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Bank Balance Sheets and the Value of Lending

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Abstract

We study 1,400 UK syndicated loans, together with the financial history of the lead bank and the borrowing firm. We interpret abnormal equity returns around loan announcements as the value of the lending relationship to the firm. We find that: *(i)* Consistent with previous evidence, the value of lending is higher when the firm is riskier or more opaque, suggesting that it primarily reflects the lead bank's screening and monitoring activities. *(ii)* As a bank becomes larger, more profitable or more capitalized, the value of its loans first increases and then decreases. The largest, most capitalised or most profitable banks do not give the most valuable loans. *(iii)* Firms which receive low-value loans are more likely to experience low profitability and financial distress during the lending relationship. By relating the state of bank balance sheets to borrower performance, we offer a new angle to evaluate the impact of financial conditions on the real economy.

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Keywords: Bank balance sheets, loan announcement effect, bank monitoring.

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Contents

List of Tables

List of Figures

I Introduction

The state of bank balance sheets can affect both the *quantity* and the *composition* of new bank lending. Bank funding costs and capitalization appear to affect bank lending volumes (Bernanke & Blinder 1992, Jiménez et al. 2014, Bridges et al. 2014); and bank asset growth and the monetary policy stance appear to affect banks' attitude towards risk, as captured by their leverage, internal credit ratings, or willingness to fund high-risk borrowers. (Adrian & Shin 2010, Dell'Ariccia et al. 2016, Jiménez et al. 2014).

In this paper, we relate bank balance sheets to another dimension of bank lending: its *value* to the borrower. Bank lending relationships affect the value of the firm in a unique way, as conjectured by Fama (1985). Banks can relax firms' financing constraints when capital market financing is not available. They can also provide firms with valuable cash management or trade finance services. More importantly, banks' expertise can improve borrowers' prospects: initial screening can help firms select appropriate projects; and ongoing monitoring and intervention can induce more effort by company management. How can the state of bank balance sheets affect the value of their lending? Trivially, more profitable banks have more resources to spend on screening, monitoring and other services. In addition, balance sheet size and diversification may affect banks' incentives to monitor by making the marginal loan more or less correlated with their overall return on assets (Diamond 1984). Furthermore, different exposure to the loan outcome - measured, for example, by loan size relative to bank capital - may also affect monitoring intensity (Besanko & Kanatas 1993, Holmstrom & Tirole 1997).

Our main contribution is to assess the empirical link between various bank balance sheet characteristics and the value of their loans. To our knowledge, this is the first study on the subject. Since bank balance sheets play a key role in the transmission of monetary and prudential policy changes (Van den Heuvel 2007), our study offers a new angle to evaluate the impact of those changes on the economy.

Our analysis relies on a dataset of around 1,400 syndicated loans to United Kingdom publicly listed non-financial firms. We merge the loan data with the published accounts of both the borrower and the lead bank in the syndicate. While syndicates can include more than 20 banks, we focus on the syndicate *lead bank*: the one which establishes the relationship with the firm, and has primary responsibility for screening and monitoring (Sufi 2007). Our dataset covers around 400 firms and 37 lead banks over 21 years (see Appendix A).

We measure the value of lending using the change in the market value of the firm's equity as a loan is announced, or "announcement effect." Two well-documented properties of the an-

nouncement effect make it a valid measure. First, bank loan announcements tend to produce positive and significant abnormal equity returns, while equity issues, bond issues and private debt placements do not (Mikkelson & Partch 1986, James 1987, Dahiya et al. 2003). Second, the announcement effect tends to be stronger for relatively more opaque or riskier borrowers, such as small firms and firms with negative profitability trends (Slovin et al. 1992, Wansley et al. 1992, Best & Zhang 1993). These results suggest that the announcement effect captures the expected impact of banks' information-intensive screening and monitoring activities. We exploit the announcement effect methodology to answer two questions: Does the market value of lending vary between banks, in particular reflecting their balance sheet position? And is variation in this market-based measure economically relevant?

We first verify that, on average, a loan announcement produces a positive and significant abnormal return on the borrowing firm's equity of 0.4 percent. We also find substantial variation in the loan announcement effect between banks and over time: the within- and between-bank standard deviations of abnormal returns 3 and 6 times the mean abnormal return, respectively.

We then study the distribution of the announcement effect across various bank balance sheet characteristics. We find a non-monotonic, bell-shaped relationship between most characteristics and the announcement effect: the effect is larger and more significant for intermediate lead banks, but smaller and insignificant for *both* very weak and very strong lead banks. For example, loans by banks with second-quartile size and capitalization produce significant returns of around 0.7 percent; while loans by bottom and top quartile banks produce insignificant returns. Our results suggest that, as a bank becomes larger, more profitable or capitalized, the value of its loans first increases and then declines; and that the largest, fastest-growing or most capitalized banks do not produce the most valuable loans.

Finally, we relate our ex-ante, market-based measure of the value of lending to the borrower performance between loan origination and maturity. We find that, after controlling for a firm's ex-ante riskiness, a higher announcement effect significantly predicts higher firm performance, and vice versa. For example, a one standard deviation increase in the announcement effect reduces the probability of financial distress by almost 30 percent. We also find evidence of non-linearities: the impact of the announcement effect appears to be higher, the worse the firm fundamentals at loan origination. Overall, the announcement effect is economically relevant, and appears to capture banks' influence on borrower outcomes.

Section II discusses literature related to our study. In Section III we describe the event study used to calculate the loan announcement effect. And relate the announcement effect to bank

characteristics. Section IV relates the announcement effect to borrower performance. Section V concludes.

II Literature Review

Our study relates to three strands of literature.

Empirical corporate finance studies how different financing arrangements affect the value of the firm. Our study builds on a central result of this literature: bank loan announcements are followed by positive and significant abnormal equity returns, while equity issues, bond issues and private placements are not (Mikkelson & Partch 1986, James 1987, Dahiya et al. 2003). This loan announcement effect suggests that banks affect the value of the firm in a unique way, as conjectured by Fama (1985). Several papers dissect the announcement effect. Smaller firms, firms with negative profit trends, or low investment opportunities benefit from a higher or more significant announcement effect than other firms (Slovin et al. 1992, Wansley et al. 1992, Best & Zhang 1993). The announcement effect is therefore stronger when the borrower is more opaque or riskier, suggesting that banks' "value added" - compared to other financing arrangements - stems from their information-intensive evaluation of, and influence on, borrower's prospects. Importantly, borrower characteristics do not fully explain the variation in announcement effect. Lender identity also matters: Billett et al. (1995) show that abnormal returns are significant only when the lead bank has a high credit rating, arguing that highly rated banks have better ability or incentives to monitor. Our paper explores further how lender characteristics affect the value of loans.

The theoretical banking literature relates some bank balance sheet characteristics to monitoring incentives. Elaborating on Diamond (1984), balance sheet size and diversification can affect incentives to monitor by making the marginal loan more or less correlated with the bank's overall return on assets. Besanko & Kanatas (1993) and Holmstrom & Tirole (1997) predict that higher bank exposure to the firm - measured by the loan value relative to the bank's assets or capital - will increase monitoring intensity.

