteriorate again once she starts to bear increased responsibility for the borrower’s repayment prospects. We test this set of predictions in Section III.

The second set of predictions is related to the question of how an officer’s reputation is affected when she reveals bad news about a firm she manages. Downgrading a firm that has been assigned to an officer for several years should have a negative impact upon her career. In contrast, when a newly assigned officer downgrades a borrower, her career should not suffer. Finally, rotation affects the incumbent officer’s reporting decisions through the threat of exposure by her successor. The direct implication is that if a loan is downgraded by a new officer, then the career of the previous officer should be negatively affected. Moreover, that effect should be larger than the reputational cost when x reveals bad news herself so that the threat is effective. Related, if rotation is an effective threat, we expect in equilibrium downgrades around rotation to be more common by incumbent officers before rotation than by their successors. We test this second set of predictions in Section IV.

II. Data and Empirical Strategy

A. Data

Using data from the internal records of the small and medium business division of The Bank we construct a monthly panel of loan officer-firm relationships (relationships). The sample covers the seven-year period from December 1997, when the small and medium business division was created, to December 2004. We observe 1,248 firms and 100 loan officers in 4,191 non-censored loan officer-firm relationships (see Table I). The median firm is observed for 62 months, and the median length of non-censored relationships is 18 months, indicating there is substantial firm reassignment across loan officers in the data (rotation). The number of firms

under management of the median officer on any given month is 10, and the median number of firms under an officer's responsibility that is reassigned in any single month is 3, conditional on any reassignment.¹²

For each firm-month pair, we observe from the internal Bank database the amount of debt outstanding, the fraction of debt that matures within a year, and the risk ratings described in Section I. This data is name-matched with the records of the Argentinean Central Bank Public Credit Registry (CDSF - Central de Deudores del Sistema Financiero) to obtain information on the relationships of the borrowers in the sample with other financial institutions. The CDSF provides monthly information on the amount of debt outstanding and standardized risk ratings issued by every financial institution to every borrower in the sample.

Public access to the CDSF database was withdrawn by the Central Bank between January 2002 and March 2003. To identify the effect of rotation using within-firm estimates we require contemporaneous information on the firm's outcomes with other lenders. For that reason, the analysis is focused on the subsample up to December 2001. The post-January 2002 internal Bank data is used to construct measures of future outcomes in some specifications (i.e., default transition rate, assets under a loan officer's management).

Table I presents the summary statistics of the firm level variables in the analysis sample. The internal Bank record data indicates that the mean outstanding loan amount is \$493,000 (median \$201,000). The median borrower has seven banking relationships, a total bank debt of \$1.3 million, and obtains 17.3% of its bank debt from The Bank. Most debt is short term debt: 87% of the debt outstanding matures in less than one year.

Both the internal and CDSF risk ratings are an integer between 1 and 5 assigned monthly by loan officers to each of their firms (*Internal_RR* and *WExternal_RR* respectively). Ratings of 1, 2, and 3 are assigned discretionarily by the officer and reflect the probability of default of the loan, with 1 representing the lowest probability of default and 3 the highest. Ratings of 4

¹²We found no evidence either in the manuals or in the data that firm assignment to officers is based on firm location or industry. 90% of the relationships that end during the sample period are due to loan officer rotation. The rest is due to firms exiting the sample and loan officer promotion. A substantial fraction of rotation occurs away from the three year rule, often for reasons related to the current creditworthiness of a borrower.

and 5 are not discretionary and must be assigned to firms in default (with repayment delays of principal or interest exceeding 90 days, or in foreclosure). The average internal risk rating in the sample is 1.5 (median 1), and the average rating assigned by other banks weighted by the amount of debt outstanding is 1.4 (median 1). The computer risk rating is an integer between 0 (best) and 29 (worst), with a median of 17.

The fraction of observations in the panel that is in default, as measured by the internal risk rating, is 8.6%. Conditional on not being in default, the probability of defaulting within 12 months is 12.8% (*Default12*). Conditional on a firm being rated 1, 2 and 3, the probability of defaulting in 12 months is 10%, 37% and 49% respectively. This indicates that risk ratings on average are informative about the default probability. Also, the default probabilities for firms with ratings of 2 and 3 indicate that not all firms with a poor risk rating default (the probability of defaulting within 24 months is 44% and 56%, respectively). This suggests that the likelihood that a borrower’s repayment prospects improve after a poor initial assessment is non-trivial and highlights the option value of delaying the report of bad news.

B. Identification: Three-Year Rotation Rule

We test whether the anticipated threat of rotation induces officers to make informative (negative) reports about the creditworthiness of borrowers under their management. The main identification problem involves distinguishing changes in an officer’s reporting behavior that are due to rotation from those due to variation in a firm’s creditworthiness. A second identification problem stems from our interest in measuring reporting behavior changes *in anticipation* of rotation. Identification thus requires variation in rotation that is uncorrelated with firm creditworthiness, and whose timing is predictable both by officers and the econometrician.

Figure 1 shows that The Bank’s internal rules provide such a potential source of variation. The three-year rotation policy induces an increase in the unconditional probability of rotation between months 34 to 36 of a loan officer-firm relationship. The monthly hazard rate of rotation is below 5% throughout the first 33 months of a relationship, and above 15% during the last three months of the third year. Conditional on reaching 34 months, a relationship is terminated

with a 58% probability within the next three months. The hazard rate then drops by half after a relationship’s 36th month.

The timing of the increase in the unconditional probability of rotation induced by the rule is entirely driven by the date the relationship initiated. It is thus plausible that the timing of rotation is unrelated to time-varying firm characteristics. We corroborate this in the on-line appendix Table A, where we show that conditional on a relationship reaching 33 months, the probability of rotation during the following three months cannot be explained by observable firm or loan officer characteristics. We show additional evidence in the results section that rotation during the end of the third year was unrelated to rating informativeness and bias. Also, the timing of the increase is predictable. Thus, the rule-induced variation in the probability of rotation provides a unique setting to identify the causal impact of rotation on loan officer reporting behavior.

C. Implementation

We analyze the changes in loan officer reporting behavior when the probability of rotation increases and subsequently declines as the relationship with a firm approaches 3 years. A rule-induced quarter of high rotation is determined for each loan officer-firm relationship as follows. Assume that an officer and a firm are paired at time $t = t_0$. The rule will induce high probability of rotation for t between $t_0 + 34$ and $t_0 + 36$, conditional on no rotation occurring before $t_0 + 33$. This period is labeled the *high rotation quarter*. Predicted high rotation quarters begin in the third quarter of 2000 and are scattered over time (between 16 and 59 per calendar quarter).

The key analysis variable of interest, quarters-to-rotation (q_R), measures the time, in quarters, elapsed before and after the high rotation quarter. Time is measured in quarters for ease of exposition, since q_R can be normalized to zero at the high rotation quarter. We follow the convention that q_R is negative (positive) for quarters before (after) the high rotation quarter, such that $q_R = -s$ ($q_R = s$) refers to s quarters before (after) the high rotation quarter.

By construction, q_R is defined only for the subsample of firms with relationships lasting 33 months or longer. Column 1 of Table II shows the number of month-firm observations per

quarter to rotation in the subsample of relationships for which q_R is defined (265 relationships). The number declines after $q_R > 0$ because some relationships reach the high rotation quarter close to the end of our analysis sample. Note that q_R continues to be defined regardless of whether rotation occurs at the high rotation quarter or afterwards. Column 2 of Table II shows the number of actual rotations that occur in each quarter to rotation for the same subsample.

We can estimate the effect of rotation locally for relationships that reach at least 33 months. We verify in several specification tests that selection on relationship duration does not drive our results. However, we cannot extrapolate the impact of rotation at other relationship lengths or ascertain the counterfactual behavior of loan officers in the absence of a rotation policy. For this reason, we do not derive normative implications about an optimal rotation frequency. Also, due to CDSF sample attrition we cannot obtain within-firm estimators after December 2001. For this reason we limit the analysis to six months after the quarter of high rule-induced rotation. Since attrition is solely determined by the starting date of relationships, it is unlikely to be systematically related to outcomes or to introduce bias.

