Financial Management

The Role of Banks in Dividend Policy

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We use loan-specific data to document a significant inverse relation between a firm's dividend payouts and the intensity of a firm's reliance on bank loan financing. Banks limit dividend payouts to protect the integrity of their senior claims on the firm's assets. Moreover, dividend payouts decline in the presence of monitoring by relationship banks, which acts as an effective governance mechanism, thereby reducing the gains from precommitting to costly dividend payouts. Bank monitoring and corporate governance (insider stake and institutional block holdings) are complementary mechanisms to resolve firm agency problems, both reducing the firm's reliance on dividend policy.

Dividends have long been viewed as an effective, but costly, mechanism to align the incentives of managers and stockholders (see, for example, Jensen and Meckling, 1976; Rozeff, 1982; Jensen, 1986).[1] Managers precommit to an inflexible dividend payout policy so as to limit their access to free cash flows that could be diverted for managerial private benefits, empire building, or other inefficient investment policies that do not maximize firm value. Thus, dividends can be viewed as a corporate governance mechanism. John and Knyazeva (2006) show that weakly governed managers are under more pressure from stockholders to pay dividends, and are subject to greater penalties (in terms of adverse shareholder reaction) if they reduce dividend payouts. Guay and Harford (2000) find that managers use dividend payouts to distribute cash flows that are viewed to be relatively permanent. Moreover, Knyazeva (2007) finds that weakly governed managers are more likely to engage in dividend smoothing so as to obviate the need for costly dividend reductions in the event that cash flows fall. Thus, an important component of the oversight aspect of dividend policy is its inflexibility, which imposes costs on firms that constrain precommitted firms from investing internally generated funds in negative net present value investments (see Easterbrook, 1984).

The literature on the corporate governance role of dividend policy has focused on the incentive conflict between managers and equity holders. However, this focus does not consider the incentive conflict between lenders and managers/shareholders. To address this, Aivazian, Booth, and Cleary (2006) and Faulkender and Petersen (2006) contrast the relation between dividend smoothing policy and public debt holdings versus bank debt, and find that firms with public debt are more

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[1] Dividends have also been considered to be a signaling mechanism (as in Miller and Rock, 1985). However, the ability of dividends to signal unexpected future changes in firm earnings has been questioned in Benartzi, Michaely, and Thaler (1997) and Benartzi et al. (2005). Further et al. (2008) find that there is no long-term abnormal performance impact of dividend reductions or omissions.

likely to pay dividends than firms with private debt.[2] However, because of data unavailability, these studies use the existence of credit ratings as a proxy for publicly traded debt. There are a number of shortcomings with this approach. First, issuers of syndicated bank loans often obtain credit ratings, and therefore Aivazian et al. (2006) and Faulkender and Petersen (2006) do not actually perform an analysis of the impact of bank debt on dividend policy. Moreover, firms may simultaneously issue public and private debt, and therefore, Aivazian et al. (2006) and Faulkender and Petersen (2006) do not control for the intensity of the firm's dependence on relationship bank lending. Similarly, Li and Zhao's (2008) finding that informationally opaque firms are relatively less likely to pay, increase or initiate dividend payouts does not control for the presence of bank monitoring in the presence of information asymmetries.

In this paper, we revisit this issue using a database of bank loans to determine how bank lending activity impacts firm dividend policy. For instance, lenders such as relationship banks might block dividend payouts to stockholders, since they reduce the firm's cash resources available to service the firm's debt obligations. In particular, bank loans regularly include covenants that limit dividend payouts.[3] Moreover, banks act as delegated monitors in their role as relationship lenders. Thus, the potential corporate governance benefits associated with dividend payouts is of limited value in the presence of active bank monitoring of managerial activities. In this paper, we consider the impact of bank lending on dividend policy. We hypothesize that dividend payouts should decline in the presence of substantial bank lending for two complementary reasons: 1) monitoring by relationship banks acts as an effective governance mechanism, thereby reducing the gains from precommitting to costly dividend payouts (*the corporate governance motivation*) and 2) banks limit dividend payouts to shareholders to protect the integrity of their senior claim on the firm's assets in the event of borrower default (*the cash flow protection motivation*)—see Ivashina et al. (2009).

Management can return cash to equity holders through stock repurchases as well as via dividend payouts. However, stock repurchases are less effective as a corporate governance mechanism than dividend payouts precisely because they are episodic, non-binding and flexible.[4] For example, Guay and Harford (2000) show that repurchases are used to redistribute transient cash flow shocks. Knyazeva (2007) shows that poorly governed managers utilize declines in repurchases to adjust for cash flow declines, but pay higher dividends when cash flows increase, because declines in share repurchase programs have less of an adverse effect on stock prices than dividend cuts. Since the corporate governance motivations associated with stock repurchases are less clear cut, we focus on dividend policy in this paper.

While there is a well-established literature on resolving the bondholder-stockholder agency conflict (for example, see the Barnea, Haugen, and Senbet, 1981 survey paper), the bank-stockholder conflict is different for a number of reasons. First, banks have potential access to insider information regarding a firm's performance, whereas bondholders generally do not. Second, banks

[2] In addition, Knyazeva (2007) shows that debt and dividends are substitute corporate governance mechanisms, but does not analyze the monitoring role of bank lending. Further, using a sample that consists of 221 German firms over 1984-1993, Goergen, Correia da Silva, and Renneboog (2005) show that firms with a bank as their major shareholder are more willing to omit their dividend than firms controlled by other shareholders.

[3] Paglia (2007) shows that more than 47% of bank loans contain covenants restricting dividends. However, our findings do not simply indicate compliance with contractual obligations, since banks with bargaining power (i.e., with more intense lending relationships) choose to incorporate dividend payout covenants in their loan documents. In this paper, we show that firms with greater dependence on bank loans (higher loan intensity) are more likely to restrict their dividend payouts.

[4] Hausch and Seward (1993) and Jagnnathan, Stephens, and Weisbach (2000) show that firms do not have to comply with announced terms of stock repurchase programs. Stephens and Weisbach (1998) document that approximately 80% of announced share repurchases are completed.

develop relationships with borrowers which create costs of borrower switching, whereas bondholders are usually transactional purchasers. Third, even if a bank loan is syndicated, the number of banks in a syndicate tends to be far smaller than the number of bondholders in a public bond offering, thereby offering the possibility of bank loan restructuring in the event that the borrower experiences financial difficulties. Thus, because of their monitoring ability, contract flexibility and large debt stake in borrowing firms, banks may exercise considerable control over dividend policy.

Bank lending intensity (i.e., firm reliance on bank loan financing) can impact dividends via both the corporate governance and the cash flow protection motivations. The more intensive the banking relationship, the greater the amount of private information produced in the course of the lending relationship and the more extensive the bank monitoring activity, thereby obviating the need for corporate governance through costly precommitment of dividend payouts. Moreover, the higher the bank lending intensity, the more power the bank has to impose its cash flow protection preferences on the firm, thereby lowering dividend payouts. Thus, both the corporate governance and cash flow protection motivations imply that firms more dependent on bank loan financing will have lower dividend payouts, ceteris paribus. We utilize two independent methodologies to comprehensively examine the relation between dividend payout and bank lending intensity. First, we control for the potential endogeneity in a firm's dividend policy using an instrumental variable (IV) approach. Second, we utilize a propensity score matched-pair sampling technique to identify the effects of bank lending on dividend payouts.

We find that firms with greater reliance on bank loan financing have significantly lower dividend payouts. For example, a one standard deviation increase in bank lending intensity suggests a 27.97% decline in dividend payouts at all firms, even after controlling for corporate governance controls such as insider stake and institutional block holdings. Thus, bank loan monitoring complements other corporate governance mechanisms in addressing potential agency conflicts, obviating the need for costly dividend precommitment.

The paper proceeds as follows. Section I presents the hypothesis, describes the database, and provides descriptive statistics. The regression analysis and robustness tests are discussed in Sections II and III, respectively. The paper concludes in Section IV.

