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The Crisis as a Wake-up Call. Do Banks Increase Screening and Monitoring During a Financial Crisis?

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The crisis as a wake-up call. Do banks increase screening and monitoring during a financial crisis?

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Abstract

We examine whether banks have systematically stepped up their screening and monitoring efforts during the current global financial crisis. To this end we analyze nearly 17,000 syndicated loans to private borrowers in 60 countries over the period 2005-2008. We find that during the crisis arranging banks started to retain larger loan portions and form more concentrated syndicates, reflecting an increased need to screen and monitor borrowers. During the crisis agency problems were attenuated – and lending standards hence tightened less – in syndicates that were composed by experienced arrangers and that were lending to repeat borrowers. In contrast, borrower credit ratings did little to alleviate agency problems during the crisis.

JEL Classification: D82, G15, G21

Keywords: bank lending, financial crisis, asymmetric information, syndication

1. Introduction

The period between 2001 and the first half of 2007 was a time of exceptionally high economic growth throughout large parts of the world. Risk perceptions came down rapidly and the global financial system was characterized by abundant liquidity. All of this changed with the outbreak of the global financial crisis in August 2007. The crisis has affected banks across the world through increased uncertainty about borrower quality and a concomitant decline in available bank funding.[1] Like in earlier crisis episodes, bank lending has been significantly reduced. According to the Dealogic Loan Analytics database used in this paper, global syndicated loan volumes fell by 41 per cent, to USD 2.9 trillion, in 2008.

Against this background, we analyze whether banks intensified their screening and monitoring during the crisis. This allows us to better understand to what extent the sharp decline in bank lending during the crisis reflects a reduction in loan supply (a 'credit crunch') rather than in loan demand. Bank customers, confronted with a falling demand for their own products, may simply have started to demand less credit for working capital and investment purposes. Empirical evidence of more intense screening and monitoring would, however, indicate that banks also contracted their credit supply. Banks may have done so to improve the risk profile of their balance sheet and to convince depositors and other financiers to keep funding them during the crisis. Evidence of increased screening and monitoring would also show that banks did not simply cut lending across the board, but instead stepped up their efforts to pick better customers (thus reducing new lending in particular) and to monitor customers more carefully. Banks tend to be hesitant to terminate relationships with existing borrowers as ending such relationships tends to be costly (Rajan, 1992; Ongena, 1999).

To empirically test whether screening and monitoring intensity increased during the financial crisis we examine data on the syndicated loan market. Syndicated loans are large loans that are provided by a group of (investment) banks – the syndicate – to a single borrower.[2] Syndication means that large loans can be spread across several financial institutions, allowing each bank to better diversify its loan portfolio (Simons, 1993). This market is of particular interest for several reasons. First, syndicated loans are a major source of external finance for a wide variety of firms in both the developed world and in emerging markets (DTCC, 2008). Second, syndicated lending combines characteristics of public financing with those of more traditional bank lending (Boot, 2000). Like bond markets, there are several creditors involved in lending to a single borrower, but syndicate members still monitor borrowers as is typically the case in relationship lending. Third, in contrast with bilateral bank lending, detailed information on syndicated loans is publicly available which allows us to control for

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[1] The rise in credit risk led, for instance, to widening spreads between interest rates on secured and unsecured inter-bank loans (Taylor, 2008) and between yields on corporate bonds and risk-free government securities.

[2] Dennis and Mullineaux (2000) and Fight (2004) provide extensive descriptions of the syndicated loan market.

various loan and borrower characteristics. Fourth, and most importantly, the structure of syndicates provides information about the lending tactics of banks during a financial crisis.