Finally, our work is related to the literature on "bank risk taking ." This literature explores the side-effects of monetary policy on the quantity (Kashyap & Stein 2000, Bernanke & Blinder 1992, Bernanke et al. 1994) and, more recently, on the riskiness of bank lending. Riskiness is captured by changes in lending standards unrelated to borrower credit risk (Maddaloni &

Peydró 2011), banks' decisions to grant or extend loans (Jiménez et al. 2014), changes in syndicated loan pricing (Paligorova & Santos 2013), or banks' internal risk ratings (Dell'Ariccia et al. 2016). Our loan announcement effect can be interpreted as an ex-ante, market-based measure of risk taking . Market measures can be a useful complement to bank lending surveys, loan pricing, and bank's own risk ratings, because they are less likely to be biased by the banks' own risk attitude (Nakamura & Roszback 2013). Unlike other studies, ours focuses directly on the link between the state of bank balance sheets and risk taking. In Adrian & Shin (2009) bank's balance sheet size appears to drive financial market risk appetite; in Dell'Ariccia et al. (2016), risk taking effects are stronger when bank capital is high; while in Jiménez et al. (2014) lower capitalization amplifies risk taking. These results suggest a complex relationship between balance sheets and risk taking, which warrants further examination.

III Loan Announcements and Bank Balance Sheets

The loan announcement effect

Using our sample of 1,431 UK syndicated loans (see Appendix A), we aim to measure the value of the bank-firm lending relationship to the borrowing firm; and investigate how this value depends on the state of the lead bank balance sheet.

We assume that the value of lending can be measured by the *loan announcement effect*, defined as the change in the market value of the firm in response to the news that a syndicated loan has been agreed. An equity price move that is immediate (close to when the deal becomes public information) and idiosyncratic (orthogonal to other information that normally affects the price) is likely to capture the market value of the new loan. More precisely, market prices will be affected by the unexpected component of the announcement. What is the likely sign of the announcement effect? If the market considers banks as special lenders, due to their expertise and access to private information about the firm, a loan announcement should increase the borrower's equity value. By signaling a successful screening process, the news should reduce market uncertainty about the firm's prospects. And since a deal typically involves ongoing monitoring by the bank, it may improve the market-implied equity return distribution. On the other hand, the new loan can lower the firm's value through "debt overhang" effects, whereby increased debt increases the probability that the firm will forgo profitable future projects (Myers 1977); or through illiquidity effects, by reducing the firm's ability to withstand adverse cash flow shocks or reinvestment needs (Tirole 2006).

We extract the loan announcement effect with a simple event study. The event is the announcement that a deal is concluded, which we assume to occur on the "credit date" reported by Dealogic. The event window should be long enough for the announcement to be fully priced in; and short enough that other firm-specific, but unrelated, information is left out. Our reported results are based on a two-day window including the credit date and the following day, in order to capture cases in which the announcement occurs after the market close.[1] For convenience, we also define a pre-event window (the 10 days before the event) and a post event-window (the 20 days after). Next, for each of our 1,431 loans, we estimate a simple model for the borrowing firm's equity returns. We regress daily equity returns on the UK overall market return and on returns on indices capturing the Fama-French "size" and "value" factors.[2] The regression sample is the union of two periods: 120 days preceding the pre-event window, and 80 days following the post-event window. Finally, we calculate time series of "abnormal" equity returns over the event window, as well as the pre- and post-event windows. Abnormal returns are the difference between actual and out-of-sample returns predicted by our 3-factor model. The cumulative abnormal return over the two-day event window is the estimated loan announcement effect (LAE). This procedure identifies the LAE under four assumptions: *(i)* the market learns about the loan during the event window; *(ii)* all the information relevant to equity returns during the event window, other than the loan announcement, is captured by the model; *(iii)* loans are independently distributed over time and across firms; *(iv)* equity price changes do not affect the likelihood of a deal occurring.

Announcement effect and borrower characteristics

Armed with our loan-specific announcement effect, we use cross-sectional regressions to study its size and significance for different loan, borrower, and bank characteristics.[3]

In Table 1, the first column reports the LAE for the full sample of $1,431$ loans. On average, a loan announcement produces an abnormal return of 0.41 percent, which is statistically significant at the 1 percent level. The magnitude of our announcement effect sits within the range of previous estimates (mostly based on US data): for example, James (1987) and Best &

[1] Using one- and three-day event windows does not significantly alter our results.

[2] All three indicies are from MSCI

[3] Compared to examining abnormal returns over subsamples, the regression approach allows for the inclusion of several explanatory variables at once. And, when including robust errors, it accommodates some violation of the assumption that events are non-overlapping. See Asquith & Mullins (1986) and Campbell et al. (1996) for a discussion.

Zhang (1993) report average effects of 1.93 and 0.32 percent, respectively. Table 1 also reports the announcement effect for various subsamples based on loan or borrower characteristics. For each variable in columns 2 to 8, 'high' and 'low' are dummy variables indicating whether its value is above or below the median of the distribution of that variable across loans.

Table 1: The Effect of Loan Announcements on Borrower Equity Returns

Ordinary least squares regression of 2-day abnormal equity returns on dummies indicating loan or borrower characteristics. For the variables loan value, firm size, profitability, Tobin's Q, leverage ratio, liquid assets, and R & D spending, 'Low' and 'High' are dummies equal to 1 if the realization for a loan is below and above the median of the distribution across loans, respectively, and 0 otherwise. For the variable 'firm rated', 'No' and 'Yes' are dummies equal to 1 if a firm does not have / has a credit rating and 0 otherwise. Robust standard errors are reported in parenthesis. ***, **, * indicate that the variable is significant at the 1, 5, and 10 percent level, respectively.

	1	2	3	4	5	6	7	8	9
SAMPLE	All loans	Loan value	Firm size	Profitability	R & D spending	Tobin's Q	Leverage ratio	Liquid asset	Firm rated?
	0.41***								
	(0.109)								
Low		0.20	0.66***	0.58***	0.20	0.51***	0.41***	0.25	
		(0.16)	(0.18)	(0.18)	(0.18)	(0.18)	(0.12)	(0.19)	
High		0.60***	0.16	0.24*	0.54***	0.30***	0.39***	0.57***	
		(0.16)	(0.12)	(0.12)	(0.22)	(0.12)	(0.18)	(0.13)	
No									0.48***
									(0.13)
Yes									0.06
									(0.20)
N	1431	1390	1424	1424	597	1404	1423	1378	1431

The LAE is large and significant for above median loan values (i.e. above US$ 335 million) while it is small and insignificant for below median values. Furthermore, the LAE tends to be larger and more significant when the borrowing firm is relatively small, has recently experienced low profitability, spends relatively more on research and development, or is perceived to have low investment opportunities (the latter measured by low values of the market-to-book ratio, a proxy for Tobin's Q). Moreover, the LAE is nearly identical for low- and high-leverage firms, and only significant for firms with highly liquid assets. These results suggest the observed changes in the market value of the firm do not reflect increases in leverage, nor improvements in the firm's liquidity position associated with a new loan. Finally, column 9 shows that the LAE is significant only when the borrowing firm does not have a credit rating. In most cases, the LAE is significant only for one subsample, pinning down neatly the source of the aggregate announcement effect.