I. Data

A. Hypothesis Testing

As discussed in the introduction, we test the following hypothesis:

H1: The greater the bank lending intensity to a given firm, the lower its dividend payouts to stockholders after controlling for corporate governance and other control variables.

To empirically test this hypothesis, we obtain loan, accounting, and stock return data for each fiscal year spanning the period 1990–2006.[5] Information on syndicated bank loans to nonfinancial firms is collected from the DealScan database of the Loan Pricing Corporation (LPC). The accounting data are obtained from the Compustat Annual Industrial files, and stock prices are extracted from the Center for Research in Security Prices (CRSP) database.

[5] The sample period begins in 1990 because *LOAN_INTENSITY*, requires three years of data, and this data is only available on Loan Pricing Corporation's DealScan database from 1987. Moreover, we end our sample period before the disruptions of the global credit crisis in 2007.

For each firm, we define the intensity of bank lending, denoted by *LOAN_INTENSITY,* to each borrowing firm as the total amount of outstanding loans provided by banks to the firm between fiscal year t–1 and t–3 normalized by the firm's total liabilities at the beginning of the fiscal year t.[6] Loans that mature before the end of fiscal year t are excluded. For term loans, we carry out a linear interpolation to estimate the remaining balance of the loan in each year.

However, the loan intensity measure can overstate the amount of bank loans outstanding due to refinancing deals and/or revolving lines of credit, since the DealScan database does not differentiate between new loans and refinancing deals.[7] In addition, many of the loan agreements contain revolving credit lines for which there is no information regarding the fraction utilized. Asarnow and Marker (1995) find that the average loan commitment usage rate on BB lines of credit is 46.8%. The average credit rating on rated loans in our sample is between BB and BB–. Therefore, under rational expectations, banks would anticipate a 50% utilization rate on credit lines in our sample in our construction of the *LOAN_INTENSITY* variable.[8]

We use three alternative variables to proxy for firm dividend payout policy: 1) *DIV* denotes the ratio of a firm's cash dividends to the firm's net sales revenue, with a lower bound value of zero; 2) *LNDIV*, the natural logarithm of *DIV*; and 3) *DIV_DUM*, a dummy variable equal to one if a firm's cash dividends are positive and zero otherwise.[9] For the convenience of the reader, all variables are summarized in Appendix A.

B. Description of Control Variables

Our sample consists of US firms with publicly traded equity. We proxy for agency conflicts using Jensen's free cash flow variable, *FCF*, which is measured as *EBITDA* minus changes in working capital (current assets minus current liabilities) minus capital expenditure normalized by net sales. Capital expenditure is set to zero if missing. *COVENANT* is a dummy variable equal to one if a loan deal contains a covenant restricting dividend payouts, as reported on the DealScan database.[10] We use Altman Z-score to proxy for default risk.[11]

We define *DEBT_DUM*, a dummy variable equal to one if the firm does not have an outstanding debt instrument with an S&P credit rating. We also control for leverage (*LEV*), measured as the book value of current and long-term debts, normalized by total assets. The *LEV* and *DEBT_DUM* variables control for the firm's alternatives to bank loans as sources of financing. To isolate the relation between bank lending and dividend policy, we must control for public debt issuance. Aivazian et al. (2006) and Faulkender and Petersen (2006) show that firms that issue public debt tend to have higher dividend payout ratios. If public debt issuance and bank borrowing are substitutes, then a finding of an inverse relation between lending intensity and dividend payouts

[6] Our results are robust to using the firm's total assets to normalize the total amount of outstanding loans in constructing the loan intensity variable.

[7] Revolving loans include "Revolver/Line < 1 Year," "Revolver/Line > 1 Year," "Revolver/Term Loan," "364-day Facility," "Demand Loan" and "Limited Line." Term loans include "Term Loan," "Delay Draw Term Loan," "Term Loan A," "Term Loan B," through "Term Loan H."

[8] The *LOAN_INTENSITY* variable measures the ex ante interactions between bank and borrower that comprise the intensity of the lending relationship, not necessarily the ex post utilization of loan commitments, thereby alleviating some of the concerns about the use of LPC to measure actual bank debt (see Sufi, 2009).

[9] Our results are robust to using total assets to normalize cash dividends.

[10] More than 50% of the syndicated bank loans in our sample have a dividend payout covenant. Sufi and Roberts (2008) contend that the LPC database under-reports this variable. However, this would bias against our finding any results, but rather we obtain statistically significant, economically meaningful results.

[11] Our results are robust to the inclusion of a variable that measures the one-year probability of default using the Merton options-theoretic structural model of default. Results are available upon request.

may be driven by this inverse relation between lending intensity and public debt issuance in which firms view bond issues and bank debt as substitute sources of financing.[12] We, therefore, control for public debt issuance using a dummy variable for the year in which public debt is issued (*DEBT_ISSUE*), as well as a variable denoting the size of the public debt issuance in each year (*PRINCIPAL*).

It is well established that dividend policy is relatively stable over time. For example, Lintner (1956) interviews 28 company managers, and finds that the primary determinant of current dividend policy is the firm's past dividend payout ratio. Similarly, Brav et al. (2005) survey 384 financial executives, and find that the determination of the dividend payout ratio is dominated by the question of whether to change past payout policy. Thus, we control for *LDIV*, the lag of *DIV*.

Other control variables include: *LNASSETS*, defined as the natural logarithm of the book value of the firm's total assets; *INCOME*, defined as the firm's net income; and the firm's market to book asset ratio; *MB*, measured as the ratio of the market value of equity plus the book value of current and long-term debts to the book value of total assets. Moreover, following Rozeff (1982) we control for firm risk levels, as measured by the control variable *RISK*, which is defined as the standard deviation of market-adjusted monthly stock returns in the given year *t*. We also control for taxes using the variable *TAXES*, defined as total income tax normalized by net sales; and growth using the variable *GROWTH*, defined as the relative changes in net sales from the previous fiscal year. We use *INTANGIBLE*, defined as the ratio of intangible assets to total assets, to control for investment opportunities as well as information asymmetry about the firm. We include dummy variables for fiscal year and for ten industry classifications, as defined by Professor Kenneth French.[13]

Institutional blockholders directly benefit from high dividend payouts that enable them to extract the firm's free cash flow. However, dividend payouts are a costly governance mechanism as they constrain the firm's investment opportunities. Thus, institutional stockholders may prefer lower payout ratios as they perform their own corporate governance oversight and need not constrain the firm's investment opportunities using dividend policy. We consider the net effect by controlling for the relation between institutional blockholders and dividend payout policy. To measure the extent of nonbank corporate governance mechanisms, we obtain institutional holdings of a firm's equity from Thomson Financial 13f filings. The institutional holdings variable, *INSTHLD*, is constructed by averaging quarterly institutional ownership data for each firm-year. Following Cremers and Nair (2005), *INSTHLD* is set to zero if missing in the database.

As another measure of corporate governance mechanisms, we control for the role of managerial (insider) stockholdings. We extract insider holdings from the Thomson Insider filings. The insider holding variable, *INSIDER*, is the total market value of shares held by a firm's management at the end of fiscal year *t*, normalized by the firm's market capitalization. Stulz (1988) and Morck, Shleifer, and Vishny (1988), McConnell and Servaes (1990), and Wruck (1989) provide evidence that managerial stockholdings align the interests of managers and shareholders only up to a point, after which entrenched managers utilize their control power to obtain private gains at the expense of stockholders and other stakeholders. Thus, we also utilize the *INSIDER ^ 2* variable (squared *INSIDER*) to control for nonlinearity in the corporate governance role of managerial shareholdings.

[12] We are indebted to an anonymous referee for this excellent point. In unreported results, we find that there is an inverse relationship between bank lending intensity and a dummy variable denoting a new public debt issue, but a positive relationship between lending intensity and the size of the public debt issue. Thus, firms seeking large sums of borrowed funds tend to use both bank loans and public debt issues as complements rather than substitutes.