The structure of a typical syndicate consists of two tiers of banks: arrangers and participant banks. The arrangers comprise the senior tier and negotiate the lending terms with the borrower. They are also mandated by the borrower to structure, organize, and market the loan. Although arrangers usually retain a part of the loan on their own books, they sell most of it to the second, junior tier of syndicate members, the participants. On-selling allows arrangers to take on new syndication mandates, and earn the related fee income, and to better diversify their remaining exposure to individual borrowers (Pennacchi, 1988; Ivashina, 2008). Participants have a more passive role than arrangers: they buy a portion of the loan but are not involved in its organization.

We exploit the fact that increased screening and monitoring during a crisis will be reflected in changes in the structure of lending syndicates. In particular, in order to increase screening and monitoring, lending syndicates will become more concentrated and arrangers will need to retain a larger portion of each loan. Our evidence indeed shows that during the crisis participant banks became more concerned about insufficient screening and monitoring by arranging banks and therefore forced arrangers to retain more of each loan and to form more concentrated syndicates. This was particularly the case for relatively risky loans but less so in case of repeat borrowers and more experienced arrangers. We also find that whether a borrower is rated by a rating agency or not, does not influence the severity of agency problems during a financial crisis. Our findings indicate that the crisis has pushed banks to more carefully pick new borrowers and to monitor them more closely. The sharp reduction in corporate bank lending during the crisis is at least partially the result of a tightening of bank lending standards.

This paper contributes in several ways to the extant banking literature. First, we use data on a particular type of bank lending to provide novel insights into how banks respond to financial crises. There exists a considerable literature on the impact of financial crises on the amount of bank lending – see for instance Demirgüç-Kunt, Detragiache and Gupta (2006) – but empirical studies that explore the impact of crises on the underlying bank behavior are few and far between.

Second, we contribute to the growing literature on syndicated lending. Earlier papers have studied the structure of lending syndicates to analyze how banks deal with asymmetric information (Dennis and Mullineaux, 2000; Lee and Mullineaux, 2004; Sufi, 2007), with weak creditor rights (Esty and Megginson, 2003), with the risk of strategic defaults (Preece and Mullineaux, 1996), and with cultural differences (Giannetti and Yafeh, 2008). We contribute to this literature by analyzing how the financial crisis and the associated increase in risk and uncertainty have impacted lending syndicates.

The remainder of this paper is structured as follows. Section 2 provides an overview of the literature. Section 3 then describes our data and empirical methodology, after which Section 4 explains our results. Section 5 concludes.

2. Financial crises, screening and monitoring, and syndicated bank lending

The empirical banking literature on the impact of financial and economic crises mostly deals with the influence of crises on the amount of bank lending. Calomiris and Wilson (2004) show that during the Great Depression of the 1930's New York-based banks were forced to substitute loans with riskless assets in order to prevent deposit withdrawals. Demirgüç-Kunt, Detragiache and Gupta (2006) find similar evidence for a broader country sample. In addition to limiting the risk of their asset portfolio, banks also often increase their capital buffer to further isolate depositors from credit risk (see Demirgüç-Kunt, Detragiache and Gupta, 2006 and the references therein). As a result of such 'deleveraging', aggregate bank lending tends to contract substantially during a financial crisis (De Haas and Van Lelyveld, 2006; 2009). Also for the current crisis, empirical evidence of a reduction in the supply of bank credit is emerging. Ivashina and Scharfstein (2008) show that US banks sharply reduced their supply of new corporate lending, especially banks that experienced increased draw-downs on revolving credit facilities with existing customers. For Germany, Puri, Rocholl, and Steffen (2009) provide evidence of a reduced supply of bank credit to retail customers during the crisis.

While empirical evidence thus shows that banks reduce their credit supply during a financial crisis, there is less evidence on *how* banks reduce their lending. In particular, do banks cut lending across the board or do they also increase their screening and monitoring to improve average borrower quality? The former approach involves reducing credit to existing customers, or selling existing loans, and this may be costly if banks have invested in client relationships through gathering proprietary information (Rajan, 1992; Ongena, 1999) or through accepting loss-making transactions in the short-term in the expectation of establishing profitable relationships in the longer term (Boot, 2000). Banks may try to limit the reduction in lending as much as possible and use complementary tactics to improve the risk profile of their balance sheet. In this paper, we focus on one such approach: improving screening and monitoring (Allen, 1990; Broecker, 1990; Diamond, 1984).