These findings confirm two well established results in the loan announcement effect literature. First, in general, a new bank-firm lending relationship appears to have a positive impact on the firm's market value. Second, the value of the relationship primarily stems from banks' information-intensive screening and monitoring activities. This is because the effect is larger, the more a firm is opaque, risky, or appears to have worse prospects at the time of the an-

nouncement. Such cross-firm variation in the announcement effect makes it a valid measure of the value of banks' screening and monitoring activities.

Announcement effect and lender characteristics

We now turn to the other party in the deal: the lender. Using the announcement effect as the measured value of lending, we test how this value depends on the lenders' characteristics. In particular, we focus on lead bank in the syndicate. While syndicates in our sample include 8 banks on average, the lead bank is the one managing the relationship with the borrower on behalf of the syndicate and - most importantly - taking on primary responsibility for monitoring the loan. Therefore, most of the lender-specific variation in the LAE should be captured by the lead bank's characteristics. On average each of the 37 lead banks in our sample manages 39 loans.

The estimated LAE is dispersed both across lead banks and over time, with between- and within-bank standard deviations of 2.4 percent and 1.5 percent, respectively, or around 6 and 4 times the average LAE, respectively. Billett et al. (1995) find significant between-lender variation in the announcement effect; in particular, it appears to be significant only when the lender has a high credit rating. Instead of third-party assessments of the bank, we focus on the lead bank balance sheet characteristics.

As explained above, the event study strongly suggests that the value of lending stems from the lead bank's screening and monitoring activities. Which bank balance sheet characteristics are likely to drive its supply of screening and monitoring? Information gathering, surveillance, and contract enforcement are costly; therefore, we use the lead bank profitability and share of non-performing assets as proxies for its ability to cover those costs. In addition, for a given cost of screening and monitoring, the bank's gains from these activities may also depend on the composition of its existing loan portfolio; for example, a well-diversified bank might care less about the outcome of its marginal loan than a less diversified one. Exploiting the typically positive correlation between bank balance sheet size and diversification[4], we use the former as a proxy for the latter. Furthermore, we use the lead bank capitalization, balance sheet growth rate, and price-to-earning (P/E) ratio as additional proxies of its incentives to monitor. The lead bank's capitalization should capture shareholders' exposure to the success of the borrowing company; as implied by several theoretical models, higher exposure should lead to more

[4]Demsetz & Strahan (1997) and Gascón & González (2000) provide evidence for US and European banks, respectively.

intensive and diligent screening and monitoring (Besanko & Kanatas 1993 and Holmstrom & Tirole 1997). Adrian & Shin (2009) show that banks' balance sheet growth can be associated with increasing levels of risk taking , which could translate in less diligent screening and monitoring. Finally, we include lead banks' P/E ratio to capture potential interactions between the lead bankers' stock-based compensation and their incentives to monitor.

To measure the impact of lead bank characteristics on the announcement effect, we sort each of the chosen lead bank variables in quartiles and run regressions of the form:

$$\text{LAE}_l = \sum_{q=1}^{4} \alpha_q x_{q,l} + \epsilon_l \tag{1}$$

where LAE_l is the 2-day cumulative abnormal return for loan l (defined above), and each $x_{q,l}$ is a dummy indicating whether the lead bank variable for that loan belongs to the q^{th} quartile. Table 2 reports the results. A general pattern emerges: banks with intermediate levels of size, growth, profitability and capitalization (2^{nd} and 3^{rd} quartile) are associated with significant abnormal returns; in contrast, banks with either very low or very high size, growth, profitability and capitalization (1^{st} and 4^{th} quartile) are associated with broadly insignificant abnormal returns. Similarly, amongst significant coefficients, the highest ones (indicating the highest average abnormal returns) lie in the intermediate regions for all the variables we consider. For example, the average LAE in the intermediate regions is 0.56, 0.46 and 0.61 percent respectively for bank size, profit and capitalization, while the average LAE in the extreme regions is 0.26, 0.37 and 0.28 percent, respectively. It follows that loans monitored by the largest, most profitable and most capitalized banks never produce the highest abnormal returns. Non-performing loans and the bank P/E ratio display a similar pattern.

Higher lead bank profits and lower non-performing assets are associated with higher LAE, suggesting that higher levels of free resources lead to more intensive monitoring. Above a certain size threshold, LAE decreases with size, consistent with a negative effect of diversification on monitoring intensity. Yet the distribution of abnormal returns across lead bank asset growth, capital and P/E is more surprising. If these variables capture the lead bank's incentives to screen and monitor the borrower - as perceived by the market - they suggest that there is significant variation in incentives. Moreover, incentives appear to weaken for relatively "successful" lead banks, i.e. the fastest-growing, most capitalized and the ones with the highest market valuation.

Table 2: The Effect of Lender Characteristics on Borrower Equity Returns (1)
Ordinary least squares regressions of 2-day abnormal equity returns on dummies indicating characteristics of the lead bank in the syndicate. For each variable, Quartile 1, 2, 3 and 4 are dummies equal to 1 if the realization for a loan is in the 1st, 2nd, 3rd and 4th quartile of the distribution of that variable across loans, respectively, and 0 otherwise. Robust standard errors are reported in parenthesis. ***, **, * indicate that the variable is significant at the 1, 5, and 10 percent level, respectively.

	1	2	3	4	5	6
Distribution of:	Balance sheet size	Asset growth	Tier-1 capital	RoA	P/E ratio	Non-performing loans
Quartile 1	0.11	0.35	0.25	0.48**	0.22	0.07
	(0.11)	(0.22)	(0.31)	(0.24)	(0.29)	(0.29)
Quartile 2	0.61***	0.55***	0.93***	0.61***	0.39***	0.72***
	(0.23)	(0.19)	(0.25)	(0.24)	(0.15)	(0.27)
Quartile 3	0.50***	0.39**	0.29	0.30	0.73***	0.45*
	(0.17)	(0.17)	(0.18)	(0.26)	(0.24)	(0.26)
Quartile 4	0.41	0.34	0.30	0.25	0.32*	0.32*
	(0.31)	(0.31)	(0.19)	(0.15)	(0.19)	(0.17)
N	1431	1372	1248	1372	1401	1189

Robustness tests

As shown above, there is substantial variation in the announcement effect between firms. The value of bank monitoring should be higher for riskier or more opaque firms because they carry a higher "demand" for monitoring. (It was precisely between-firm variation in the LAE which suggested using it as a proxy for the value of screening and monitoring.) Only for identical borrowers, differences in the announcement effect are likely to reflect only the lead banks' monitoring intensity. If there is clustering between bank and firm characteristics, the results in Table 3 might just reflect firm-specific variation in the demand, rather than supply, of monitoring. For example, low LAE by strong lead banks is consistent with matching between the best banks and the safest borrowers. In this case, the low LAE would reflect the relative irrelevance of the lead bank's contribution, rather than low monitoring effort.