[13] See http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

C. Descriptive Statistics

We start with 73,342 observations for "completed" or "closed" loan facilities originated by 21,901 borrowers between 1983 and 2006 on the DealScan database. This sample is merged with Compustat using a matching algorithm comparing the borrower's name, as provided by LPC, with the firm's name as shown in Compustat.[14] We are able to identify 7,218 borrowers on the Compustat database, which correspond to 36,236 loan facilities. We obtain 20,592 loan intensity observations following the aforementioned variable definition. We eliminate 5,131 observations for which dividend or control variables are unavailable. We further eliminate 719 observations in which the borrower was either a regulated financial institution or a utility (standard industrial classification (SIC) codes 6000-6999 and 4900-4949). The resulting sample contains 14,742 observations spanning the period of fiscal year 1990–2006, associated with 3,512 distinct borrowers. All variables are estimated on an annual basis.[15]

Table I provides descriptive statistics of our sample, and Table II provides correlations across variables. Variable definitions are available in Appendix A. The mean loan intensity in our sample is 33.83%, so that the sum of three years of bank loans averages 33.83% of the firm's total liabilities. The dividend payout ratio for the firms in our sample averages 0.64%, and ranges from zero to a maximum of 8.71% per annum. As evidence of the connection between bank loans and dividend payout policy, the *COVENANT* variable in Table I shows that more than 50% of the loans in our sample have dividend restricting covenants. Indeed, Table II shows that the Pearson correlation between *LOAN_INTENSITY* and the existence of a dividend restricting covenant is 0.20. These covenants are effective in reducing dividend payout, as indicated by the –0.16 correlation coefficient between the dividend payout ratio and the *COVENANT* variable.

Table III provides a univariate analysis of the relation between *LOAN_INTENSITY* and dividend payout policy. Observations are sorted into 20 equal groups on *LOAN_INTENSITY*. The mean values of *DIV* and *DIV_DUM* are reported for each group. Table III shows that the dividend payout ratio tends to decrease as bank loan intensity increases. For example, the lowest loan intensity group has an average loan intensity of 3.77% and an average dividend payout averaging 1.18%. In contrast, the highest loan intensity group has an average loan intensity of 98.75% and an average dividend payout of 0.40%. A *t*-test indicates that the difference between the average dividend payout for the highest and lowest loan intensity groups is significant at the 1% level.

II. Regression Analysis

To more formally test the relation between dividend payouts and loan intensity we begin by estimating the following model:

$$DIVIDEND\ MEASURE = \alpha + \gamma \cdot ln(LOAN\_INTENSITY) + \beta \cdot CONTROLS + e. \quad (1)$$

In our initial model, we use three different specifications for the dividend payout measure: *DIV*, *LNDIV*, and *DIV_DUM*. All observations in the sample are used when either *DIV* or

[14] Company names and ticker symbols are the only identifiers commonly shared by the DealScan database and the Compustat database. Given that ticker symbols change more frequently than company names, we link the DealScan observations to the Compustat database through the company name.

[15] We also winsorize all variables in the sample (except for the dummy variables) at the 0.005 and 0.995 fractiles to eliminate extreme outliers.

Table I. Descriptive Statistics

This table reports the descriptive statistics on the variables used in this paper. DIV denotes the ratio of firm's cash dividends to its net sales. LNDIV is the natural logarithm of DIV. DIV_DUM is a dummy variable equal to one if firm's cash dividends are positive. LOAN_INTENSITY denotes firm's loan intensity deflated by total liabilities (may exceed 100% because of off-balance sheet contingent line of credit liabilities in numerator not converted to actual liabilities in denominator). CHANGE_TIGHTNESS is the net percentage of domestic respondents tightening standards for commercial and industrial loans as reported by the Federal Reserve Board's Senior Loan Officer Opinion Survey on Bank Lending Practices for the quarter of the observation. N_LEAD is the value-weighted number of leading arrangers of loans originated between year t–3 and t–1 with maturity after year t. COVENANT is a dummy variable taking the value of one if a loan deal contains any dividend covenant reported on the DealScan database. GROWTH is the relative changes in net sales from the previous fiscal year. LNASSETS is the natural logarithm of firm's total assets. INCOME is firm's net income normalized by its total assets. LEV is the book value of current and long-term debts normalized by total assets. FCF is EBITDA minus changes in working capital (current assets minus current liabilities) minus capital expenditure normalized by net sales. MB is the ratio of the market value of equity plus the book value of current and long-term debts to the book value of total assets. TAXES are the income taxes normalized by net sales. RISK is the standard deviation of market-adjusted monthly stock returns in the given fiscal year t. INTANGIBLE is the ratio of intangible assets to total assets. Z denotes Altman Z-score. DEBT_DUM is a dummy variable equal to one if a firm does not have a debt instrument with an S&P credit rating and a maturity date after the end of fiscal year t. INSTHLD is institutional holding variable, constructed by averaging quarterly institutional ownership data for each year. INSIDER is the ratio of total market value of shares held by firm's management at the end of fiscal year t to its total market capitalization. INSIDER^2 is the square of INSIDER. DEBT_ISSUE is a dummy variable set to one if a firm issues public debt in fiscal year t, and PRINCIPAL is the total principal amount of the debt issuance normalized by firm's total assets at the beginning of fiscal year t.

Variable	Mean	Minimum	Maximum	Std. dev.	No. of obs.
DIV	0.0064	0.0000	0.0871	0.0132	14,742
LNDIV	−4.7256	−13.6679	−2.4411	1.2854	5,936
DIV_DUM	0.4027	0.0000	1.0000	0.4904	14,742
LOAN_INTENSITY	0.3383	0.0263	1.3501	0.2658	14,742
COVENANT	0.5043	0.0000	1.0000	0.5000	14,742
GROWTH	0.1634	−0.6059	2.6497	0.3647	14,742
LNASSETS	6.1449	3.1342	10.3971	1.6170	14,742
INCOME	0.0082	−0.8307	0.2691	0.1320	14,742
LEV	0.3014	0.0000	1.1223	0.2065	14,742
FCF	0.0092	−3.0353	0.7836	0.3357	14,742
MB	1.3709	0.2523	8.3008	1.0425	14,742
TAXES	0.0203	−0.1619	0.1894	0.0375	14,742
RISK	0.1331	0.0317	0.5480	0.0777	14,742
INTANGIBLE	0.1377	0.0000	0.7572	0.1740	14,742
Z	3.5262	−3.6691	26.0155	3.2742	14,742
DEBT_DUM	0.2931	0.0000	1.0000	0.4552	14,742
INSIDER	0.0714	0.0000	1.0000	0.1801	14,742
INSIDER^2	0.0375	0.0000	1.0000	0.1569	14,742
INSTHLD	0.4781	0.0010	0.9663	0.2539	14,742
DEBT_ISSUE	0.2694	0.0000	1.0000	0.4437	14,742
PRINCIPAL	0.0948	0.0000	1.9800	0.2577	14,742
CHANGE_TIGHTNESS	0.0761	−0.2410	0.5970	0.2203	14,742