The pay-off of screening and monitoring may have increased during the financial crisis. During the preceding boom years, the probability of firms actually defaulting was relatively low and most of the advantages of screening and monitoring (such as reduced shirking by firm management) benefited shareholders rather than creditors. During the crisis, as the proportion of borrowers with a high probability of default increased, the importance of screening and monitoring rose as well (Ruckes, 2004). There is indeed earlier empirical evidence that when borrowers perform well, lending

standards tend to be relaxed while they are tightened during a negative economic shock (Rajan, 1994; Berger and Udell, 2004). Steffen and Wahrenburg (2008) find that during recessions banks not only tighten their credit standards but also exploit their information monopoly over borrowers by charging higher loan spreads.

Our empirical approach to analyze whether screening and monitoring increased during the current crisis builds on the seminal theoretical contribution by Holmström and Tirole (1997). A crucial feature of their model is that banks not only invest their own capital in firms but also external funds from 'uninformed investors' such as depositors. This reduces their incentive to screen and monitor borrowers and creates an agency problem between banks and their financiers. In order to overcome this moral hazard problem, banks need to inject a sufficient amount of own capital into firms (Leland and Pyle, 1977). Only then will the providers of funding to the banks be reassured that the latter will not shirk.

This model fits well with the syndicated loan market that we study. Participants are essentially uninformed investors that rely on the screening and monitoring of arrangers. In order to convince participants that they do not shirk when monitoring, arrangers need to keep a portion of the syndicated loan on their own balance sheet. A higher retention rate then implies a greater commitment to monitor, as arrangers have more of their own money at stake and will thus be less likely to shirk. A higher retention also signals that arrangers have thoroughly screened borrowers or have gained private information about them through previous lending relationships. In general, arrangers will want to sell most of each loan in order to free up space on their balance sheet to engage in new (fee generating) syndication business and to diversify their loan portfolio. Increasing retention rates is thus unlikely voluntary but instead reflects pressures from the participants within the syndicate.[3] For example, several studies find that particularly in the case of opaque borrowers, arrangers may be forced to retain a large part of the loan in order to signal that they have appropriately screened the borrower (Dennis and Mullineaux, 2000; Jones, Lang and Nigro, 2005; Sufi, 2007).[4] Similarly, Giannetti and Yafeh (2008) find that arrangers need to retain more of the loans when significant cultural differences between them and the participant banks exist.

All in all, we expect that to the extent that increased screening and monitoring has been an important tactic of banks to cope with the crisis, this will be reflected in an increase in the loan share that

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[3] Ivashina (2008) finds that arrangers that need to retain a larger portion of a loan in order to reduce agency problems within the lending syndicate charge a higher loan spread to the borrower in order to compensate for the fact that this higher stake limits their ability to optimally diversify their loan portfolio.

[4] A related literature analyses similar issues in the context of underwriters' retention rates during an IPO (Chen, Jhou and Yeh, 2007, and Corwin and Schultz, 2005).

arrangers jointly retain (either through more arrangers or through each arranger taking a larger stake).[5] At the same time, the average number of participants may have been reduced during the crisis, reflecting that increased agency problems make participants more hesitant to buy syndicated loans in the first place (even if arrangers would keep a larger share of each loan). Given a certain loan size and number of participants, increased screening and monitoring will also have resulted in more concentrated lending syndicates.[6] In the remainder of this paper, we test whether these predictions are borne out by studying (pre-)crisis data on syndicated bank lending.