As a robustness test, we re-estimate equation 1 adding firm- and loan-level controls. We choose variables that the literature identifies as sources of variation in the announcement effect. First, we include the historical volatility of firm profits and the firm's Tobin's Q to capture the argument in Best & Zhang (1993) that borrowers with relatively volatile or uncertain prospects benefit more from bank monitoring. Second, we consider the number of participants in the lending syndicate as an indication of ex-ante credit risk. Sufi (2007) shows that high-risk loans are associated with smaller syndicates in order to ensure higher diligence in screening and monitoring. We also include a dummy indicating whether a loan marks the first relationship between the firm and the lead bank. Lummer & McConnell (1989) find that the announcement effect is significant only for repeated relationships, indicating that banks' information advan-

tage comes from a continuing working relationship with the borrower.

Table 3 reports the results. In all cases, the only significant firm-level variable is Tobin's Q: lower investment opportunities are associated to a more positive market reaction to the loan. But by and large, adding firm-level controls do not suppress the variation in the announcement effect between banks. Moreover, the non-monotonic, bell-shaped relationship between bank characteristics and the LAE appears robust. The LAE is first increasing, then decreasing with bank size, asset growth, capital and profitability. Compared to the results in Table 2, introducing firm-level controls flattens differences across banks in some cases. For example, the LAE

Table 3: The Effect of Lender Characteristics on Borrower Equity Returns (2)
Ordinary least squares regression of 2-day abnormal equity returns on characteristics of the loan, firm, and lead bank in the syndicate. For each variable, Quantile 1, 2, 3 and 4 are dummies equal to 1 if the realization for a loan is in the 1st, 2nd, 3rd and 4th quartile of the distribution of that variable across loans, respectively, and 0 otherwise. 'No. of participants' indicates the number of banks in the loan syndicate. 'Previous relationship' is a dummy equal to 1 if the firm and the lead bank have been in a previous lending relationship, 0 otherwise. Robust standard errors are reported in parenthesis. ***, **, * indicate that the variable is significant at the 1, 5, and 10 percent level, respectively.

	Bank size				Bank asset growth				Bank Tier-1 capital			
	1	2	3	4	1	2	3	4	1	2	3	4
Quartile 1	0.13	0.17	0.19	0.11	0.38*	0.45**	0.44*	0.35	0.30	0.31	0.34	0.26
	(0.12)	(0.10)	(0.14)	(0.12)	(0.23)	(0.23)	(0.27)	(0.22)	(0.31)	(0.35)	(0.39)	(0.35)
Quartile 2	0.63**	0.70***	0.70**	0.61**	0.54***	0.52***	0.60***	0.51**	0.99***	1.04***	1.01***	0.95***
	(0.25)	(0.25)	(0.28)	(0.25)	(0.20)	(0.19)	(0.23)	(0.21)	(0.26)	(0.25)	(0.28)	(0.26)
Quartile 3	0.53***	0.61***	0.61**	0.50**	0.41**	0.50***	0.47**	0.38**	0.35*	0.33*	0.38	0.30
	(0.18)	(0.17)	(0.21)	(0.18)	(0.17)	(0.17)	(0.21)	(0.19)	(0.19)	(0.18)	(0.23)	(0.19)
Quartile 4	0.44	0.45	0.51	0.41	0.43	0.47	0.48	0.39	0.35*	0.42**	0.40	0.31
	(0.28)	(0.31)	(0.35)	(0.31)	(0.28)	(0.32)	(0.35)	(0.32)	(0.20)	(0.19)	(0.25)	(0.20)
Firm RoA	-0.27				-0.29				-0.51			
	(0.60)				(0.60)				(0.60)			
Tabin's Q		-0.06***				-0.06***				-0.07***		
		(0.02)				(0.02)				(0.02)		
No. of participants			-0.01				-0.01				-0.01	
			(0.01)				(0.01)				(0.02)	
Previous relationship				-0.002				0.003				-0.008
				(0.04)				(0.04)				(0.04)
N	1430	1404	1431	1431	1372	1350	1372	1372	1247	1224	1248	1248
	RoA				P/E ratio				Non-performing loans			
	1	2	3	4	1	2	3	4	1	2	3	4
Quartile 1	0.51**	0.55**	0.56**	0.48**	0.25	0.28	0.31	0.22	0.15	0.12	0.19	0.05
	(0.26)	(0.25)	(0.28)	(0.24)	(0.27)	(0.30)	(0.32)	(0.30)	(0.25)	(0.30)	(0.35)	(0.30)
Quartile 2	0.65***	0.67***	0.69**	0.62**	0.41**	0.41***	0.49***	0.39**	0.77***	0.80***	0.86***	0.69**
	(0.25)	(0.24)	(0.27)	(0.25)	(0.16)	(0.14)	(0.18)	(0.16)	(0.28)	(0.28)	(0.31)	(0.28)
Quartile 3	0.33	0.36	0.38	0.30	0.75***	0.86***	0.85***	0.73***	0.53*	0.54*	0.57*	0.44*
	(0.22)	(0.27)	(0.31)	(0.28)	(0.24)	(0.25)	(0.29)	(0.25)	(0.25)	(0.27)	(0.31)	(0.26)
Quartile 4	0.28*	0.35**	0.34*	0.26	0.34*	0.42**	0.43*	0.32	0.37**	0.39**	0.45**	0.3
	(0.16)	(0.16)	(0.19)	(0.16)	(0.20)	(0.19)	(0.23)	(0.20)	(0.18)	(0.18)	(0.22)	(0.20)
Firm RoA	-0.27				-0.29				-0.51			
	(0.60)				(0.60)				(0.60)			
Tabin's Q		-0.06***				-0.07***				-0.06***		
		(0.02)				(0.02)				(0.02)		
No. of participants			-0.01				-0.01				-0.02	
			(0.01)				(0.01)				(0.02)	
Previous relationship				-0.002				-0.0002				0.01
				(0.04)				(0.04)				(0.04)
N	1372	1350	1372	1372	1400	1357	1401	1401	1188	1167	1189	1189

becomes significant for banks in the 1^{st} quartile of asset growth and return on assets. However, the more surprising 4^{th} quartile results hold: in none of the 24 specifications loans by the strongest banks display the highest LAE.

Which banks produce the most "valuable" loans?

Our event study uncovered a broad, non-monotonic relationship between measures of bank balance sheet strength, and our market-based measure of the value of lending. Here we characterize more precisely the value of each balance sheet variable that maximizes the loan announcement effect; that is, the thresholds below which the value of lending is increasing and above which decreasing.