Table II. Correlations

This report reports correlations between the variables in our sample. Appendix A lists variable definitions.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
DIV	(1)																						
LNDIV	(2)	0.77																					
DIV_DUM	(3)	0.59	0.00																				
LOAN_INTENSITY	(4)	−0.13	−0.07	−0.17																			
COVENANT	(5)	−0.16	−0.15	−0.17	0.20																		
GROWTH	(6)	−0.10	−0.16	−0.08	0.10	0.04																	
LNASSETS	(7)	0.34	0.24	0.39	−0.29	0.02	0.00																
INCOME	(8)	0.14	0.14	0.18	0.01	−0.05	0.10	0.19															
LEV	(9)	−0.03	−0.06	−0.05	−0.03	0.07	0.02	0.07	−0.27														
FCF	(10)	0.06	0.03	0.10	−0.04	0.00	−0.12	0.11	0.18	0.01													
MB	(11)	0.09	0.16	−0.02	0.02	−0.02	0.20	0.04	0.20	−0.18	−0.08												
TAX	(12)	0.18	0.22	0.11	0.04	−0.03	0.12	0.14	0.36	−0.19	0.12	0.32											
RISK	(13)	−0.28	−0.27	−0.34	0.08	0.15	0.02	−0.34	−0.38	0.13	−0.14	−0.01	−0.22										
INTANGIBLE	(14)	−0.01	0.02	−0.03	0.13	0.18	0.09	0.15	0.00	0.13	0.15	0.00	0.05	−0.02									
Z	(15)	−0.01	−0.05	−0.02	0.08	−0.04	0.14	−0.07	0.40	−0.53	−0.02	0.69	0.30	−0.08	−0.09								
DEBT_DUM	(16)	0.07	0.02	0.07	−0.12	0.11	0.01	0.39	0.01	0.18	0.02	0.00	0.01	−0.07	0.12	−0.11							
INSIDER	(17)	−0.09	−0.10	−0.10	0.04	0.05	0.04	−0.14	−0.01	−0.02	−0.03	0.07	0.01	0.09	−0.04	0.08	−0.07						
INSIDER^2	(18)	−0.06	−0.06	−0.09	0.02	0.03	0.02	−0.11	−0.02	−0.01	−0.03	0.05	−0.01	0.08	−0.04	0.05	−0.05	0.95					
INSTHLD	(19)	0.14	0.11	0.20	−0.09	0.12	0.01	0.58	0.25	−0.15	0.08	0.17	0.21	−0.33	0.13	0.15	0.28	−0.13	−0.12				
DEBT_ISSUE	(20)	0.09	0.07	0.09	−0.06	−0.01	0.17	0.32	0.02	0.10	−0.15	0.08	0.05	−0.08	0.07	−0.04	0.18	−0.03	−0.03	0.21			
PRINCIPAL	(21)	−0.03	−0.03	−0.06	0.05	0.04	0.30	0.05	−0.02	0.06	−0.31	0.19	0.05	0.06	0.06	0.09	0.08	0.03	0.02	0.08	0.61		
CHANGE_TIGHTNESS	(22)	−0.04	−0.02	−0.07	0.06	0.15	−0.04	0.00	−0.13	0.10	−0.01	−0.04	−0.06	0.31	0.04	−0.05	−0.01	0.02	0.02	−0.08	−0.03	−0.03	
N_LEAD	(23)	0.15	0.09	0.19	−0.04	0.18	−0.04	0.64	0.08	0.12	0.11	0.00	0.09	−0.17	0.24	−0.10	0.36	−0.10	−0.08	0.42	0.18	0.01	0.05

Table III. Univariate Relation Between LOAN_INTENSITY and Dividends

Observations are sorted in 20 equal groups on LOAN_INTENSITY. The mean value of DIV is reported for each group. Appendix A lists variable definitions.

Group	No. of Obs.	Mean LOAN_INTENSITY	Mean DIV	Mean *DIV_DUM*
1	738	0.0377	0.0118	0.5772
2	737	0.0675	0.0114	0.5780
3	737	0.0891	0.0099	0.5360
4	737	0.1091	0.0092	0.5400
5	737	0.1311	0.0078	0.4668
6	737	0.1546	0.0080	0.4722
7	737	0.1782	0.0068	0.4532
8	737	0.2020	0.0066	0.4695
9	737	0.2275	0.0059	0.4030
10	737	0.2560	0.0052	0.3962
11	738	0.2872	0.0052	0.3780
12	737	0.3208	0.0057	0.3758
13	737	0.3628	0.0051	0.3514
14	737	0.3975	0.0045	0.3406
15	737	0.4420	0.0036	0.2687
16	737	0.5001	0.0043	0.2917
17	737	0.5629	0.0038	0.3216
18	737	0.6552	0.0042	0.2795
19	737	0.7971	0.0040	0.2768
20	737	0.9875	0.0040	0.2768

DIV_DUM is the dependent variable, while only observations where *DIV* is greater than zero are used when *LNDIV* is the dependent variable. Hence, when *DIV* is the dependent variable, we are testing the overall relation between the level of dividend payouts and bank lending intensity. When *DIV_DUM* is the dependent variable, we are testing whether there is a relation between the bank lending intensity and the decision to pay out dividends. When *LNDIV* is the dependent variable, we are testing whether firms base their dividend payout level on bank lending intensity, conditional on the decision to pay dividends. The vector of control variables is as follows:

$$\begin{aligned}\text{CONTROLS} = [&\textit{LDIV}, \textit{COVENANT}, \textit{GROWTH}, \textit{LNASSETS}, \textit{INCOME}, \textit{LEV}, \textit{FCF}, \textit{MB},\\ &\textit{TAXES}, \textit{RISK}, \textit{INTANGIBLE}, \textit{Z}, \textit{DEBT\_DUM}, \textit{INSIDER}, \textit{INSIDER}\,\hat{}\,2,\\ &\textit{INSTHLD}, \textit{DEBT\_ISSUE}, \textit{PRINCIPAL}, \text{industry dummies},\\ &\text{fiscal year dummies}].\end{aligned} \tag{2}$$

All control variables are defined in Section I.B (and listed in Appendix A). We perform two types of regression tests. Section II.A presents results using regression models under the assumption that *LOAN_INTENSITY* is exogenous to the dividend payout decision. In Section II.B we implement the instrumental variable methodology to control for the possibility that *LOAN_INTENSITY* is endogenously determined.

A. Simple Regression Estimation Results

The results of the simple regression estimations of Equation (1) are reported in Table IV. Since *DIV* is left censored with a lower bound of zero, we implement a Tobit estimation technique in column (1) of Table IV. When *LNDIV* is the dependent variable, we implement ordinary least squares (OLS) estimation (see column (2) of Table IV). We estimate a Probit and Logit models when *DIV_DUM* is the dependent variable (results in column (3) of Table IV).[16]

Table IV shows that the bank loan intensity coefficients in all four regressions are significantly negative, indicating an inverse relation between dividend payout and firm dependence on bank loans. This result is robust in all four specifications even after adding controls for lagged dividends, size, income, leverage, growth, risk, and the issuance of public debt. Consistent with theory, the control variables with significant coefficients across all four specifications are lagged dividends (positive), dividend restricting covenants (negative), size (positive for both assets and income), and firm risk exposure (negative). Moreover, the inverse relation between dividend payout and loan intensity persists even with the inclusion of corporate governance variables that control for large institutional block holders and insiders.[17]

B. Instrumental Variables (IV) Regression Analysis

While suggestive, the regression results presented in Table IV may be subject to selectivity bias since they do not take into account the possibility that *LOAN_INTENSITY* is endogenous. That is, firms that have a low dividend payout policy may choose to borrow more from banks since they are internally retaining profits for investment and other purposes. We hypothesize that dividend payout policy is inversely related to the level of the firm's dependence on bank financing, as measured by the *LOAN_INTENSITY* variable. However, firms with low dividend payouts may tend to be more reliant on bank loan financing since they are capital constrained. That is, if a firm has profitable investment opportunities, it might simultaneously increase its bank borrowing activity, and also reduce its dividend payouts, so as to reinvest net income as in Myers and Majluf (1977). Thus, an inverse relation may be spuriously determined by endogeneity in the firm's financing activities. To address this problem, we utilize an instrumental variables approach. For consideration, our instrumental variables must vary with *LOAN_INTENSITY* due to exogenous factors not related to the firm's dividend policy. Hence, the instruments must be correlated with bank lending intensity, and only influence the dividend policy measures through the lending intensity variable.