Table II shows how two features of officer reporting behavior vary with quarter-to-rotation. First, the correlation of internal risk ratings (*Internal_RR*) and the probability of defaulting in 12 months (*Default12*) is shown in column 3. The correlation is not significant three or four quarters before the high rotation quarter ($q_R = \{-3, -4\}$), but it is positive and significant during the two quarters before, and the quarter of high rotation ($q_R = \{-1, -2, 0\}$). The correlation increase is statistically significant at the 1% level (Table II, column 2). The correlation coefficient then drops, eventually becoming insignificant two quarters after the high rotation quarter. This stylized pattern indicates that officers produce internal risk ratings that are better predictors of default at the end of a relationship's third year. Next, column 5 of Table II shows the average level of ratings by quarter-to-rotation, and column 6 the differences in average ratings with respect to the high rotation quarter. Risk ratings are on average significantly higher, indicating higher default risk, during the two quarters before the high rotation quarter.

These patterns imply that officers assign worse ratings, and these ratings are better predic-

tors of default, at the end of the third year of a relationship. To test whether these patterns hold after controlling for time effects and unobserved cross sectional heterogeneity we estimate the following random effects probit specification:¹³

$$\Pr(Default12_{it} = 1|.) = \Phi \left[\begin{array}{c} \sum_{s=-8}^2 1[s = q_R] (\beta_s Internal_RR_{it} + \zeta_s WExternal_RR_{it}) + \\ \beta Internal_RR_{it} + \zeta WExternal_RR_{it} + \\ \alpha_{Loan_Officer} + \alpha_{Industry \times t} \end{array} \right] \quad (1)$$

The outcome of interest is the probability of entering default in one year. The explanatory variable of interest is the internal risk rating $Internal_RR$. We allow the coefficient on internal risk rating to vary with quarter-to-rotation (β_{q_R}) by interacting $Internal_RR$ with a set of quarter-to-rotation indicators. This specification allows us to estimate how rating predictive power changes with quarter-to-rotation, while imposing no structure in the time variation pattern. Due to the CDSF sample restrictions we limit the analysis to the eight quarters before, and two quarters after the rule-induced high rotation quarter ($q_R \in [-8, 2]$). The parameters are indexed using a Q next to the corresponding quarter-to-rotation to emphasize their quarterly nature. For example, β_{-1Q} denotes the parameter corresponding to one quarter before the high rotation period.

We add the weighted average external risk rating $WExternal_RR$ and its interactions with q_R as controls. Thus, the coefficient on internal ratings, β_{q_R} , measures the marginal predictive power of the ratings assigned by a loan officer in The Bank relative to the external ratings assigned to the same firm, and at the same time, by other banks. This specification controls for all firm-level time-series variation in creditworthiness or its predictability.¹⁴ Only variation that is specific to the relationship between the firm and The Bank will influence the estimation (i.e. loan officer rotation). As additional controls, the specification includes loan officer and industry-

¹³We present probit results because they allow obtaining marginal probability estimates. The patterns in rating informativeness with quarter-to-rotation are qualitatively unchanged when unobserved firm heterogeneity is accounted for using a conditional logit (or a linear probability model with firm fixed effects).

¹⁴The correlation between internal and external risk ratings is 0.78 in the sample, which rules out concerns of multicollinearity.

calendar month dummies. These controls take into account potential loan officer heterogeneity in rating style or ability, and time-varying industry-specific shocks to default rates or the ability of ratings to predict default. Although the effect of rotation is measured only for the subsample of relationships lasting at least 33 months, efficient estimation of the parameters in the probit model calls for the use of the full sample of firms. We show that using the full sample does not alter the results.

We use a similar specification to test whether the average level of ratings changes with q_R :

$$\begin{aligned}
 Internal_RR_{it} = & \sum_{s=-8}^2 \gamma_s \cdot 1[s = q_R] + \psi WExternal_RR_{it} + \\
 & \alpha_i + \alpha_{Loan_Officer} + \alpha_{Industry \times t} + v_{it}
 \end{aligned} \tag{2}$$

The dependent variable is the internal risk rating $Internal_RR$, and the right hand side includes a full set of quarter-to-rotation dummies. The estimated parameters on these dummies, γ_{q_R} , represent the average internal rating for every quarter-to-rotation $q_R \in [-8, 2]$. In addition to the controls in specification (1) we include firm fixed-effects to control for unobserved firm heterogeneity.

III. Effect of Rotation on Reporting Behavior

In this section we study the effect of rotation on loan officer reporting behavior and bank lending decisions. We defer evidence on the mechanism which drives this reporting behavior until Section IV.

A. Information Content of Ratings

The coefficients in specification (1) estimated on the full sample are presented in column 1 of Table III. All risk ratings are standardized for estimation to facilitate interpretation, and standard errors are clustered at the firm level to account for serial correlation. The coefficient on the risk rating without interactions with q_R , β specification (1), represents the baseline explanatory power of risk ratings on default probabilities in the sample of relationships that do

not reach 33 months. The baseline estimate, 0.24, implies that firms with a risk rating of 2 are 5 percentage points more likely to default than firms with a risk rating of 1. The interaction terms, β_{q_R} , represent differences in predictive power of ratings relative to this baseline (i.e., $\beta_{q_R} = 0$ implies that the predictive power in quarter-to-rotation q_R is not different from the baseline). Higher values of β_{q_R} imply that differences in ratings across firms are more informative about future default probabilities. An estimate of $\beta_{q_R} = 1$ implies that a firm with a rating of 2 is 28 percentage points more likely to default than a firm with a rating of 1.

To ease interpretation we plot the estimated β_{q_R} and their 95% confidence intervals in Figure 2.a. The plot features three distinct periods. In the first, from early in the loan officer-firm relationship and up to four quarters-to-rotation, rating informativeness is declining: the point estimates of β_{q_R} go from positive and significant to negative and not significant during this period. Pairwise comparisons of the coefficients indicate that the decline is significant at the 1% level. This is true also when the estimates are obtained solely from the subsample of firms with relationships lasting 33 months or longer (Table III, column 2).

The point estimates indicate that the decline is also economically important. The difference in the probabilities of default between firms with a rating of 1 and a rating of 2, decreases from 20 percentage points at eight quarters-to-rotation (the end of the first year of the loan officer-firm relationship), to 0 at four quarters prior to rotation (end of the second year). The decline represents more than two-thirds of the average difference in default rates between firms with a 1 rating and a 2 rating (27 percentage points, see Table I). The ability of internal risk ratings to discriminate between firms with high and low default probabilities decreases substantially between the first and second year of a loan officer-firm relationship.

The second period in the graph begins at four quarters-to-rotation, when the declining trend in rating informativeness reverses. Pairwise comparisons of the point estimates indicate that β_{q_R} increases significantly during the last year of the relationship, reaching a peak around the rule-induced high rotation quarter. During the third year of a loan officer-firm relationship, the difference between the default probability of firms with a rating on 1 and a rating of 2 increases by 28 percentage points.

The findings suggest that imminent rotation induces loan officers to produce more informative reports about a firm’s creditworthiness. The empirical specification, which controls for the external ratings assigned to the same firms by other banks, insures that the observed change is due to a change in the reporting behavior of the loan officer and not firm-level shocks. We verify at the end of this section that the observed pattern is not driven by changes in firm default rates or creditworthiness, or the timing of loan terminations. Also, the non-monotonic pattern in informativeness observed throughout the relationship is unlikely driven by the loan officer learning about firm creditworthiness through experience. Such learning process would predict a gradual increase in the informativeness of reports, and not an abrupt trend change during the last year of the relationship.

Column 3 of Table III verifies that the observed informativeness pattern does not arise from variation in loan officers’ workload or other shocks their productivity. These may result, for example, from time series variation in the number of firms under an officer’s management that is induced by the rotation rule. We introduce a full set of loan officer-month dummies in specification (1) to control for loan officer shocks, and the informativeness pattern in Figure 2 remains unchanged.

We explore whether the observed patterns are related to the non-verifiable component of the information communicated by loan officers through internal risk ratings. We estimate specification (1) using the computer risk rating, which is based on verifiable information, as the dependent variable. The point estimates, reported in column 4 of Table III, have no observable pattern around the high rotation quarter. This result implies that the observed informativeness patterns occur due to changes in non-verifiable information, where there is scope for agency problems in communication.

The previous result also indicates that officers do not systematically vary the intensity with which they collect verifiable information. If there are strong complementarities in collecting verifiable and non-verifiable information, i.e., because both entail considerable interaction with the firm, this result suggests that the amount of information possessed by loan officers does not vary over time. This would imply that the observed changes in rating informativeness

arise because officers withhold information they possess, and not because they do not collect information in the first place.