We employ a simple procedure based on Chow tests to identify the thresholds. For each bank balance sheet variable, we rank all loans in our sample based on that variable, and split the sample in two groups, with the n^{th} loan as the cutoff point. Our balance sheet data is annual. When a lead bank gives two or more loans in the same year, we treat them as one representative loan by averaging the individual announcement effects. We then estimate the following equation to test if n marks a significant structural break:

$$LAE_l = g_1 + g_2 + \alpha_1 g_1 x_l + \alpha_2 g_2 x_l + e_l \tag{2}$$

In equation 2, g_1 and g_2 are dummies indicating whether the loan belongs to group 1 or 2, respectively, and x_l represents a bank characteristic for loan l. We start with $n = 20$, and repeat this procedure for $n + 1$, $n + 2$ etc. until all values have been tested. The threshold is the value of n associated with the most significant Chow test.

Table 4 summarizes the results. For all bank characteristics, the thresholds mark a clear structural break: most Chow test statistics are significant at the 5 percent level or more. Specifically, the LAE tends to increase below the threshold and decrease above it. For example, the announcement effect is higher the larger the bank balance sheet; however, this positive relationship turns around as it reaches around $\$900$bn and, beyond this point, larger size is associated with smaller announcement effects. Since $\$900$bn marks approximately the 80^{th} percentile in our sample, about 20 percent of loans are monitored by banks perceived to be "too big" by the market, as reflected in a negative relationship between size and announcement effect. This pattern generalizes to the other balance sheet variables: the thresholds tend to be at the upper end of their distribution, suggesting that a "perverse" relationship between bank balance sheet strength and the value of lending sets in only for rather extreme bank characteristics.

Table 4: The Effect of Lender Characteristics on Borrower Equity Returns (3)
Chow tests for a structural break in OLS regressions of 2-day abnormal equity returns on lender balance sheet variables. For further details of the test, see the main text.

	1	2	3	4	5	6
	Balance sheet size	Asset growth	Tier-1 capital	RoA	P/E ratio	Non-performing loans
Observations (unique values)	244	249	201	248	224	181
Chow test p-value	0.059	0.051	0.040	0.035	0.044	0.063
Break Point	$900 bn	10.5%	4.8%	1.5%	18.5	1.9%
- Percentile	80	49	68	90	82	91

IV Borrower Performance

In the previous section we provided evidence that the market value of a syndicated loan - measured by the loan announcement effect - varies significantly between banks; and that variation is non-linear: the value first increases and then declines with several indicators of the lead bank's balance sheet strength. Surprisingly, the strongest banks do not generate the most valuable loans.

In this section we investigate whether the loan announcement effect - an ex-ante, financial market metric - is a economically valid measure of the value of lending, by analyzing its correlation with the ex-post performance of the borrowing firm. Borrower performance is the ultimate proof of a valuable lending relationship: effective screening by the lender should separate good and bad borrowers; and effective monitoring of the projects enabled by the loan should increase their probability of success. A well-monitored borrower should be more likely to perform well, *ceteris paribus*, than a poorly monitored one.

Our data allows us to measure borrower performance along various dimensions, both absolute and relative to other borrowers. We focus on four measures. Two are commonly used indicators of financial soundness (alternatively, distress): whether the borrowing firm's interest coverage ratio falls above (below) one between loan origination and maturity; and whether the firm pays dividends (no dividends) during the same period. The other two are indicators of the firm's relative performance in terms of profitability (captured by return on assets) and financial liquidity (captured by the Kaplan & Zingales 1997 measure of financial constraints) between loan origination and maturity.[5]

We are interested in whether the loan announcement effect (LAE) predicts firm perfor-

[5]The caption to Table 5 describes how we construct these indicators.

mance, after controlling for relevant firm characteristics. Crucially, our presumption that the LAE captures bank screening and monitoring implies that borrower characteristics after loan origination are in part endogenous to the bank's activities. Therefore, we explain performance using only information known at the time of loan origination. In practice, we estimate equations of the form:

$$P^l_{t,t+m} = \alpha + \beta \mathbf{x}^l_t + \gamma LAE^l + \delta(LAE^l z^l_t) + \epsilon_l \tag{3}$$

In equation 3, $P^l_{t,t+m}$ is a measure of firm performance for loan l between loan origination (year t) and maturity (year $t+m$), LAE^l is the loan announcement effect for loan l, and $\mathbf{x}^l_t$ and z^l_t are vectors of borrower characteristics. Several characteristics are likely to predict performance and - as shown by the earlier event study - are correlated with the size and significance of the announcement effect, motivating their inclusion in equation 3. In particular, we include the average and standard deviation of past return on assets, and the shares of liquid and tangible assets. We include one indicator of borrower riskiness, the z-score z^l_t,[6] both in $\mathbf{x}^l_t$ and as interaction term with LAE^l, in order to capture possible dependence between the quality of the borrower and the marginal impact of bank screening and monitoring. $P^l_{t,t+m}$ takes values 0 or 1 when defined as indicator of financial distress, or 1-4 when defined as relative performance. We estimate equation 3 as a probit regression in the former case, and OLS in the latter.

Table 5 contains the results. By and large, the coefficients on the firm characteristics have the expected sign, suggesting that better past performance or a more liquid balance sheet anticipate better future performance – that is, lower odds financial distress, higher return on assets, higher liquidity scores. Less intuitively, a higher share of liquid assets appears to increase the probability of missing dividend payments; yet, this may reflect firms' preference for liquidity in anticipation of large investment needs or at times of distress (both circumstances may be associated with low dividend payments). For all specifications, we also display the results for a variant including a dummy equal to 1 if a recession occurred during the life of the loan. The coefficient on the recession dummy is positive and significant when we consider absolute performance, indicating that, in general, that is likely to be worse in a downturn. While it tends to be small or insignificant when we measure relative performance.

In nearly all specifications, a higher loan announcement effect predicts better borrower performance: it significantly lowers the probability that the borrower will have a low interest

[6]The z-score is defined as the number of standard deviations the firm's profits would have to fall from their current level to wipe out its equity capital.

Table 5: Loan Announcement Effect and Borrower Performance

Regressions of indicators of borrower performance between loan origination and maturity on the loan announcement effect and borrower characteristics. Borrower performance is measured by: a dummy indicating whether the firm's interest coverage ratio has fallen below one (specification 1); a dummy indicating whether the firm missed a dividend payment (specification 2); a variable taking values 1 to 4, depending on whether the firm's average return on asset or financing constraints are in quartiles 1-4 of the relevant distribution across loans, respectively (specification 3 and 4). 'Recession' is a dummy equal to 1 if a recession occurred before loan maturity, 0 otherwise. Specifications 1 and 2 above are probit regressions; 3 and 4 are OLS regressions. Robust standard errors are reported in parenthesis. ***, **, * indicate that the variable is significant at the 1, 5, and 10 percent level, respectively.