3. Data and methodology

3.1 Data and summary statistics

We obtain our data from the Dealogic Loan Analytics database, which provides comprehensive market data on virtually all global syndicated loans. Lenders have a strong incentive to report deals to Dealogic as this database is used by the financial press to generate league tables of the most successful arrangers. Our dataset contains detailed information on 16,918 syndicated loans to private borrowers in the United States, Western Europe, and a large number of emerging economies. Annex 1 contains more details on the geographical break-down of the dataset. All loans were signed between January 2005 and end-year 2008. Just over sixty per cent of the loans in our sample consist of multiple tranches. In those cases we compute weighted averages for our variables at the loan level, weighing each tranche by its amount. The tranches of a syndicated deal are negotiated at the same point in time and are part of one contract and as such should not be treated econometrically as individual observations (Sufi, 2007). By using the loan as the unit of observation we also prevent oversampling.

Our dataset includes information about the borrower (country of incorporation, industry, and credit rating), about the loan terms (maturity, volume, currency, spread, fee structure, and loan purpose), and about the structure of the syndicate (number of arrangers and participants). For a sub-sample of the data we also have information on the share of the loan held by each lender. Our initial data download consists of 22,725 loans. For each loan we check the availability of information on the identities of all syndicate members and only keep loans with complete and consistent information. We exclude

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[5] Increasing the number of arrangers could lead to duplication of monitoring efforts or, on the contrary, to free-riding among arrangers (Esty and Megginson, 2003). However, in most syndications an agent bank performs the practicalities of monitoring on behalf of all banks. To the extent that this effectively centralizes the monitoring process, adding more arrangers will be less of a problem.

[6] Small syndicates may also facilitate the restructuring process in case of default (Bolton and Scharfstein, 1996). Indeed, Lee and Mullineaux (2004) find that syndicates are smaller and more concentrated for riskier borrowers.

project finance loans, loans to (quasi-) government entities, and loans where an international financial institution (such as the EBRD or the IFC) is a syndicate member. This data cleansing reduces our sample to 16,918 loans. For each loan we categorize all syndicate members as either arrangers or participant banks. We define arrangers as those financial institutions with the title of mandated lead arranger or book runner and classify all other syndicate members as participants.[7,8]

Our main independent variable is a crisis dummy that is 'zero' for syndicated loans signed between January 2005 and September 2007 and 'one' for loans signed during the crisis period, which we define as October 2007-December 2008 (the latter date is the cut-off date of our dataset). We let the crisis start in October 2007 rather than August 2007 to take into account that there is a time lag between starting loan negotiations and signing the deal. The negotiation and arrangement process takes on average almost eight weeks (Godlewski, 2008). Exactly a quarter of all observations concern loans signed during the crisis period; the remainder was signed pre-crisis.

While August 2007 is generally regarded as the start of the crisis[9], the negative impact of the crisis on financing conditions progressively increased during the following months. This means that our "early start" of the crisis is a conservative approach when estimating the impact of the crisis on bank behavior. Our results are robust to starting the crisis at a later point in time (January 2008 or mid-March 2008) and our results also remain the same when we start our pre-crisis period in January 2004 or January 2006 instead of January 2005 (results available from the authors upon request). Finally, we also use step-up dummies to test whether the impact of the crisis on banks' screening and monitoring intensified over time. We do not find evidence for such an increased impact over time.

Table 1 provides summary statistics for the variables that we use in the empirical analysis. Before the crisis, the average loan amounts to USD 641 million and has an average maturity of four years and nine months. During the crisis, loans become on average 12 per cent smaller and the average maturity shortens by half a year. We create three dummy variables that single out loans with the purpose of refinancing an existing loan, acquiring a company (acquisition finance), or for general corporate purposes (such as working capital and trade finance). Before the crisis, 27 per cent of all syndicated loans are meant to refinance existing loans. This percentage almost halves during the crisis. We also include two risk mitigant dummies. The first one indicates whether a loan is secured through

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[7] Book runners sell the loan to participants but are not involved in negotiations with the borrower.