The third and final period in the graph begins after the high rotation quarter, when rating informativeness declines again. Recall that the plot follows the set of firms that reach 33 month relationships with a loan officer, even if the loan officer is reassigned during the high rotation quarter. Thus, the informativeness estimates after the high rotation quarter reflect ratings reported by newly assigned loan officers (58%) and incumbent loan officers that were not reassigned. We turn to the analysis of the post-rotation period in next subsection, when we look at the informativeness of the rotation and no-rotation groups separately.

A-1. Ex ante Threat of Rotation: No-Rotation Subsample

If new loan officers are more likely to make mistakes or make conservative lending recommendations at the beginning of their assignments, then the assignment of a new loan officer can directly affect a firm's repayment prospects. Under this interpretation, the increase in rating informativeness prior to rotation may occur because the incumbent loan officer correctly predicts this "new officer effect." We explore this interpretation by looking at the subset of relationships that are not turned over during the high rotation quarter. Figure 2.b shows that the estimated coefficients on this subsample of firms follow the same pattern as in the full sample prior to rotation (tested formally in column 6 of Table III). This result rules out the possibility that the actual incidence of rotation drives the documented patterns in rating informativeness. Instead, it shows that it is the anticipated threat of rotation that induces loan officers to produce more informative ratings.

Furthermore, there is no statistically significant difference in the time series evolution of the average rating informativeness of the rotation and no-rotation groups (Table III, column 6). This demonstrates that conditional on surviving 33 months, the probability of rotation during the high rotation quarter is unrelated to rating informativeness. The parallel trends also demonstrate that unobservable firm characteristics associated with the dynamics of informativeness are, on average, balanced between the two groups. Overall, this represents strong

evidence that the rotation rule is effectively random, in the sense that the selection into rotation induced by the rule is orthogonal to officer reporting behavior or lending outcomes.

Figure 2.b shows a second trend change in rating informativeness at the high rotation quarter. The upward trend in informativeness just prior to rotation stops, and flattens out, at the high rotation quarter. This implies that the upward trend in informativeness is temporary even when the firm is not reassigned to a different loan officer during the third year of a relationship. Again, this pattern is unlikely driven by learning through experience, which would imply the upward trend to continue past three years. Further, the increase and subsequent decline in the trend of informativeness coincides with the temporary increase in the hazard rate of rotation documented in Figure 1. These findings further corroborate the observed patterns in the informativeness of reporting behavior are driven by the threat of rotation.

Our finding that ratings are relatively uninformative two years into a relationship begs the question of whether the three year frequency is optimal. In other words, why not increase the rotation frequency and prevent uninformative reports? The most likely explanation is that rotation involves substantial costs. Loan officers may have specific knowledge about the borrower's creditworthiness that is difficult to communicate and is lost when she is reassigned. Further, the incentives of loan officers to invest in gathering such information may be diminished by short relationships. The estimates on the no-rotation subsample can be used to assess these costs empirically. Note that because selection into rotation during the high-rotation-quarter is unrelated to rating informativeness, post-rotation interaction coefficients in column 6 of Table III can be interpreted as differences-in-differences estimators of the effect of a new officer on ratings' informativeness (see Abadie (2005)). The estimated interaction coefficient is not significant one quarter after the high-rotation-quarter, but positive and significant two quarters after. Consistent with substantial rotation costs, the estimates suggest that newly assigned loan officers can produce informative ratings in the short run, but are at a disadvantage relative to incumbent ones when interpreting new information about firm creditworthiness.

B. Bias in Ratings

We now show that the documented change in rating informativeness comes from suppressing bad news. Using specification (2) we measure how average risk ratings change with q_R . The point estimates and 95% confidence intervals of the average ratings are plotted in Figure 3.a. Three periods can be identified in the plot. In the first one, for q_R between -6 and -8, average risk ratings are declining. Pairwise comparisons of the estimated averages indicate that the differences between consecutive quarters are statistically significant at the 1% level. This result implies that firms are upgraded on average, relative to the external rating. It also implies that the decline in rating informativeness documented in the previous section is due to a systematic misclassification of high default probability firms with low risk ratings. Risk ratings build up an *optimistic* bias during the first two years of the officer-firm relationship, in the sense that ratings systematically under-predict default.

The second period begins at $q_R = -4$, when average risk ratings sharply increase. Pairwise comparisons of consecutive quarters indicate that the average risk ratings increase between $q_R = -4$ and $q_R = -2$ at the 1% confidence level. The point estimates (Table IV, column 1) increase by 0.12 during the year before the high rotation quarter. Given that the standard deviation of ratings is 1.1, this implies that rotation induces downgrades to 13% of the firms towards the end of the third year of a relationship (assuming 1 integer downgrades). This pattern indicates that firms are on average downgraded during the third year of the relationship, as the informativeness of ratings increases. It implies that the optimistic bias built up in ratings during the first two years of the relationship is reverted during the third year, as high default probability firms are correctly classified with high risk ratings. Finally, there is a trend break at the high rotation quarter, when the upward trend in average risk ratings stops. This implies that no additional systematic downgrades occur after the threat of rotation subsides. Again, this coincides with the informativeness pattern reported above.

As before, we confirm that the same pattern in average ratings is present among the rotation and no-rotation subsamples (Figure 3.b. and columns 2 and 3 of Table IV). The overall results indicate that loan officers tend to systematically misclassify high default probability firms with

low risk ratings during the first two years of a relationship. The increase in ex ante threat of rotation during the third year induces loan officers to reveal bad news about the creditworthiness of firms.

C. Additional Identification Tests

We provide two additional pieces of evidence to validate our identification strategy. First we corroborate that other outcomes at the firm and relationship level do not vary with quarter-to-rotation. Appendix Table B shows that the average rating assigned by other banks to firms in our sample does not vary significantly as the high rotation quarter approaches (column 1). Similarly, lending by other banks does not vary by quarter-to-rotation (column 2). This implies that firm creditworthiness and demand for credit are not significantly correlated with our right-hand side variable of interest after controlling for industry-month dummies, and firm and loan officer heterogeneity. At the relationship level, we corroborate that the probability of default and the fraction of debt with a maturity less than a year do not vary with quarter-to-rotation (Table B, columns 3, 4, and 5). This implies that the results are not driven by systematic changes in the probability of default or in the timing of loan terminations related to the three-year rule.

Second, we repeat the analysis selecting relationships that last to 21 months (instead of 33) to rule out that our results are driven by relationship selection. We define the last quarter of the second year of a relationship as a placebo high rotation quarter, and use it to construct a *placebo quarter-to-rotation* variable. When placebo quarter-to-rotation is 0, actual quarter-to-rotation is -4 . Placebo quarter-to-rotation is defined for every relationship that lasts at least 21 months. Column 1 of Table C of the Appendix shows the estimates of specification (1) using the placebo quarter-to-rotation variable. For comparison, we report the estimates using the actual quarter-to-rotation over the subsample of relationships that last at least 33 months in column 2. The results are independent of firm selection: rating informativeness declines during the second year of a relationship and increases during the third regardless of the subsample choice.

D. Information and Capital Allocation Decisions

We now explore whether the increased precision of ratings reported by loan officers is incorporated in lending outcomes ultimately approved by The Bank. Risk ratings are a key input for bank capital allocation decisions and we expect the amount of credit to be more sensitive to changes in ratings when the information content of ratings increases.

The sensitivities of lending to changes in internal ratings by quarter-to-rotation are obtained using the following firm fixed-effects specification:

$$\begin{aligned} \ln(\text{debt_Bank}_{it}) = & \sum_{u=-8}^2 1[s = q_R] (\theta_s \text{Internal_RR}_{it} + \zeta_s \text{WExternal_RR}_{it}) + \\ & + \vartheta \ln(\text{debt_othbanks}_{it}) + \theta \text{Internal_RR}_{it} + \zeta \text{WExternal_RR}_{it} + \\ & + \alpha_i + \alpha_{\text{Loan_Officer}} + \alpha_{\text{Industry} \times t} + \nu_{it} \end{aligned} \quad (3)$$

The dependent variable is the amount of credit allocated by The Bank to firm i at month t (in logs). The right hand side variable of interest is the internal risk rating, interacted with a full set of quarter-to-rotation dummies. The coefficients on these interactions represent the lending semielasticity to changes in the rating, after controlling for unobserved firm heterogeneity. We also include the external risk ratings interacted with the quarter-to-rotation dummies and the total amount of credit of firm i with other banks in the financial system at time t (in logs). These variables control for firm-specific time series variation in the demand for credit or firm creditworthiness. As before, a full set of loan officer and industry-month dummies are included.