To control for endogeneity in our regressions, we define two instrumental variables related to overall conditions in the bank loan market, as well as the borrowing firm's characteristics. It is clear that if bank credit approval policies become increasingly strict (lenient), then bank loan availability will decrease (increase), ceteris paribus. Thus, bank credit approval policies will impact the *LOAN_INTENSITY* variable without directly impacting dividend policy. To measure the availability of bank loan financing, we utilize a quarterly measure of bank lending standards called the "Net Percentage of Domestic Respondents Tightening Standards for C&I Loans" (denoted *CHANGE_TIGHTNESS*) provided by the *Federal Reserve Bank Senior Loan*

[16] In all specifications, standard errors are adjusted for the possibility of heteroskedasticity and firm clustering. The results are robust to unadjusted standard errors.

[17] There is an inverse relationship between dividend payouts and institutional holdings. However, the coefficient is not consistently significant across all specifications and actually has less statistical significance in the IV regressions presented in Table V, as compared to the results in Table IV. This can be explained by the endogeneity of institutional holdings, which are significantly positively related to loan intensity (see Probit results in Table VI).

Table IV. Simple Regression Estimation

The relation between dividends and LOAN_INTENSITY is tested using the model: DIVIDEND MEASURE $= \alpha + \gamma \cdot \ln(\text{LOAN\_INTENSITY}) + \beta' \cdot \text{CONTROLS} + e$, where CONTROLS = [LDIV, COVENANT, GROWTH, LNASSETS, INCOME, LEV, FCF, MB, TAXES, RISK, INTANGIBLE, *Z*, DEBT_DUM, INSIDER, INSIDER ^ 2, INSTHLD, DEBT_ISSUE, PRINCIPAL, industry dummies, fiscal year dummies]. Three separate specifications of the dividend measure are DIV, LNDIV, and DIV_DUM. Tobit estimation is implemented when DIV is the dependent variable; OLS regression is implemented when LNDIV is the dependent variable; Probit and Logit estimations are performed when DIV_DUM is the dependent variable. Appendix A lists variable definitions. Standard errors are adjusted for heteroskedasticity and firm clustering.

Sample Model Dependent	All obs. Tobit DIV	DIV > 0 OLS LNDIV	All obs. Probit DIV_DUM	All obs. Logit DIV_DUM
ln(LOAN_INTENSITY)	−0.0009***	−0.0475*	−0.0463**	−0.0926**
	(0.0003)	(0.0281)	(0.0231)	(0.0470)
LDIV	0.4907***	0.4387***	2.7426***	4.8759***
	(0.0232)	(0.0367)	(0.0388)	(0.0796)
COVENANT	−0.0032***	−0.1556***	−0.1784***	−0.3349***
	(0.0005)	(0.0492)	(0.0416)	(0.0829)
GROWTH	−0.0070***	−0.9600***	0.0329	0.0144
	(0.0009)	(0.1123)	(0.0632)	(0.1381)
LNASSETS	0.0036***	0.1449***	0.1676***	0.3319***
	(0.0002)	(0.0237)	(0.0171)	(0.0349)
INCOME	0.0068**	0.7958	0.4183**	0.9147**
	(0.0030)	(0.7953)	(0.2123)	(0.4187)
LEV	−0.0076***	−0.1756	−0.4878***	−0.8826***
	(0.0020)	(0.2359)	(0.1277)	(0.2592)
FCF	0.0013	0.5009	0.0448	0.2065
	(0.0013)	(0.3079)	(0.0782)	(0.1675)
MB	0.0013***	0.1502**	0.0423	0.0475
	(0.0005)	(0.0586)	(0.0325)	(0.0641)
TAXES	0.0084	3.7887***	−0.5955	−1.0839
	(0.0077)	(1.3799)	(0.5283)	(1.0664)
RISK	−0.0649***	−3.4167***	−3.2606***	−6.9555***
	(0.0053)	(0.5704)	(0.4064)	(0.7258)
INTANGIBLE	−0.0025	−0.1333	−0.2661**	−0.5893**
	(0.0018)	(0.1771)	(0.1195)	(0.2408)
Z	−0.0003	−0.0341	−0.0089	−0.0135
	(0.0002)	(0.0281)	(0.0120)	(0.0243)
DEBT_DUM	−0.0013**	−0.0754	−0.0836**	−0.1639**
	(0.0006)	(0.0508)	(0.0413)	(0.0826)
INSIDER	0.0024	−0.2622∗	0.5072	1.0223
	(0.0040)	(0.1570)	(0.3157)	(0.6440)
INSIDER^2	−0.0075	0.2953∗	−0.9115**	−1.7628**
	(0.0046)	(0.1757)	(0.3652)	(0.7230)
INSTHLD	−0.0037**	−0.5178***	−0.1217	−0.1721
	(0.0015)	(0.1373)	(0.0935)	(0.1926)
DEBT_ISSUE	0.0002	−0.0299	0.1066**	0.1962∗
	(0.0005)	(0.0567)	(0.0538)	(0.1121)
PRINCIPAL	0.0002	0.3364**	−0.065	−0.1292
	(0.0011)	(0.1664)	(0.1098)	(0.2445)

(*Continued*)

Table IV. Simple Regression Estimation (*Continued*)

Sample Model Dependent	All obs. Tobit DIV	DIV > 0 OLS LNDIV	All obs. Probit DIV_DUM	All obs. Logit DIV_DUM
CONSTANT	−0.0175***	−4.6710***	−1.9803***	−3.6193***
	(0.0024)	(0.2107)	(0.1875)	(0.3849)
Year dummies	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES
Chi-square	2,524.19		6,276.15	4,440.52
R-square		0.582		
N	14,742	5,936	14,742	14,742

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

Officer Opinion Survey. Our first instrumental variable, *CHANGE_TIGHTNESS*, measures the perceptions of bank managers about overall lending practices in the bank loan market, and ranges from –100% to +100%. Hence, lending standards can range from the most lenient (–100%) to the tightest (+100%). We hypothesize that the level of bank financing, and *LOAN_INTENSITY* increases (decreases) as lending conditions improve (deteriorate), i.e., as *CHANGE_TIGHTNESS* decreases (increases).

The second instrumental variable relates to the bank/borrower relationship. There is an extensive literature describing the private information generated in the course of a long-term bank-borrower relationship; see Boot (2000) for a survey of relationship lending. However, it is also well established that intensive and exclusive banking relationships can breed a damaging hold-up problem. More intensive banking relationships may produce private information that could enable even informationally opaque firms to finance investment opportunities, but may also enable the bank to extract project rents. Firms will, therefore, weigh these two offsetting effects in determining the intensities of their bank borrowing activities. Houston and James (1996) show that firms can mitigate detrimental hold-up effects by maintaining multiple bank relationships. Our second instrumental variable, *N_LEAD,* measures the number of bank relationships incorporated in the *LOAN_INTENSITY* variable to control for the exclusivity of the lead bank relationship.[18] *N_LEAD* is defined as the number of lead arrangers (value-weighted) for all of the loans originated between year *t*–3 and *t*–1 with maturity after year *t* for each borrower. We hypothesize that firms with more banking relationships are more dependent on banks for financing, and therefore, *LOAN_INTENSITY* and *N_LEAD* are positively correlated. However, in the presence of multiple banking relationships, each lead bank has less hold-up power, thereby reducing the *LOAN_INTENSITY* variable's impact on dividend policy.

We perform formal econometric endogeneity tests in Appendix B. Our results support the use of the two instrumental variables, *CHANGE_TIGHTNESS* and *N_LEAD* in the regressions to control for selectivity bias.

The results of the IV estimation are reported in Table V. All coefficients on the *LOAN_INTENSITY* variable are significantly negative at the 5% level or better. To gauge the

[18] Since the *LOAN_INTENSITY* variable is measured using a fixed 50% takedown rate, there is no relation between the intensity of use of loan lines of credit and investment opportunities that could violate the exclusion restriction.