	(1) Interest coverage ratio < 1		(2) No dividend payment		(3) Average RoA		(4) Average Kaplan-Zingales score	
Announcement effect	-0.06**	-0.06**	-0.05	-0.06*	0.06*	0.06*	-0.07**	-0.07**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.030)	(0.027)	(0.03)
Z-score	-0.53***	-0.55***	-0.52***	-0.55***	0.23***	0.23***	-0.48***	-0.49***
	(0.08)	(0.08)	(0.09)	(0.09)	(0.07)	(0.066)	(0.07)	(0.07)
Announcement effect x Z-score	0.02*	0.02*	0.02*	0.02*	-0.03**	-0.03**	0.03***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Historical average RoA	-1.33**	-1.03*	-3.05***	-2.80***	3.87***	3.87***	-1.22**	-1.11*
	(0.62)	(0.62)	(0.75)	(0.74)	(0.60)	(0.60)	(0.561)	(0.57)
Historical RoA standard deviation	-1.21*	-1.13*	-1.56*	-1.56**	0.81	0.81	-2.15***	-2.13***
	(0.72)	(0.68)	(0.85)	(0.78)	(0.71)	(0.71)	(0.805)	(0.79)
Liquid assets	-0.71	-0.58	1.33***	1.70***	1.30***	1.30***	-0.83**	-0.78**
	(0.49)	(0.50)	(0.49)	(0.53)	(0.48)	(0.48)	(0.378)	(0.38)
Tangible assets	-0.30**	-0.19	-0.13	0.08	0.12	0.13	0.75***	0.75***
	(0.15)	(0.15)	(0.18)	(0.18)	(0.12)	(0.12)	(0.12)	(0.12)
Recession before maturity		0.44***		0.68***		0.01		0.12*
		(0.08)		(0.09)		(0.07)		(0.07)
Constant	1.04***	0.86***	0.51	0.23	1.50***	1.50***	3.77***	3.71***
	(0.27)	(0.26)	(0.31)	(0.30)	(0.23)	(0.231)	(0.26)	(0.26)
N	1,367	1,367	1,367	1,367	1,182	1,182	1,168	1,168
Pseudo R-squared	0.08	0.10	0.12	0.16	0.09	0.09	0.11	0.11

coverage ratio or will pay no dividends (specifications 1 and 2); and it is associated with higher relative profitability and liquidity (specifications 3 and 4). The correlation between the LAE and subsequent performance is economically relevant: for example, a one standard deviation increase in LAE (4.1 percentage points) lowers the probability of financial distress by around 30 percent for an average firm, ceteris paribus.[7] The LAE interaction term is statistically significant, and has the opposite sign to the standalone LAE coefficient in all specifications. Thus, the marginal contribution of screening and monitoring to firm performance tends to be higher for riskier firms.

Overall, our results indicate a positive and significant relationship between the intensity of a lender's screening and monitoring activities and subsequent borrower performance. Moreover, the effectiveness of screening and monitoring appears to depend both on the lead bank's efforts - proxied by the announcement effect - and on the borrower's intrinsic riskiness. Intuitively, for given effort, the lead bank appears to have more room to improve the performance of a riskier firm than that of an already safe and profitable firm.

[7]The average firm is a representative firm with characteristics evaluated at the sample mean.

V Discussion and Conclusions

Our analysis uncovers a non-monotonic, bell-shaped relationship between banks' balance sheet characteristics and the value of lending. Loans by banks of intermediate balance sheet strength tend to produce positive and significant announcement effects - a signal of high screening and monitoring intensity, implying a high value of lending to the borrower. In contrast, loans by the largest, most capitalized and profitable banks - as well as loans by the weakest banks - tend to produce insignificant announcement effects, a signal of low value of lending. The relationship between bank balance sheets and the value of lending tends to turn negative only for rather extreme characteristics, however. For example, our identified thresholds for balance sheet size and return on assets lie near the 80^{th} and 90^{th} percentile in our sample, respectively.

We have also shown that the announcement effect - an ex-ante, financial market-based measure of the value of lending - helps predict the borrowing firm's ex-post performance. Firms that receive "higher value" loans are more likely to be profitable and less likely to be in financial distress during the lending relationship, and vice versa. This result reinforces the interpretation of the announcement effect as the value of the lead bank's screening and monitoring activities.

Theoretical studies generally predict a positive relationship between a bank's balance sheet strength and its incentives to screen and monitor loans. Therefore, the empirical correlation between strong banks and low value loans is *prima facie* puzzling.

Indeed, the announcement effect may be an invalid proxy of the value of lending for the strongest banks. For example, the strongest banks may tend to pair up with safe borrowers, for whom - as shown in Section III - the announcement effect tends to be less significant. In addition, repeated bank-firm lending relationships, which tend to carry lower "signaling" value to the market than new relationships, may be more prevalent among strong banks.[8] In these cases, a low announcement effect would not necessarily indicate low screening and monitoring intensity. Yet, we have shown that the bell-shaped relationship between bank balance sheet strength and announcement effect is robust to controlling for borrower riskiness and repeated relationships.

Another, more intriguing explanation for our results is that very strong banks deliberately choose low screening and monitoring , "correctly" captured by a relatively low announcement effect. Strong banks may tend to compete more aggressively than other banks by loosening lending standards, which may include weaker screening and monitoring effort.[9] Alternatively,

[8]For example, Von Rheinbaben & Ruckes (2004) suggest that firms with low credit ratings tend to restrict themselves to a small number of creditors in order to reduce the risk of information leak.

[9]Several bank lending surveys, such as the Bank of England Credit Conditions Survey, Federal Reserve Senior

low screening and monitoring by strong banks may indicate high "risk taking": less diligence may boost profits by reducing costs, but it also increases the probability of future losses from loan default. Our data cannot offer a conclusive explanation. However, we show in a simple model that, when the *effectiveness* of monitoring is a function of both the borrower's intrinsic riskiness and the lender's effort, both weak and strong banks may optimally choose low monitoring intensity, consistent with our empirical results (Appendix B).

Our results have two potential policy implications. First, in relation to "too-important-to-fail" policies (Ötker-Robe et al. 2011), they suggest that restraining excessive credit growth could limit bank risk taking incentives, thereby contributing to financial stability. Second, our results support minimum bank capital requirements, since poorly capitalized banks may not have sufficient resources or incentives to monitor their borrowers. But they also highlight that, after a threshold, additional capital requirements may be detrimental, by inducing less diligent screening and monitoring.

Loan Officer Opinion Survey, and ECB Bank Lending Survey often identify competition as a major driver of changes in lending standards.

Appendix

A Data Description

Our dataset has three building blocks: syndicated loan data from Dealogic; firm and bank balance sheet data from Thomson Reuters Worldscope; and equity return data from Thomson Reuters Datastream.