The estimated lending sensitivities to internal risk ratings by quarter-to-rotation, θ_{qR} , are shown in Table V. As in specification (1), these interaction terms represent differences relative to the baseline sensitivity, θ , reported on the first row. A negative point estimate indicates that the same firm downgrade, i.e., an increase in the risk rating from 1 to 2, leads to a larger decline in The Bank's amount of lending. The point estimates of the interaction terms are not significant during the first two years of a relationship, negative and significant during the year before the high rotation quarter, and not significant again afterwards. This pattern indicates that internal ratings and the credit allocation are significantly correlated precisely at

the time when rating’s informativeness is increasing. The economic magnitude of the change is large: lending sensitivity to rating changes increases by 2 to 4 times during the year before the high rotation quarter. The evidence is consistent with The Bank incorporating the additional information in internal credit ratings induced by rotation into lending decisions.

IV. Rotation and Incentives: Career Concerns

The results so far demonstrate that rotation affects the reporting behavior of loan officers, but cannot pin down the underlying mechanism. In this section we provide direct evidence that loan officer career concerns discourage reporting bad news, and that this incentive problem is mitigated by rotation. We take three equilibrium implications of our career concerns account of rotation of Section I to the data. First, we test whether the reputation of an officer is hurt when she downgrades a firm later in an assignment. We argued that an officer has incentives to withhold bad news when she is responsible for the state of the loan because revealing bad news lowers The Bank’s assessment of her active monitoring ability. Second, we verify that a loan officer’s reputation is not adversely affected when she downgrades a firm early in an assignment, thus removing her incentive to misreport. Finally, we test whether the threat of being uncovered by a successor provides incentives to an incumbent officer to reveal bad news at the end of an assignment. Specifically, we expect that when a successor downgrades a firm right after rotation, the incumbent officer’s reputation suffers more than when the incumbent downgrades the firm herself.

These predictions motivate the following specification:¹⁵

$$\ln(A_{jt}) = \theta_1 [\#DGPRES_{jt-6}] + \theta_2 [\#DGPOST_{jt-6}] + \theta_3 [\#DGSUCC_{jt-6}] + \gamma X_{jt} + \alpha_j + \alpha_t + v_{jt} \quad (4)$$

The left hand side variable is a measure of assets under management of loan officer j at time

¹⁵Follows from extending the model in Section I to an environment where N signals are released about the loan officer’s type. The linear specification follows from the assumption that asset allocations are proportional to the log likelihood ratio of the posterior about an officer’s type, which is linear in the log likelihood of the prior (accounted for by fixed effects) and the number of signals of each kind (good or bad).

t (in logs). Following the logic in Berk and Green (2004) we use the assets under management of an officer as a proxy for The Bank’s posterior beliefs about her monitoring ability. Two measures of assets under management are used: the number of firms and the total amount of loans outstanding under the management of a loan officer.

The three variables of interest on the right hand side count the number of: downgrades at the end of an assignment, downgrades at the beginning of an assignment, and downgrades by a successor.¹⁶ We focus on downgrades that occur during the six months before and after a high rotation quarter because the timing of rotations during this quarter are anticipated by the loan officer. $\#DGPRE_{jt}$ and $\#DGPOST_{jt}$, count the number of times up to time t that loan officer j has downgraded a firm during the six months before and after a high rotation quarter respectively. $\#DGSUCC_{jt}$ counts the same downgrades as $\#DGPOST$ but adds to the count of the loan officer managing the firm *before* the high rotation quarter. The descriptive statistics of the three counts are presented in Table VI.

The estimated coefficients of (4) are shown in Table VII. All standard errors are estimated allowing for clustering at the loan officer level. All downgrade counts are lagged six months to allow for a response time between changes in reputation and the reassignment of assets. The results that follow are robust to the lag choice. We include loan officer fixed effects and month dummies (additional controls are discussed below). The fixed effects specification accounts for unobserved loan officer heterogeneity, stemming, for example, from age or experience, and the month dummies account for common shocks to assets under management in the cross section.

The point estimate on the number of times an officer downgrades a firm before the high rotation quarter ($\#DGPRE$) is negative and significant in all specifications. This indicates that when an officer downgrades a firm at the end of a relationship her future career suffers. We verify that downgrading a firm seven to twelve months before the high rotation quarter, $\#DGPRE_{-12}$, also leads to a decline in future assets under management (see Table VII, column 3). In contrast, the sign of the coefficient on $\#DGPOST$ can be positive or negative,

¹⁶All counts are defined solely on downgrades to ratings of 2 or 3 to avoid mechanical changes in the variables due to defaults or foreclosures.

but the point estimate is insignificant in all specifications. This implies that downgrading a firm at the beginning of a relationship does not damage an officer's reputation.

The comparison of the point estimates has three important implications for our analysis. First, the fact that an officer's reputation suffers when she reports bad news after the first six months of her assignment underscores the source of the agency problem. In terms of our theory, an officer's active monitoring role is more informative for her type than her passive monitoring role ($p > q$), which creates the basic incentive to hide bad news. The negative impact on her career is increasing in the time she has been assigned to the firm, as she bears more responsibility for the repayment prospects of the borrower. These facts are at odds with alternate accounts of the source of an officer's incentive to underreport bad news (e.g., collusion, effort). By these accounts, a bad news report in the middle of a relationship is a signal of good behavior, which is hard to reconcile with the finding that such reports hurt the officer's career.

The second implication is that an officer has strong incentives to reveal bad news early in her assignment. If a new officer were to conceal bad news and be forced to reveal it later, her career would suffer. In contrast, revealing bad news at the beginning of an assignment bears no consequences on her career. Finally, these results are inconsistent with accounts of rotation based on the assumption that an agent is unaffected by information she reveals at the end of her assignment (e.g., Prescott and Townsend (2006)).

Now we turn to the estimated parameter on the proxy for number of downgrades by a successor, $\#DGSUCC$. The point estimate is negative and significant in all specifications, indicating that an officer's future assets under management are negatively affected when a firm she managed is downgraded by a successor. Moreover, the magnitude of the coefficient is four to five times larger than that of the coefficient on $\#DGPRE$, the number of downgrades before the high rotation quarter. Consistent with our hypothesis, an officer is better off when she reveals bad news herself than when news is uncovered by a successor. That explains why in equilibrium newly assigned loan officers rarely downgrade a loan: in Table VI, the average number of pre-rotation downgrades is an order of magnitude larger than the number of post-rotation downgrades.

Downgrades by newly assigned officers affect the career of the prior loan officer, which suggests that these reports are informative (not cheap talk). This supports our assumption that downgrades require verifiable justification. This result also highlights the mechanism through which rotation provides incentives to reveal bad news. Rotation allows The Bank to compare the reports issued by the incumbent officer with those issued by the new officer, who faces strong incentives to reveal bad news. These results are inconsistent with explanations for rotation based on collusion between the officer and the firm that rely on folk theorem arguments (see Tirole (1986)); rationales based merely on the termination of relationships are, at best, an incomplete account of the way in which rotation mitigates agency conflicts.

We add two controls to verify the robustness of the estimates. First, the total number of high rotation quarters loan officer j has experienced up to time t where no reputation event occurred. This variable controls for the mechanical effect on the reputation counts that results when an officer handles a larger portfolio.¹⁷ And second, the average risk rating assigned to the firms under management of loan officer j by all other banks, weighted by the amount of loans outstanding of each firm. This control accounts for time varying firm characteristics in the officer’s portfolio that may affect future assets under management. After including these controls, the coefficient estimates become more precisely estimated, and their sign and magnitude remains unchanged (Table VII, columns 2 and 6).

A. Additional Evidence from the Cross-Section

The career concerns model has empirical implications for the cross section of loan officers that can be verified in the data. First, older loan officers with more established reputations will have less incentives to produce biased ratings, and their reputations will be affected less by news events (see Gibbons and Murphy (1992), Chevalier and Ellison (1999), Holmstrom (1999)). Thus, we expect bad news reports by older officers to have a smaller impact on their future careers. To verify this we augment specification (4) with the interaction of all the variables on

¹⁷It also accounts for the fact that rotations that are not followed by a downgrade lead The Bank to improve its assessment of the loan officer.

the right hand side with a dummy equal to one if loan officer j is in the top quartile of the age distribution (age>38 years in 2000). All the estimated interaction coefficients have the opposite sign to the main effects, which indicates that reporting bad news has a smaller influence on the career of older officers (Table VII, columns 4 and 8). The estimates suggest that neither revealing bad news before rotation nor being uncovered by a successor significantly affect the future assets under management of older officers.