Table V. Method of Instrumental Variables

The relation between dividends and LOAN_INTENSITY is tested using the model: DIVIDEND MEASURE $= \alpha + \gamma \cdot \ln(\text{LOAN\_INTENSITY}) + \beta' \cdot \text{CONTROLS} + e$, where CONTROLS = [LDIV, COVENANT, GROWTH, LNASSETS, INCOME, LEV, FCF, MB, TAXES, RISK, INTANGIBLE, *Z*, DEBT_DUM, INSIDER, INSIDER ^ 2, INSTHLD, DEBT_ISSUE, PRINCIPAL, industry dummies, fiscal year dummies]. Three separate specifications of the dividend measure are DIV, LNDIV, and DIV_DUM. The method of instrumental variables is implemented where the instrumental variables are CHANGE_TIGHTNESS and N_LEAD. IV Tobit estimation is implemented when DIV is the dependent variable; IV OLS regression is implemented when LNDIV is the dependent variable; IV Probit and IV Logit estimations are performed when DIV_DUM is the dependent variable. Appendix A lists variable definitions. Standard errors are adjusted for heteroskedasticity and firm clustering.

Sample	**All obs.**	**DIV > 0**	**All obs.**	**All obs.**
Model	**Tobit**	**OLS**	**Probit**	**Logit**
Dependent	**DIV**	**LNDIV**	**DIV_DUM**	**DIV_DUM**
ln(LOAN_INTENSITY)	−0.0039***	−0.2818**	−0.2219**	−0.4533**
	(0.0014)	(0.1367)	(0.1040)	(0.2156)
LDIV	0.4912***	0.4378***	2.7048***	4.8459***
	(0.0230)	(0.0365)	(0.0535)	(0.0811)
COVENANT	−0.0016**	0.0355	−0.1065*	−0.1883
	(0.0008)	(0.0714)	(0.0594)	(0.1185)
GROWTH	−0.0066***	−0.8832***	0.0463	0.0386
	(0.0009)	(0.1155)	(0.0631)	(0.1384)
LNASSETS	0.0027***	−0.0033	0.1278***	0.2540***
	(0.0004)	(0.0384)	(0.0288)	(0.0562)
INCOME	0.0074**	0.6719	0.4403**	0.9780**
	(0.0030)	(0.8253)	(0.2109)	(0.4235)
LEV	−0.0071***	−0.0825	−0.4671***	−0.8381***
	(0.0020)	(0.2461)	(0.1278)	(0.2593)
FCF	0.0013	0.4723	0.0453	0.2072
	(0.0013)	(0.3156)	(0.0777)	(0.1681)
MB	0.0009*	0.1094*	0.0262	0.0113
	(0.0005)	(0.0609)	(0.0342)	(0.0678)
TAXES	0.0123	5.0462***	−0.423	−0.7364
	(0.0078)	(1.4619)	(0.5367)	(1.0925)
RISK	−0.0656***	−2.9593***	−3.2915***	−7.0880***
	(0.0053)	(0.5828)	(0.4034)	(0.7259)
INTANGIBLE	0.0007	0.2753	−0.1243	−0.3102
	(0.0021)	(0.2065)	(0.1454)	(0.2937)
Z	−0.0001	−0.0146	−0.0022	0.0012
	(0.0002)	(0.0286)	(0.0127)	(0.0259)
DEBT_DUM	−0.0015***	−0.0922*	−0.0927**	−0.1874**
	(0.0006)	(0.0539)	(0.0415)	(0.0833)
INSIDER	0.003	−0.2531*	0.5332*	1.0711*
	(0.0040)	(0.1330)	(0.3153)	(0.6436)
INSIDER ^ 2	−0.0083*	0.1869*	−0.9425***	−1.8122**
	(0.0046)	(0.1013)	(0.3650)	(0.7210)
INSTHLD	−0.0022	−0.3466**	−0.0572	−0.0388
	(0.0015)	(0.1366)	(0.1001)	(0.2061)
DEBT_ISSUE	0.0002	−0.0139	0.1059**	0.1980*
	(0.0005)	(0.0586)	(0.0537)	(0.1124)
PRINCIPAL	0.0005	0.3673**	−0.0514	−0.1048
	(0.0011)	(0.1686)	(0.1094)	(0.2468)

(*Continued*)

Table V. Method of Instrumental Variables (*Continued*)

Sample Model Dependent	All obs. Tobit DIV	DIV > 0 OLS LNDIV	All obs. Probit DIV_DUM	All obs. Logit DIV_DUM
CONSTANT	−0.0198***	−0.8297***	−2.0693***	−3.8461***
	(0.0025)	(0.1279)	(0.1914)	(0.4078)
Year dummies	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES
Chi-square	2,499.13		6,368.91	4,427.93
R-square		0.5370		
N	14,742	5,936	14,742	14,742

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

economic significance of these results, a one standard deviation increase in loan intensity (using the *DIV* specification in column (1) of Table V) results in a 27.97% decrease in dividend payout ceteris paribus.[19]

The inverse relation between dividend payout and loan intensity is robust to the inclusion of control variables. Moreover, after controlling for endogeneity, the controls for lagged dividends, firm risk exposure and the absence of rated debt (*DEBT_DUM*) are statistically significant in all four specifications. That is, we find persistence in the firm's dividend payout policy (positive coefficient on *LDIV*), an inverse relation between dividend payout and firm risk, and a positive relation between the presence of outstanding S&P-rated debt and dividend payout policy.[20]

We have identified two possible explanations for the finding of an inverse relation between dividend payout policy and bank lending intensity: 1) the corporate governance motivation, where banks act as monitors obviating the need for costly dividend precommitment to discipline management; and 2) the cash flow protection motivation, where banks protect their senior claim on the firm's assets. Table V provides some evidence that both mechanisms are at work. We find that after controlling for corporate governance mechanisms (insider stake and institutional block holdings) there is still an inverse relation between dividend payout policy and bank lending intensity. If bank monitoring is a substitute for institutional monitoring or managerial self-monitoring (via high stock holdings) then including these variables would negate the significance of the loan intensity variable. Despite controlling for this tradeoff between corporate governance mechanisms and dividend policy as monitoring mechanisms, Table V shows the persistence of an inverse relation between dividend payout and bank lending intensity, consistent with the existence of the cash flow protection motivation for bank lenders in addition to the corporate governance motivation.

[19] That is, using the results of column (1) in Table V, a one standard deviation increase in the fitted ln(*LOAN INTENSITY*) obtained from the first stage of the IV Tobit procedure is 0.4590. The coefficient estimate of –0.0039 shown in column (1) of Table V represents a 27.97% decline relative to the sample mean of 0.0064 of *DIV* reported in Table I.

[20] We have also added firm age and an index of US macroeconomic activity (as measured by the Chicago Fed National Activity Index (CFNAI) with no qualitative change in results. To conserve space, these results are available upon request.

III. Robustness Tests

In this subsection, we further demonstrate the robustness of our results by using propensity score matching as another methodology to control for endogeneity. Propensity score matching (see Rosenbaum and Rubin, 1983, 1985a, 1985b) involves estimation of the propensity of one of two states (treatment or control) based on selected determinants of participation in the states, and then uses a matching procedure to identify firms that have similar propensities but differ in their participation in the states.[21] In our context, the treatment is high loan intensity, whereas the control is low loan intensity. Hence, our method determines the propensity score for firms being characterized as high if their *LOAN_INTENSTIY* is above the sample median *LOAN_INTENSITY*, and the remaining firms are put into the low loan intensity category. We then match the high loan intensity "treatments" to the low loan intensity "controls" on the basis of these propensity scores.