First, we searched Dealogic for all syndicated loans issued by private nonfinancial companies (PNFCs) incorporated in the UK, or by offshore finance vehicles whose parent company is a UK PNFC, since 1990. The search returned around 6,800 loans issued by around 2,900 PNFCs. For each loan, Dealogic reports the amount, pricing (often expressed as margin over LIBOR), start and maturity dates, credit ratings, as well as the lead and participant banks in the syndicate. Our focus is the equity market impact of loan announcements. Therefore, we restricted our dataset to syndicated loan issuers that also have publicly listed equity. Doing so reduces our sample markedly, to around 1,430 loans and 380 companies. Next, we downloaded relevant annual balance sheet data for each borrowing company and each lead bank from Worldscope. Separately, we downloaded series of daily equity returns for each company from Datastream, and used them to estimate abnormal returns around the syndicated loan announcement date - as described in Section III. Finally, we merged the loan, balance sheet, and abnormal return data, resulting in a panel of around 23,300 loan-years. This rich dataset allows us to relate the market reaction to each syndicated loan to the past and future performance of both the borrower and lender. Table A1 shows key summary statistics for our dataset.

Table A1: Summary Statistics for Syndicated Loan Deals

This table presents summary statistics for the sample of 1,431 syndicated loan deals representing 37 lead banks and 381 UK nonfinancial corporations from 1990 through 2012. Summary statistics for loan characteristics are calculated at the loan level. Summary statistics for firm (lead bank) characteristics are calculated at the firm (lead bank) level for the year of loan origination.

				Distribution		
	No. of Observations	Mean	S.D.	25th	50th	75th
Syndicated loan characteristics						
Loan value ($ millions)	1390	899	2531	115	335	800
Maturity (years)	1285	4	3	3	5	5
Interest rate margin (over LIBOR, basis points)	698	126	152	40	75	150
Number of participant banks	1431	9	8	3	6	12
Credit rating indicator (rated = 1)	1431	0.19	0.39			
Firm characteristics						
Total assets ($ billions)	1424	5.8	17.8	0.3	1.0	3.3
Employees (thousands)	1414	28.0	53.8	2.8	9.6	31.9
Years of operation	1431	15	8	9	15	21
Leverage ratio (book debt/book assets)	1423	0.28	0.21	0.16	0.24	0.36
Tangible asset ratio	1421	0.36	0.26	0.14	0.30	0.55
Liquid asset ratio	1387	0.07	0.09	0.02	0.04	0.09
Profitability (return on assets)	1424	0.05	0.10	0.02	0.05	0.08
Number of syndicated loans	1431	4	4	1	2	4
Lend bank characteristics						
Total assets ($ billions)	1431	2106	1632	218	443	987
Annual asset growth	1372	0.20	0.61	0.05	0.11	0.21
Tier-1 capital ratio	1248	0.04	0.12	0.03	0.04	0.05
Annual return on assets (%)	1372	0.73	0.55	0.41	0.75	0.97
P/E ratio	1401	11.9	20.6	8.9	11.4	15.3
Non-performing loans (%)	1189	1.2	0.9	0.6	1.1	1.5
Number of syndicated loans	1431	39	85	3	7	20

B Model

We write a very simple model in which a bank chooses how much to lend and how intensively to monitor its loans. We show that if monitoring is costly, and if the effectiveness of monitoring depends on the riskiness of the borrower, the relationship between lending volume and monitoring intensity is non-monotonic: after a threshold, it may be in the bank's interest to increase lending but decrease monitoring. Under plausible assumptions – that lending correlates positively with bank assets, capital, and profits – this simple model is consistent with the empirical results in the paper.

Consider a representative, risk-neutral bank. The bank can lend to a population of potential borrowers, which we represent as a continuum between 0 and 1. For simplicity, we assume that the bank has an initial screening technology, which allows it to rank loans according to their expected return, and to select only those with positive expected return. The actual return from a loan depends on the bank's monitoring effort: monitoring can prevent the borrower from "hiding" part of the interest due, or it can increase the probability of success of the borrower's project. We also assume that the cost of monitoring is increasing in the monitoring effort. These assumptions imply that the bank will lend to the safest borrower first, then to the next safest and so on. The bank's expected profit can be written as:

$$\Pi = \{r[1 - \delta(L, \mu)] - c\, exp(\mu)\}L \tag{4}$$

where r represents the loan expected return in the case of no default, $\delta(L, \mu)$ represents the default rate, $c\ exp(\mu)$ represents the monitoring costs for a given effort, and L is the lending volume. Our key assumption is that the default rate $\delta(L, \mu)$ is an increasing function of lending L and a decreasing function of monitoring effort μ. More specifically we assume the following functional form for δ:

$$\delta(L, \mu) = (L/q)\, exp[-\mu(1 - L)] \tag{5}$$

Equation 5 implies that as borrowers become riskier, not only does their "no monitoring" default rate increase; but also the marginal impact of monitoring effort on the default rate declines. Therefore, the effectiveness of monitoring depends on both the bank's effort and the borrower type. The constant q determines how quickly credit quality declines as the bank lends to additional borrowers. The key departure from other simple models of bank monitoring (i.e. Dell'Ariccia et al. 2010) is relating the effectiveness of monitoring to the characteristics of the

borrowers. In this sense, our model is related to Ruckes (2004).

The bank will choose lending volume and monitoring effort to maximize profit. We solve the problem in two stages. First, we maximize the bank's profit function by choosing the optimal monitoring effort μ^* for a given volume of lending L. Then, we determine the optimal size of the bank's loan portfolio.

The first-order condition for μ is:

$$\mu^* = \frac{ln[rL(1-L)] - ln(bc)}{2-L} \tag{6}$$

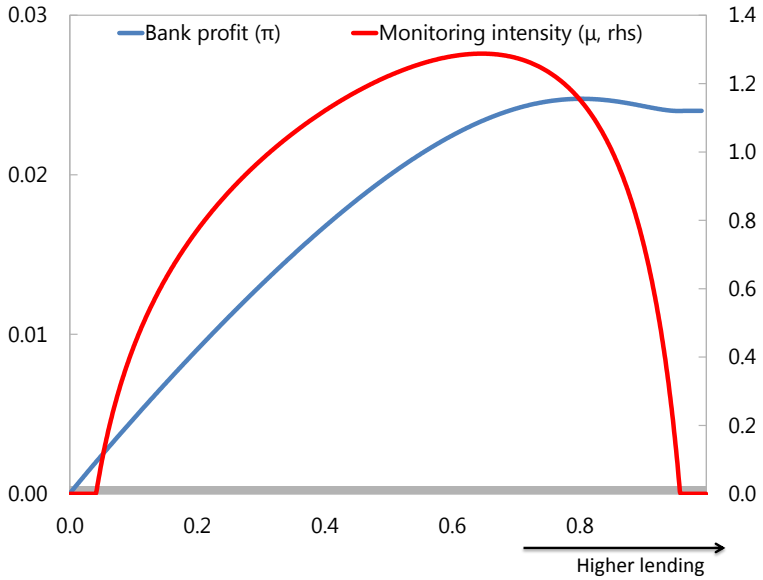
This condition implies that the bank will choose low monitoring effort when lending volume is *both* relatively low and relatively high. When lending is relatively low, the bank's borrowers are safe. Even though monitoring is effective for these borrowers, there is a limit to how much the bank can improve the expected return from these loans. And for the safest borrowers, the gains from monitoring do not justify the cost. When lending is relatively high, borrowers are risky and monitoring, although desirable, is less effective. In this case, monitoring effort still lowers the default rate, its effect is dampened by the borrower's intrinsic riskiness. Therefore, it may be optimal to accept the higher default rate in order to save on the monitoring cost.