The results on rating bias in the previous section show similar cross sectional patterns. Columns 4 and 5 of Table IV show the estimated coefficients of specification (2) augmented with an interaction of all right-hand-side variables and a dummy equal to one if the officer managing firm i at time t is in the top quartile of the age distribution. The main coefficients (Table IV, column 4) describe the evolution of average ratings with quarter to rotation for young officers, and indicate that firms are on average downgraded before the high rotation quarter. The interaction coefficients (Table IV, column 5) indicate that the rating behavior of older officers does not vary systematically with the quarter-to-rotation variable.

Second, our framework suggests that an officer has stronger incentives to produce biased ratings for a firm when she has had a more substantial active monitoring role. We assume that the loan officer that originates the first loan to a firm has a substantial origination role.¹⁸ Columns 6 and 7 of Table IV show the estimates of specification (2) augmented with an interaction of all right-hand-side variables with a dummy equal to one if the officer managing firm i at time t is the loan officer that originated the firm's first loan. The interaction point estimates are negative and significant for q_R of -4 to -7, indicating that the optimistic bias and the systematic downgrade patterns are stronger when the loan officer originated the first loan. We find similar results if we instead classify relationships according to the average percentage increase in lending during a relationship (Table IV, columns 8 and 9).

The cross sectional patterns are consistent with the hypothesis that, absent rotation, officers have the strongest incentive to conceal bad news when the state of the loan is most informative for their type. Although the evidence is suggestive, it does not establish a causal link between

¹⁸We thank an anonymous referee for suggesting this.

age, origination, and rating behavior since firm assignment to different loan officers might be related to past firm risk ratings. In support of our interpretation however, we do not find evidence that age-based selection is driving our results: young and old loan officers manage firms with similar size and rating.¹⁹

V. Conclusion

We provide evidence that rotation can be used to limit agency problems in communication due to career concerns. We explore this in the context of a commercial bank that routinely reassigns loan officers to different borrowers using a three-year rotation rule. The effect of rotation is identified using rule-induced variation in the probability of rotation, and by comparing the reports on borrower creditworthiness issued by a loan officer, with those issued by other financial institutions on the same borrowers. When faced with the imminent threat of rotation, officers temporarily issue more informative internal risk ratings. The additional information comes from the release of bad news about the borrower's repayment prospects. We show that the agency problem in communication stems from the negative effect of reporting bad news upon a loan officer's career. Rotation is effective because officers who fail to report bad news about a borrower and are exposed by a successor go on to manage smaller lending portfolios.

Our findings have several implications for policy responses to agency problems in communication. Our results highlight the potential problems of combining active and passive monitoring roles. An obvious response involves separating these functions. However, important complementarities may exist between these two roles. In a banking context, a borrower may be unwilling to cooperate with a loan officer whose only role is to detect bad news. We show that the ex ante threat of rotation induces truthful reporting by incumbent loan officers. This implies that randomized rotation rules can provide incentives, while lowering the costs associated with task reassignment. Finally, our results indicate that rotation works by facilitating the

¹⁹When firm characteristics are measured on the subsample of relationships that reach 34 months, the median firm's total bank debt and risk rating managed by a young (old) officer are \$2.05 million and 1 (\$2.02 and 1) respectively.

comparison of the performance of an incumbent monitor with her successor. This suggests that the effectiveness of rotation may be enhanced by punishment schemes that penalize an agent when she is exposed by her successor.

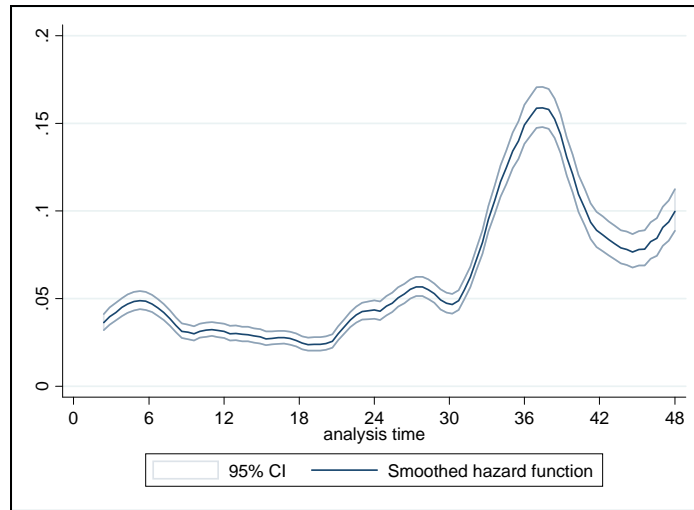
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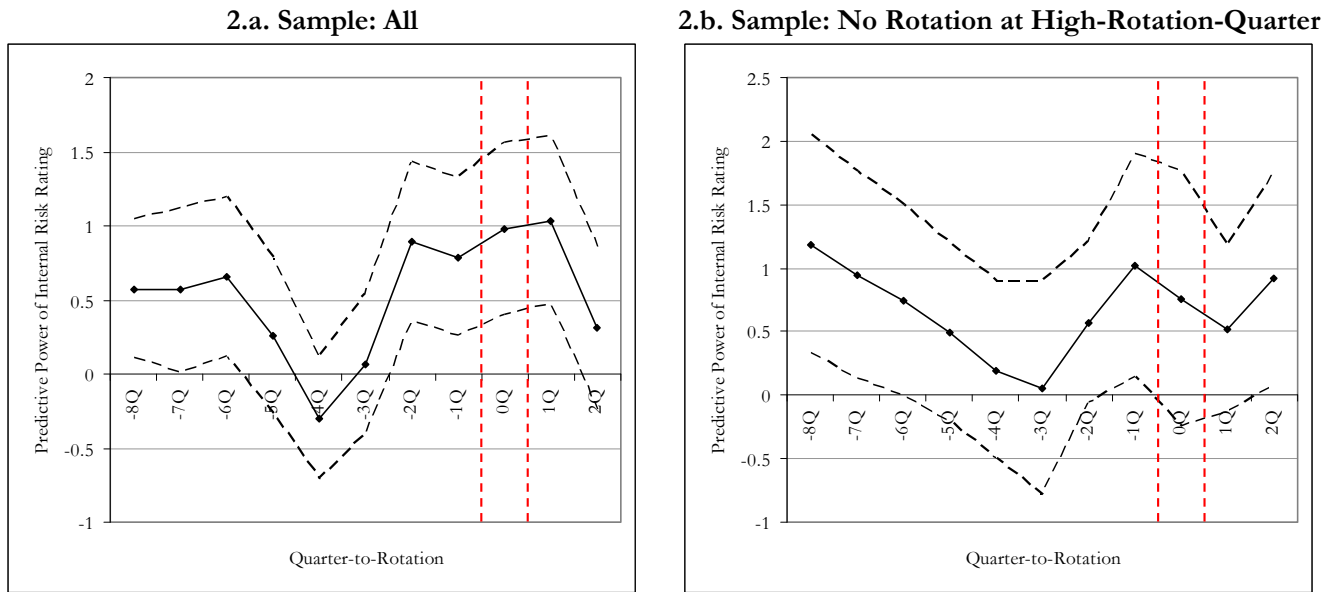
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FIGURE 1
Loan Officer-Firm Relationship Termination Hazard Rate