To develop propensity score for each observation, we estimate the following Probit model:

$$\begin{aligned} LOAN\_INTENSITY\_CATEGORY = {} & LDIV, COVENANT, GROWTH, LNASSETS, INCOME, \\ & LEV, FCF, MB, TAXES, RISK, INTANGIBLE, Z, \\ & DEBT\_DUM, INSIDER, INSIDER\,\hat{}\,2, INSTHLD, \\ & DEBT\_ISSUE, PRINCIPAL, CHANGE\_TIGHTNESS, \\ & N\_LEAD, \text{industry dummies, fiscal year dummies} + \text{e.} \quad (3) \end{aligned}$$

In the above model, *LOAN_INTENSITY_CATEGORY* is a dummy variable equal to one if the observation has been categorized as high loan intensity and zero otherwise. All other variables are as defined in Appendix A. The results of the above estimation are presented in Table VI.[22]

Consistent with our choice of *CHANGE_TIGHTNESS* and *N_LEAD* as instrumental variables in Section II.B, these variables are statistically significantly (at the 1% level) and positively related to *LOAN_INTENSITY.*

Table VII reports the summary statistics on *DIV* and *DIV_DUM* for the high and low *LOAN_INTENSITY* groups.[23] The matched test results show that, on average, firms with high loan intensity pay significantly less dividends than otherwise similar firms with low loan intensity, consistent with the cash flow protection motivation implying an inverse relation between dividend payout policy and bank lending intensity.

[21] Examples of the use of propensity matching in the finance literature includes Bharath et al. (2011), Drucker and Puri (2005), Gottesman and Roberts (2007), Heckman, Ichimura, and Todd (1998), Michaely and Roberts (2007), and Saunders and Steffen (2011).

[22] A propensity score of 0.8 indicates that the given observation has an 80% chance of being high loan intensity given the specified determinants. The average propensity score for those observations categorized as high loan intensity is 0.5965, and 0.4022 for those categorized as low loan intensity. To ensure that propensity scores overlap, we eliminate those high loan intensity observations whose propensity scores are outside of the range of propensity scores associated with low loan intensity observations. This eliminates eight high loan intensity treatment observations. Matches are then identified for the remaining 7,363 observations specified as high loan intensity borrowers.

[23] We next use the nearest neighbor matching method to match the high loan intensity treatments to the low loan intensity controls using the propensity score closest to treatment as the match. We recycle a control used as a match to maximize the number of matched observations. In its simplest form nearest neighbor matching identifies a single matched control, designated as NN(1). We test the robustness of our results by expanding from the single nearest control to a group that contains the nearest 50 (N(50)) and 100 (N(100)) controls in terms of propensity score. Table VII shows that the results are robust to alternative methods of nearest neighbor matching.

Table VI. LOAN_INTENSITY Propensity Score Probit Estimation

The propensity of falling into a high LOAN_INTENSITY category is determined through the Probit regression: LOAN_INTENSITY_CATEGORY = LDIV, COVENANT, GROWTH, LNASSETS, INCOME, LEV, FCF, MB, TAXES, RISK, INTANGIBLE, *Z*, DEBT_DUM, INSIDER, INSIDER^2, INSTHLD, CHANGE_TIGHTNESS, N_LEAD, DEBT_ISSUE, PRINCIPAL, industry dummies, fiscal year dummies + *e*. LOAN_INTENSITY_CATEGORY is a dummy variable taking the value of one if firm's loan intensity is above the sample median LOAN_INTENSITY. Appendix A lists variable definitions.

	LOAN_INTENSITY Category Propensity
LDIV	1.1932*
	(0.6437)
COVENANT	0.5560***
	(0.0276)
GROWTH	0.1969***
	(0.0339)
LNASSETS	−0.4454***
	(0.0125)
INCOME	0.3007***
	(0.1037)
LEV	0.2233***
	(0.0722)
FCF	−0.0487
	(0.0362)
MB	−0.1207***
	(0.0175)
TAXES	1.2317***
	(0.3409)
RISK	−0.4857***
	(0.1795)
INTANGIBLE	1.0517***
	(0.0737)
Z	0.0511***
	(0.0064)
DEBT_DUM	−0.1279***
	(0.0280)
INSIDER	0.2994
	(0.1939)
INSIDER^2	−0.4087*
	(0.2190)
INSTHLD	0.4497***
	(0.0601)
DEBT_ISSUE	0.0078
	(0.0350)
PRINCIPAL	0.1203**
	(0.0597)
CHANGE_TIGHTNESS	0.0158
	(0.1669)
N_LEAD	0.4845***
	(0.0233)
CONSTANT	1.5349***
	(0.1347)
Year dummies	YES
Industry dummies	YES
Chi-square	3,159.11
N	14,742

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

Table VII. Matched Tests

Propensity scores are used to identify matches between observations characterized as high and low LOAN_INTENSITY_CATEGORY. To ensure that propensity scores overlap, those high LOAN_INTENSITY observations whose propensity scores are outside of the range of propensity scores associated with low LOAN_INTENSITY observations are eliminated. Nearest neighbor matching with replacement is implemented using *k*-nearest neighbors, where *k* is defined as 1, 50, and 100 (NN(1), NN(50), and NN(100), respectively). Entries in the table report the averages of DIV and DIV_DUM for the high and low LOAN_INTENSITY matched pairs, mean differences, and standard errors. Appendix A lists variable definitions.

		DIV	DIV_DUM
NN(1)	High LOAN_INTENSITY	0.0046	0.3162
	Low LOAN_INTENSITY	0.0053	0.3552
	Difference	−0.0007*	−0.0390***
	Standard error	(0.0003)	(0.0131)
NN(50)	High LOAN_INTENSITY	0.0046	0.3162
	Low LOAN_INTENSITY	0.0052	0.3494
	Difference	−0.0006**	−0.0333***
	Standard error	(0.0003)	(0.0101)
NN(100)	High LOAN_INTENSITY	0.0046	0.3162
	Low LOAN_INTENSITY	0.0052	0.3541
	Difference	−0.0006**	−0.0379***
	Standard error	(0.0003)	(0.0101)
Unmatched	High LOAN_INTENSITY	0.0046	0.3161
	Low LOAN_INTENSITY	0.0081	0.4892
	Difference	−0.0035***	−0.1731***
	Standard error	(0.0002)	(0.0080)

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

The results of the matching tests are also consistent with the corporate governance motivation for dividend policy. We incorporate corporate governance variables in our propensity score estimation performed to match the observations in the sample. As shown in Table VI, institutional block holding (*INSTHLD*) corporate governance mechanisms had a statistically significant (at the 1% level) positive impact on the propensity score. Even after taking that into account, Table VII shows a statistically significant (at the 5% level or better) inverse relation between loan intensity and dividend payout policy, suggesting a complementary role for corporate governance mechanisms and bank monitoring in determining corporate dividend policies.

IV. Conclusion

We document the inverse relation between dividend payout policy and the dependence of the firm on bank financing. That is, the more reliant a firm is on bank loans, the lower their dividend payout, ceteris paribus. We identify two complementary reasons for this effect: 1) monitoring by relationship banks acts as an effective governance mechanism, thereby reducing the gains from precommitting to costly dividend payouts (*the corporate governance motivation*); and 2) banks limit dividend payouts to shareholders to protect the integrity of their senior claim on the firm's

assets (*the cash flow protection motivation*). The inverse relation persists even after controlling for corporate governance mechanisms such as insider stake and institutional block holdings, suggesting a complementary role for corporate governance mechanisms and bank monitoring in determining corporate dividend policies.

Our results are robust to several methodological specifications. We utilize different specifications of both independent and dependent variables. We also employ a two-stage instrumental variables analysis to control for the endogeneity in dividend payout policy. Moreover, we utilize a matched pair sampling technique to further investigate the relation between dividend payout policy and bank lending intensity. The inverse relation between dividend payout and bank lending intensity is robust to all methodologies and variable definitions.