We now substitute μ^* into the profit function (equation 4), and maximize for L to find the optimal lending level. To illustrate the characteristics of the solution, we calibrate the model by setting values for the parameters r (expected return without default), c (monitoring cost) and q (the speed at which borrower credit quality deteriorates) and perform a simple comparative statics exercise. As a baseline, we calibrate r to 5 percent, close to the average interest rate in our syndicated loan sample. We set c so that the average monitoring cost is 0.5 percent.[10] Finally, we set q to 2. Figure B1 illustrates the bank's profits (blue line) and the optimal monitoring effort (red line) as a function of the lending volume.

We highlight four features of the solution. First, in general monitoring effort increases bank profits: when μ is chosen optimally, profits are 10 percent higher than when μ is set to zero. Second, the bank does not always lend to all potential borrowers; as explained above, for very risky borrowers the positive impact of monitoring on profits is outweighed by its cost. Third, the relationship between lending volume and monitoring effort is bell-shaped, due to the assumed interplay between monitoring effectiveness and cost (see equation 5). Monitoring effort

[10]To inform this choice, we calculated the average difference in interest rates between loans representing new bank-loan relationship and those representing repeated relationship, 0.46 percent in our sample. Since new relationships are likely to require more monitoring than repeated ones, this difference should be related to the typical monitoring cost.

Figure B1: Bank Lending, Profit, and Monitoring Intensity - Baseline

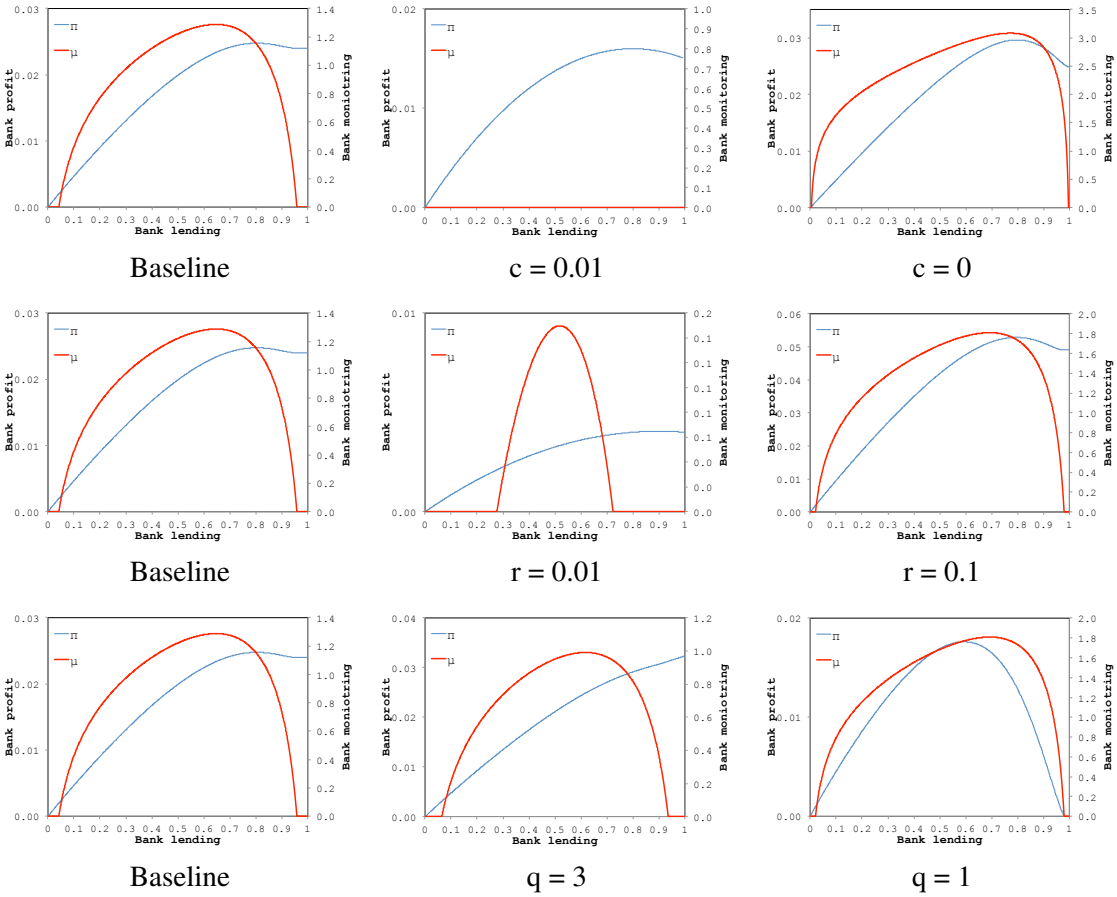


is low for very good borrowers, who do not default much, *and* for very bad borrowers, because they default too much to pay the associated cost. Finally, monitoring effort can decline before the profit-maximizing volume of lending is reached. That is, the bank may still find it profitable to lend to some risky borrowers while decreasing its monitoring effort. In these cases, monitoring has lost its effectiveness, thus it is not convenient to pay the associated cost.

In Figure B2, the second and third columns of the top panel show how the solution varies when we increase (by one order of magnitude) and decrease (to zero) the monitoring cost, respectively. In the latter case, the bank finds it profitable to monitor riskier borrowers than in the baseline. The second and third columns of the middle panel show the effect of a lower and higher expected return relative to the baseline, respectively. When the expected return falls, the bank only monitors a smaller portion of intermediate-quality borrowers, bad enough that monitoring is still effective, but good enough to warrant the monitoring cost. Finally, the second and third columns of the bottom panel show the effect of assuming a slower and faster deterioration in borrower credit quality relative to the baseline, respectively. A better pool of borrowers allows the bank to optimally lend to all of them. As in the baseline case, however, profits are maximized by letting monitoring effort decline for some risky borrowers. A worse pool of borrowers induces extra caution, with lower lending volumes and higher monitoring effort.

Under the reasonable assumption that a bank's lending volume is positive related to its capital, profitability, and overall balance sheet strength the model offers a possible explanation for our empirical findings: the value of bank monitoring – captured by loan announcement effect – may first rise and then fall as the bank's balance sheet becomes stronger.

Figure B2: Bank Lending, Profit, and Monitoring Intensity - Sensitivity Analysis



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