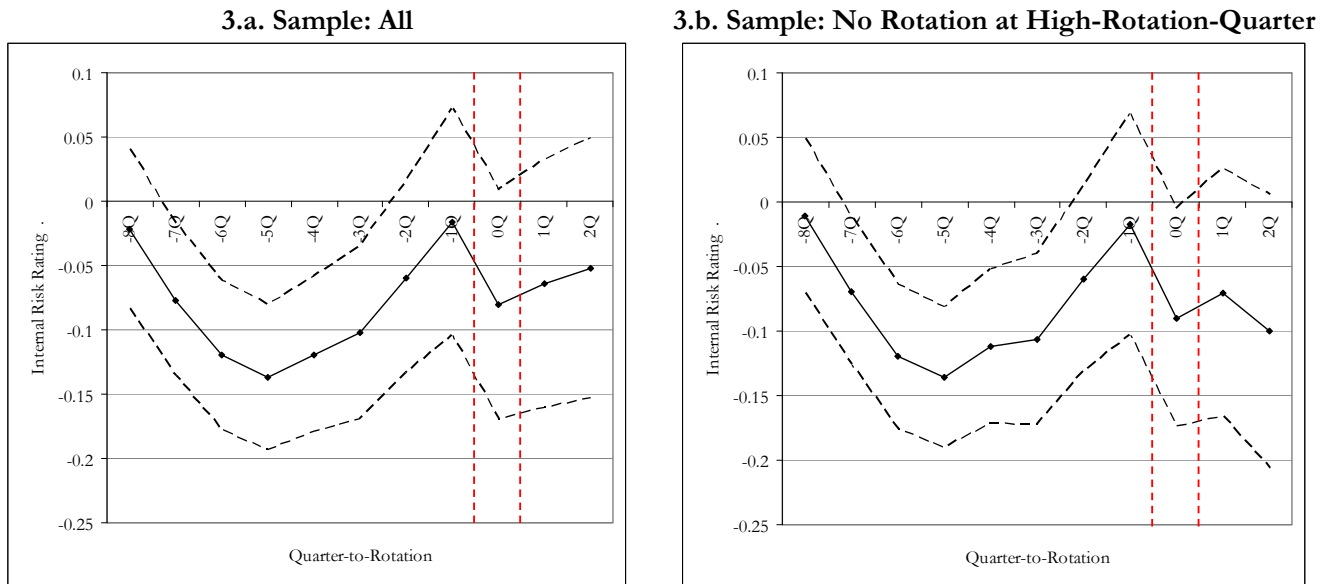
The horizontal axis measures time since the beginning of a loan officer-firm relationship. The plot represents the smoothed conditional hazard rate of relationship termination. Relationships shorter than 48 months are reported (December 1997 to December 2001).

FIGURE 2
Predictive Power of Internal Ratings by Quarter-To-Rotation



The graphs plot the point estimates and 95% confidence intervals of the coefficients on internal risk ratings interacted with quarter-to-rotation, obtained from the estimation of the probit model of default in specification (1). Panel 2.a plots the estimates using the full sample and Panel 2.b. plots the estimates using the subsample of loan officer-firm relationships that is not rotated during a relationship's third year.

FIGURE 3
Average Internal Risk Ratings by Quarter-To-Rotation



The graphs plot the point estimates and 95% confidence intervals of the coefficients on quarter-to-rotation, in a regression with internal risk ratings as the left hand side variable (specification (2)). Panel 2.a plots the estimates using the full sample and Panel 2.b plots the estimates using the subsample of loan officer-firm relationships that is not rotated during a relationship's third year.

TABLE I
Sample Summary Statistics

Panel 1. Summary statistics of a monthly panel of loan officer-firm assignments between December 1997 and December 2001 from a multinational bank in Argentina (The Bank). There are 1,248 firms and 100 loan officers in 4,181 non-censored firm-loan officer relationships. *Number of Relations per Firm* represents the number of loan officer changes a borrower experiences through out the sample period. *Number of Different Loan Officers per Firm* represents the number of different loan officers a borrower experienced in the sample.

Panel 2. Statistics based on 22,659 firm-month-year observations corresponding to a panel of 1,248 firms between December 1997 and December 2001. *Outstanding Amount* is the total amount of credit disbursed to the borrower by The Bank. *Outstanding Reported by Central Bank* is the total amount disbursed to the borrower in the CDSF database by The Bank. *Total Bank Debt Reported by Central Bank* is the total amount disbursed to each borrower by all lenders (including The Bank). *Debt Bank/Total Debt* is the share of The Bank's debt over the total amount of debt reported in the CDSF. *Number of Lending Relationships* represents the number of banks each firm borrows from. *Fraction of debt with Maturity < 1 Year* is the fraction of debt outstanding that becomes due within a year. *Internal Risk Rating* is a number between 1 (best) and 5 (worse) assigned on a monthly basis by loan officers to every firm in their portfolio. Classifications 1, 2 and 3 are under the discretion of the loan officer and reflect the probability of default of the loan. Classifications 4 and 5 represent defaults and write-offs. *Weighted External Risk Rating by Other Banks* is the average risk rating all other financial institutions assign to the firms in the sample, weighted by the amount of debt outstanding. The numerical rating is also expressed on a scale of 1 (Current) to 5 (Uncollectible). *Computer Generated Risk Rating* numerical indicator on a scale of 0 (best) to 29 (worse), generated by a proprietary algorithm based on the borrower's financial statement information and past repayment history. *Default* takes a value of 1 if *Internal Risk Rating* is greater than 3, and 0 otherwise. *Default within 12 Months* takes a value of 1 if *Default* is zero at time t , and is one anytime between $t+1$ and $t+12$. Default measures for observations dated between January and December of 2001 use out of sample default data from January 2002 to December 2002.

Variable	Mean	Median	SD	Min	Max
Panel 1. Loan Officer-Firm Relationship Statistics					
Number of Firms in Loan Officer Portfolio	25.57	10.0	36.14	1	221
Length of Loan Officer-Firm Relationship	22.11	18.0	18.04	1	84
Number of Relationships per Firm	3.04	3.0	1.29	1	7
Number of Different Loan Officers per Firm	3.19	3.0	1.43	1	9
Panel 2. Firm Statistics					
Outstanding Debt Amount (x \$1000)	493	201	1,273	0	72,205
Outstanding Debt Reported by Central Bank (x \$1000)	513	226	936	0	34,922
Total Bank Debt Reported by Central Bank (x \$1000)	2,941	1,336	4,882	0	83,139
Debt Bank/Total Debt	0.27	0.17	0.27	0	1
Number of Lending Relationships	7.52	7.00	4.08	1	34
Fraction of Debt with Maturity < 1 Year	0.87	1.00	0.31	0	1
Internal Risk Rating	1.54	1.00	1.11	1	5
Weighted External Risk Rating by Other Banks	1.41	1.00	1.03	1	5
Computer Generated Risk Rating	17.61	17.00	2.79	0	29
In Default	0.09				
		Subsample: Internal Risk Rating =			
	All	1	2	3	4, 5
Defaults within 12 Months	0.13	0.10	0.37	0.49	1.00

TABLE II
Risk Rating Predictive Power and Average: By Quarter-To-Rotation

Statistics by quarter-to-rotation over the subsample of relationships that reach at least 33 months: number of actual rotations, correlation between internal risk ratings and probability of default in 12 months, and average risk ratings. Quarter-to-rotation measures the time, in quarters, elapsed before and after the high rotation quarter. The number of observations per quarter-to-rotation (column (1)) is 795 before the high rotation quarter (265 relationships that reach at least 33 months, times 3 months per quarter), and drops afterwards due to end-of-sample attrition. Column (2) shows the number of actual rotations occurred in each quarter-to-rotation. Columns (4) and (6) report the difference of each statistics relative to the high-rotation-quarter. *, ** and *** indicate that the correlation calculated in column (3) [average differences in columns (4) and (6)] is statistically significant at the 10, 5 and 1 percent levels.

Sample Quarter, measured relative to High Rotation Quarter	N	# of Rotations	Correlation of Risk Rating and Default in 12 months	Difference w/High Rotation Quarter	Average Internal Risk Rating (stdev)	Difference w/High Rotation Quarter
	(1)	(2)	(3)	(4)	(5)	(6)
Quarter-to-rotation = -4	795	0	0.032	-0.134 ***	1.56 (1.21)	-0.40 ***
Quarter-to-rotation = -3	795	0	-0.008	-0.174 ***	1.60 (1.24)	-0.36 ***
Quarter-to-rotation = -2	795	0	0.150 ***	-0.016	1.66 (1.27)	-0.30 ***
Quarter-to-rotation = -1	795	0	0.135 ***	-0.031	1.79 (1.34)	-0.17 **
High Rotation Quarter	795	82	0.166 ***		1.96 (1.42)	
Quarter-to-rotation = 1	794	46	0.104 *	-0.062	2.07 (1.48)	0.11
Quarter-to-rotation = 2	766	20	0.076	-0.090 *	1.67 (1.21)	-0.29 ***
Overall	5,535	148	0.057 ***		1.76 (1.33)	

TABLE III
How Informative Are Credit Ratings?