Appendix A: Variable Definition

Variable	Definition
Dividend payout variables	
DIV	Ratio of firm's cash dividends to its net sales, with a lower bound value of zero
LNDIV	Natural logarithm of DIV
DIV_DUM	Dummy variable taking the value of one if firm pays cash dividends, and zero otherwise
Loan intensity variables	
LOAN_INTENSITY	Total amount of loans outstanding provided by banks to the firm between fiscal year $t-3$ and $t-1$. with maturity after year t normalized by total liabilities of the firm at the beginning of fiscal year t
ln(LOAN_INTENSITY)	Natural logarithm of LOAN_INTENSITY
Instrumental variables	
CHANGE_TIGHTNESS	Net percentage of domestic respondents tightening standards for commercial and industrial loans as reported by the Federal Reserve Board's Senior Loan Officer Opinion Survey on Bank Lending Practices for the quarter of the observation
N_LEAD	The value-weighted number of leading arrangers of loans originated between year t–3 and t–1 with maturity after year t
Control variables	
COVENANT	Dummy variable taking the value of one if a loan deal contains any dividend covenant reported on the DealScan database
GROWTH	Relative changes in net sales from the previous fiscal year
LNASSETS	Natural logarithm of firm's total assets
INCOME	Net income normalized by its total assets
LEV	Book value of current and long-term debts normalized by total assets
FCF	EBITDA minus changes in working capital (current assets minus current liabilities) minus capital expenditure normalized by net sales; Capital expenditure is set to zero if missing
MB	Ratio of the market value of equity plus the book value of current and long-term debts to the book value of total assets
TAXES	Income taxes normalized by net sales. RISK is the standard deviation of market-adjusted monthly stock returns in the given fiscal year t

(*Continued*)

Appendix A: Variable Definition (*Continued*)

Variable	Definition
INTANGIBLE	Ratio of intangible assets to total assets
Z	Altman Z-score based on the formula: $Z = 1.2 \times T1 + 1.4 \times T2 + 3.3 \times T3 + 0.6 \times T4 + 0.999$T, where $T1$ = Working Capital/Total Assets; $T2$ = Retained Earnings/Total Assets; $T3$ = Earnings Before Interest and Taxes/Total Assets; $T4$ = Market Value of Equity/Book Value of Total Liabilities; $T5$ = Sales/Total Assets.
DEBT_DUM	Dummy variable equal to one if a firm does not have a debt instrument with an S&P credit rating and a maturity date after the end of fiscal year t
INSIDER	Ratio of total market value of shares held by firm's management at the end of fiscal year t to its total market capitalization
INSIDER^2	INSIDER squared
INSTHLD	Institutional holding variable, constructed by averaging quarterly institutional ownership data for each year. INSTHLD is set to zero if missing in the database
DEBT_ISSUE	Dummy variable set to one if a firm issues public debt in fiscal year t
PRINCIPAL	Total amount of public debt issued by the firm in fiscal year t, normalized by its total assets at the beginning of year t

Appendix B: Endogeneity Tests

To tests for endogeneity in our model, we perform the Durbin-Wu-Hausman test (Durbin, 1954; Hausman, 1978; Wu, 1973) for the OLS regression model and the test for endogeneity proposed by Smith and Blundell (1986) for the Probit and Tobit models. Panel A of Table AI reports the results of these tests. As can be seen from Table AI, both tests reject the null hypothesis of exogeneity of bank lending intensity in our model. We therefore implement the method of instrumental variables to control for the endogenity of *LOAN_INTENSITY*.

In our instrumental variables estimation we regress the endogenous regressor, *LOAN_INTENSITY*, against the instrumental variables and the vector of control variables in Equation (2). The dividend measure is regressed on the predicted values of *LOAN_INTENSITY* as well as the control variables. Maximum likelihood estimation is used when the structural equation is Probit or Tobit. Two-stage least squares is used when the structural equation is ordinary least squares. Standard errors are adjusted for the possibility of heteroskedasticity and firm clustering.[24]

We utilize two instrumental variables: *CHANGE_TIGHTNESS*, a measure of the tightness of lending standards overall, and *N_LEAD*, a measure of the number of relationship banks for each borrower.[25] In addition to the economic justification of the choice of these instrumental

[24] The results are robust to changes from maximum likelihood estimation to two stage estimation and v.v., as well as to unadjusted standard errors.

[25] In an earlier version of this paper, we followed John and Knyazeva (2006) and also used an industry measure as an instrumental variable. In our specification, we measured bank lending intensity on an industry level. Results were qualitatively unchanged from those presented here.

variables provided in Section II.B, we perform formal statistical tests to determine whether our two instrumental variables, *CHANGE_TIGHTNESS* and *N_LEAD*, are correlated to the structural equation's error term *LOAN_INTENSITY*. To test whether the instruments are exogenous to the structural equation we implement the Sargan (1958) test when the structural equation is OLS and the Amemiya-Lee-Newey minimum chi-square statistic (Lee, 1992; Newey, 1987) when the structural equation is Probit or Tobit. These test the null hypotheses that the instruments are valid, i.e., the chosen instruments are not correlated to the structural equation's error term and therefore correctly excluded from the structural equation. Table AI, Panel B reports the results of these tests. For all three models, we fail to reject the null hypothesis. This affirms the exogeneity of the instruments.

Table AI. Tests of Endogeneity and Instruments

Panel A tests endogeneity of LOAN_INTENSITY in the regression estimation DIVIDEND MEASURE $= \alpha + \gamma \cdot \ln(\text{LOAN\_INTENSITY}) + \beta' \cdot \text{CONTROLS} + e$. The Durbin-Wu-Hausman test (Durbin, 1954; Wu, 1973; Hausman, 1978; is implemented for the OLS regression model and Smith and Blundell (1986) for the Probit and Tobit models. Panel B tests whether the instruments (CHANGE_TIGHTNESS, N_LEAD) are exogenous to the structural equation. The Sargan (1958) test is performed when the structural equation is OLS and the Amemiya-Lee-Newey minimum chi-sq statistic (Newey, 1987; Lee, 1992) when the structural equation is Probit or Tobit. The Anderson (1951) canonical correlation LR statistic is estimated to test whether the instruments are underidentified. The Cragg and Donald (1993) statistic is estimated to test for weak instruments, and the statistic is compared to the Stock and Yogo (2005) critical values.

	DIV	LNDIV	DIV_DUM
Panel A. Testing Endogeneity of LOAN_INTENSITY			
Smith-Blundell statistic	17.1920		2.7593
Durbin-Wu-Hausman statistic		6.1180	
p-value	0.0000	0.0134	0.0967
Panel B. Testing Exogeneity of the Instruments			
Amemiya-Lee-Newey	0.009		1.081
Sargan statistic		1.231	
p-value	0.9247	0.2673	0.2985
Anderson canonical correlation LM statistic	852.149	298.131	852.149
p-value	0.0000	0.0000	0.0000
Cragg-Donald statistic	450.834	155.758	450.834
Stock Yogo critical values, maximal size of 10, of a 5% Wald test	19.93	19.93	19.93

Further, we test whether our models are under identified or weak.[26] The Anderson (1951) canonical correlation LR statistic is estimated to test the null hypothesis that the instruments are underidentified. The Anderson canonical correlation LR statistic for all models, reported in Panel B of Table AI, are significantly different from zero, rejecting the null of underidentification. The Cragg and Donald (1993) statistic is estimated to test for weak instruments. The Cragg-Donald

[26] These tests are implemented in the context of a linear IV two-stage least squares estimation. We are not aware of similar tests of under identification or weak instruments that account for Probit or Tobit structural equations. Angrist and Kruger (2001, p. 80) note, "Even if the underlying second-stage relation is nonlinear, linear instrumental variables estimates such as two-stage least squares typically capture an average effect of economic interest. . ." Therefore, we implement these tests in our context.

statistics for all models, reported in Panel B of Table AI, are above the Stock and Yogo (2005) critical values.[27] This suggests that our instrumental variables are not weak.

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[27] The Cragg-Donald statistic is significantly different from zero at the 5% significance level of a Wald test for the desired maximal size of 10. See table II of Stock and Yogo (2005).

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