Estimates of predictive power of Risk Ratings on default, by quarter-to-rotation (q_R), using the random-effects probit specification (1):

$$\Pr(\text{Default}_{12_{it}} = 1) = \Phi \left[\sum_{s=-8}^2 1[s = q_R] (\beta_s \text{Internal_RR}_{it} + \zeta_s \text{WExternal_RR}_{it}) + \beta \text{Internal_RR}_{it} + \zeta \text{WExternal_RR}_{it} + \alpha_{\text{Loan_Officer}} + \alpha_{\text{Industry} \times t} \right]$$

q_R measures the time, in quarters, elapsed before and after the high rotation quarter induced by the three-year rotation rule. $\text{Default}_{12_{it}}$ is equal to 1 if firm i is not in default at t , but defaults between $t+1$ and $t+12$. All columns include Internal Risk Ratings, Weighted External Risk Rating, Loan Officer Dummies and Industry-Calendar Month Dummies. Columns (1) and (2) report the interaction of the Internal Risk Ratings with a set of q_R indicators, estimated on the full sample and the subsample of relationships that reach 33 months respectively. Column (3) repeats the estimation in column (1) adding loan officer-month dummies. Column (4) reports the results of a placebo test using a computer generated risk rating in place of the internal risk rating. Columns (5) and (6) report the parameters of an augmented specification that includes the interaction of all variables in the right hand side with a dummy equal to one if the loan officer of firm i is not reassigned during the high rotation quarter. Standard errors (in parenthesis) are heteroskedasticity-robust and clustered at the firm level. *, ** and *** statistical significance at the 10, 5 and 1 percent levels.

Dependent Variable	Probability of Entering Default in Next 12 Months					
	Loan Officer			Computer	Loan Officer	
	Main	Main	Main	Main	Main	× No Rotation
Internal Risk Rating Assigned by: Reported coefficient	(1)	(2)	(3)	(4)	(5)	(6)
Risk Rating	0.243*** (0.066)		0.165** (0.079)	0.137*** (0.038)	0.247*** (0.066)	-0.076 (0.078)
1(Quarter-to-Rotation = -8) × Risk Rating	0.574** (0.236)	0.555 (0.349)	0.599** (0.260)	-0.144 (0.119)	0.263 (0.283)	0.995 (0.589)
1(Quarter-to-Rotation = -7) × Risk Rating	0.566** (0.282)	0.670* (0.363)	0.444 (0.324)	0.205 (0.174)	0.421 (0.354)	0.492 (0.528)
1(Quarter-to-Rotation = -6) × Risk Rating	0.655** (0.272)	0.834*** (0.290)	0.591** (0.285)	-0.169 (0.099)	0.644* (0.352)	0.075 (0.511)
1(Quarter-to-Rotation = -5) × Risk Rating	0.255 (0.268)	0.347 (0.314)	0.123 (0.276)	-0.004 (0.128)	0.166 (0.332)	0.326 (0.486)
1(Quarter-to-Rotation = -4) × Risk Rating	-0.301 (0.207)	-0.216 (0.223)	-0.371* (0.218)	0.031 (0.199)	-0.534** (0.253)	0.720 (0.443)
1(Quarter-to-Rotation = -3) × Risk Rating	0.065 (0.242)	0.195 (0.266)	0.148 (0.262)	0.407 (0.278)	0.006 (0.270)	0.206 (0.532)
1(Quarter-to-Rotation = -2) × Risk Rating	0.892*** (0.275)	1.160*** (0.279)	1.105*** (0.290)	0.051 (0.165)	1.023*** (0.368)	-0.467 (0.475)
1(Quarter-to-Rotation = -1) × Risk Rating	0.790*** (0.272)	0.957*** (0.271)	0.810*** (0.290)	0.047 (0.166)	0.652** (0.323)	0.428 (0.610)
1(Quarter-to-Rotation = 0) × Risk Rating	0.979*** (0.297)	1.128*** (0.300)	1.062*** (0.301)	0.238 (0.189)	1.067*** (0.357)	-0.318 (0.579)
1(Quarter-to-Rotation = 1) × Risk Rating	1.036*** (0.286)	1.290*** (0.313)	1.107*** (0.308)	0.125 (0.251)	1.498*** (0.553)	-0.919 (0.639)
1(Quarter-to-Rotation = 2) × Risk Rating	0.309 (0.281)	0.493* (0.288)	0.351 (0.288)	0.063 (0.588)	-0.03 (0.391)	0.965* (0.558)
External Rating × Quarter-to-Rotation Interactions	Yes	Yes	Yes	Yes		Yes
Loan Officer dummies	Yes	Yes		Yes		Yes
Loan Officer × month dummies			Yes			
Industry × Month dummies	Yes	Yes	Yes	Yes		Yes
Observations	18,255	4,838	17,202	18,255		18,255
Pseudo R-Sq	0.157	0.263	0.196	0.138		0.164

TABLE IV
Effect of Rotation on Average Ratings

This table estimates the effect of loan officer rotation on ratings. It reports OLS-firm FE coefficients of specification (2):

$$Internal_RR_{it} = \sum_{s=8}^2 \gamma_s \cdot 1[s = q_R] + \psi WExternal_RR_{it} + \alpha_i + \alpha_{Loan_Officer} + \alpha_{Industry \times t} + v_{it}$$

The dependent variable is the Internal Risk Rating of firm i at time t . Column (1) reports the parameters on the set of quarter-to-rotation dummies (q_R). q_R measures the time, in quarters, elapsed before and after the high rotation quarter induced by the three-year rotation rule. The estimates represent the average internal risk rating by quarter-to-rotation. Columns (2) through (9) report the parameters of an augmented specification that includes the interaction of all right hand side variables with a dummy equal to one if: the loan officer of firm i is not rotated during the high rotation quarter [(2) and (3)]; if the loan officer of firm i has age greater than 38 years in 2000 [(4) and (5)]; if firm i 's loan officer is the same one as when the relationship with the bank initiated [(6) and (7)]; if firm i has average percentage increase in debt above the median (0.9%) before the high rotation quarter [(8) and (9)]. Columns (3), (5), (7), and (9) present the parameter on these interactions. Standard errors (in parenthesis) are heteroskedasticity-robust and clustered at the firm level. *, ** and *** statistical significance at the 10, 5 and 1 percent levels.

Dependent Variable	Internal Risk Rating								
	Main	Main	× No Rotation	Main	× Old Officer	Main	× First Officer	Main	× High Origination
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1(Quarter-to-Rotation = -8)	-0.022 (0.031)	-0.009 (0.038)	-0.045 (0.044)	-0.020 (0.032)	-0.020 (0.054)	-0.016 (0.043)	-0.006 (0.042)	-0.069** (0.034)	0.013 (0.037)
1(Quarter-to-Rotation = -7)	-0.077** (0.030)	-0.074** (0.035)	-0.028 (0.044)	-0.099*** (0.029)	0.063 (0.054)	-0.003 (0.049)	-0.144*** (0.030)	-0.113*** (0.031)	-0.046 (0.037)
1(Quarter-to-Rotation = -6)	-0.120*** (0.030)	-0.140*** (0.033)	0.023 (0.044)	-0.096*** (0.030)	-0.032 (0.056)	-0.073 (0.052)	-0.145*** (0.034)	-0.108*** (0.034)	-0.106*** (0.035)
1(Quarter-to-Rotation = -5)	-0.137*** (0.029)	-0.146*** (0.031)	-0.001 (0.042)	-0.097*** (0.032)	-0.056 (0.057)	-0.122*** (0.046)	-0.129*** (0.045)	-0.111*** (0.039)	-0.145*** (0.032)
1(Quarter-to-Rotation = -4)	-0.119*** (0.031)	-0.105*** (0.030)	-0.052 (0.042)	-0.088** (0.036)	-0.035 (0.061)	-0.078 (0.052)	-0.094* (0.055)	-0.122*** (0.033)	-0.097*** (0.039)
1(Quarter-to-Rotation = -3)	-0.103*** (0.034)	-0.074** (0.037)	0.033 (0.034)	-0.074* (0.041)	-0.039 (0.069)	-0.035 (0.066)	-0.086 (0.064)	-0.121*** (0.039)	-0.071 (0.048)
1(Quarter-to-Rotation = -2)	-0.059 (0.038)	-0.001 (0.044)	0.033 (0.033)	-0.001 (0.044)	-0.132* (0.069)	0.003 (0.078)	-0.013 (0.071)	-0.066 (0.044)	-0.019 (0.056)
1(Quarter-to-Rotation = -1)	-0.016 (0.045)	0.062 (0.056)	-0.012 (0.033)	0.022 (0.051)	-0.140* (0.076)	0.193 (0.152)	0.003 (0.081)	-0.048 (0.055)	0.092 (0.082)
1(Quarter-to-Rotation = 0)	-0.081* (0.045)	-0.042 (0.055)	-0.085 (0.073)	-0.035 (0.050)	-0.137** (0.068)	-0.065 (0.083)	-0.072 (0.116)	-0.036 (0.053)	-0.013 (0.086)
1(Quarter-to-Rotation = 1)	-0.064 (0.049)	-0.010 (0.056)	-0.105 (0.080)	-0.014 (0.061)	-0.159* (0.084)	-0.015 (0.069)	-0.177 (0.189)	-0.063 (0.052)	-0.029 (0.094)
1(Quarter-to-Rotation = 2)	-0.053 (0.051)	0.036 (0.065)	-0.146* (0.083)	-0.008 (0.058)	-0.166* (0.090)	-0.005 (0.073)	-0.181 (0.164)	-0.052 (0.058)	-0.022 (0.099)
External Rating Control	Yes	Yes		Yes		Yes		Yes	Yes
Firm and Loan officer FE	Yes	Yes		Yes		Yes		Yes	Yes
Industry × Month Dummies	Yes	Yes		Yes		Yes		Yes	Yes
Observations	21,400	21,400		21,400		21,400		21,400	21,400
R-Sq	0.79	0.79		0.80		0.80		0.79	0.79

TABLE V
Effect of Rotation on Sensitivity of Lending to Ratings

The table reports OLS estimates of coefficients on the interaction between quarter-to-rotation dummies and Internal Risk Ratings in specification (3):

$$\ln(\text{debt_Bank}_{it}) = \sum_{s=-8}^2 1[s = q_R](\theta_s \text{Internal_RR}_{it} + \zeta_s \text{WExternal_RR}_{it}) + \vartheta \ln(\text{debt_othbanks}_{it}) + \theta \text{Internal_RR}_{it} + \zeta \text{WExternal_RR}_{it} + \alpha_i + \alpha_{\text{Loan_Officer}} + \alpha_{\text{Industry} \times t} + v_{it}$$

The dependent variable is the log of debt of firm i at time t with The Bank. q_R measures the time, in quarters, elapsed before and after the high rotation quarter induced by the three-year rotation rule (zero for the high rotation quarter and negative (positive) before (after) the high rotation quarter). The estimates represent the sensitivity of lending to internal risk ratings for every quarter-to-rotation. The regression also includes the Weighted External Risk Rating assigned to firm i at time t by other banks interacted with the set of quarter-to-rotation dummies (not reported). Standard errors (in parenthesis) are heteroskedasticity-robust and clustered at the firm level. *, ** and *** statistical significance at the 10, 5 and 1 percent levels. All significant estimates are in bold typeface.

Dependent Variable (logs)	Debt
Risk Rating	-0.184* (0.097)
1(quarter-to-rotation = -8) × Risk Rating	0.168 (0.275)
1(quarter-to-rotation = -7) × Risk Rating	0.291 (0.335)
1(quarter-to-rotation = -6) × Risk Rating	-0.059 (0.299)
1(quarter-to-rotation = -5) × Risk Rating	-0.037 (0.357)
1(quarter-to-rotation = -4) × Risk Rating	-0.139 (0.342)
1(quarter-to-rotation = -3) × Risk Rating	-0.773** (0.305)
1(quarter-to-rotation = -2) × Risk Rating	-0.598** (0.282)
1(quarter-to-rotation = -1) × Risk Rating	-0.454** (0.228)
1(quarter-to-rotation = 0) × Risk Rating	-0.438** (0.213)
1(quarter-to-rotation = 1) × Risk Rating	-0.29 (0.205)
1(quarter-to-rotation = 2) × Risk Rating	-0.303 (0.245)
ln(Debt other Banks)	Yes
Risk Rating other Banks × quarter-to-rotation Dummies	Yes
Firm FE	Yes
Loan Officer Dummies	Yes
Industry × Month Dummies	Yes
Observations	19,443
Pseudo R-Sq	0.460

TABLE VI
Summary Statistics on Loan Officer Reputation Event Counts Based on High Rotation Quarter

The table presents summary statistics for the count of the number of downgrades that occur during the twelve months before and six months after a high rotation quarter between December 1997 and December 2001. *DGPRE* (*DGPRE_12*) and *DGPOST*, count the number of times up to time *t* that loan officer *j* has downgraded a firm during the six (seven to twelve) months before and after a high rotation quarter respectively. *DGSUCC* counts the number of downgrades by a successor after a high-rotation-quarter. Events are defined using the internal risk ratings of The Bank, based solely on downgrades to ratings of 2 or 3, to avoid mechanical changes in the variables due to defaults or foreclosures.

Variable	Mean	Median	SD	Min	Max
# events pre-High Rotation Quarter loan officer downgrades firm firm 1-6 months prior (<i>#DGPRE</i>)	0.436	0	1.78	0	14
# events pre-High Rotation Quarter loan officer downgrades firm firm 7-12 months prior (<i>#DGPRE_12</i>)	0.103	0	0.87	0	9
# events post-High Rotation Quarter loan officer downgrades firm 1-6 months after (<i>#DGPOST</i>)	0.043	0	0.28	0	4
# events pre-High Rotation Quarter loan officer's firm downgraded post-High Rotation Quarter (<i>#DGSUCC</i>)	0.081	0	0.52	0	5
# of High Rotation Quarters with no downgrade	2.237	1	4.43	1	31

TABLE VII
The Effect of Firm Downgrade Events on Loan Officer's Assets under Management (Reduced Form)

This table estimates the effect of reputation events on measures of the assets under management of a loan officer using specification (5):

$$\ln(A_{jt}) = \theta_1[\#DGPRE_{jt-6}] + \theta_2[\#DGPOST_{jt-6}] + \theta_3[\#DGSUCC_{jt-6}] + \gamma X_{jt} + \alpha_j + \alpha_t + v_{jt}$$

The left hand side variable is the log of a measure of assets under management of loan officer j at time t (number of firms under management and total amount of debt). $\#DGPRE$, $\#DGPRE_{12}$ and $\#DGPOST$, count the number of times up to time t that loan officer j has downgraded a firm during the six months before, 7 to 12 months before, and 6 months after, a high rotation quarter. $\#DGSUCC$, counts the number of times a firm under the management of loan officer j before the high rotation quarter is downgraded during the six months after the high rotation quarter. It is based on the same events as $\#DGPOST$, but it imputes the events to the loan officer managing the firm before the high rotation quarter. Two additional controls are used in specifications 2-4 and 6-8: number of High Rotation Quarters where no downgrade occurred, and the weighted average risk rating assigned to the firms under management of loan officer j by all other banks. All specifications include loan officer fixed effects and month dummies. Standard errors (in parenthesis) are heteroskedasticity-robust and clustered at the loan officer level. *, ** and *** statistical significance at the 10, 5 and 1 percent levels. All significant estimates are in bold typeface.

Dependent Variable (logs)	# Firms				Debt			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
# events pre-High Rotation Quarter loan officer downgrades firm firm 1-6 months prior ($\#DGPRE$)	-0.104*** (0.036)	-0.145*** (0.023)		-0.135*** (0.028)	-0.170 (0.108)	-0.184** (0.073)		-0.173** (0.060)
# events pre-High Rotation Quarter loan officer downgrades firm firm 7-12 months prior ($\#DGPRE_{12}$)			-0.079** (0.037)				-0.078 (0.069)	
# events post-High Rotation Quarter loan officer downgrades firm 1-6 months after ($\#DGPOST$)	0.083 (0.127)	-0.038 (0.083)	-0.056 (0.105)	-0.040 (0.099)	0.171 (0.289)	0.294 (0.277)	0.293 (0.281)	0.141 (0.499)
# events pre-High Rotation Quarter loan officer's firm downgraded post-High Rotation Quarter ($\#DGSUCC$)	-0.466*** (0.074)	-0.330*** (0.071)	-0.355*** (0.090)	-0.310*** (0.075)	-0.701*** (0.176)	-0.681*** (0.142)	-0.728*** (0.114)	-0.592*** (0.154)
$\#DGPRE \times$ (Dummy=1 if loan officer in highest age quartile)				0.085 (0.138)				0.104 (0.261)
$\#DGPOST \times$ (Dummy=1 if loan officer in highest age quartile)				-0.058 (0.122)				0.254 (0.488)
$\#DGSUCC \times$ (Dummy=1 if loan officer in highest age quartile)				0.241*** (0.141)				0.653*** (0.243)
Additional Controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Controls \times (Dummy=1 if loan officer in highest age quartile)				Yes				Yes
Loan Officer FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	944	944	944	944	944	944	944	944
R-Sq	0.87	0.90	0.90	0.90	0.79	0.83	0.83	0.83