[8] We believe this is the best way to distinguish between banks that are actively involved in the loan structuring and marketing and those that only provide funds. However, occasionally banks are given the title of mandated arranger or book runner due to the amount they provide, even though they do not do any arranging work.

[9] On Thursday August 9th 2007, the European Central Bank and the US Federal Reserve injected substantial amounts of liquidity into their banking systems. Other central banks soon followed suit. That week also saw the TED spread – the difference between the three-month T-bill rate and three-month LIBOR, an indicator of perceived credit risk – spike above 100 basis points for the first time.

collateral and the second one whether repayment is guaranteed by a third party. Pre-crisis only 3 per cent and 18 per cent of all loans are guaranteed by a third party or secured by collateral, respectively. During the crisis the percentage of secured loans drops by a third, suggesting banks moved away from more risky loans (which in general are secured).

Table 1
Summary Statistics for Syndicated Loan Deals - Pre-Crisis and Crisis

The table shows summary statistics for our sample of 16,918 syndicated loans signed between January 2005 and December 2008. The pre-crisis period starts January 2005 and ends October 2007, the crisis period includes the rest of the sample period.

	Pre-Crisis			Crisis		
	No.	Mean	St. Dev.	No.	Mean	St. Dev.
Syndicated loan characteristics						
Volume (US$ million)	12652	641	1690	4265	565	1642
Maturity (years)	12190	4.74	2.37	4046	4.24	2.72
Loan is guaranteed	12653	0.03	0.18	4265	0.04	0.19
Loan is secured	12653	0.18	0.39	4265	0.12	0.33
Loan for refinancing purposes	12653	0.27	0.44	4265	0.16	0.37
Loan for acquisition purposes	12653	0.21	0.41	4265	0.20	0.40
Loan for general corporate purposes	12653	0.40	0.49	4265	0.48	0.50
Syndicate structure characteristics						
Number of arrangers	12652	2.87	2.30	4265	2.79	2.32
Number of participants	12562	4.41	5.94	4195	3.27	4.42
Total share held by arrangers	2665	0.55	0.27	757	0.63	0.28
Average share held by arrangers	2654	0.27	0.20	756	0.29	0.19
Concentration: share of five largest lenders	2665	0.78	0.24	757	0.84	0.21
Concentration: Herfindahl index	2665	0.24	0.18	757	0.27	0.18
Borrower and lender characteristics						
Borrower has credit rating	12653	0.32	0.46	4265	0.26	0.44
Times borrowed since 1980 at time of signing	12653	4.40	5.13	4265	4.24	4.88
Located in USA	12653	0.62	0.49	4265	0.62	0.48
Located in EU15	12653	0.28	0.45	4252	0.23	0.42
Located in emerging market	12653	0.10	0.30	4265	0.15	0.35
Average market share arrangers at time *t-1*	12652	1.63	1.85	4265	1.26	1.64

As dependent variables we create a number of measures of loan syndicate structure. These include the number of arrangers, the number of participating banks, and the average share and the total share of the loan held by the arrangers. We measure the concentration of the syndicate by the Herfindahl-Hirschman Index (HHI), which is the sum of the squared loan shares held by all syndicate members, and by the combined loan share of the five largest syndicate members. The structure of the lending syndicate changes during the crisis.[10] While the average number of arrangers stays more or less the same, at just below three, the average number of participants declines from 4.4 to 3.3. The average

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[10] Note that these are basic descriptive statistics where we do not correct for changes in loan size.

percentage of the loan that the arrangers jointly retain increases by 15 per cent to 63 per cent and the average share kept by each individual arranger increases by 7 per cent to 29 per cent. Lending syndicates also become more concentrated. The share held by the five largest lenders increases by 8 per cent and the HHI by 13 per cent. Unfortunately, complete information on the distribution of the loan among the syndicate members is only available for a fifth of the sample (3,422 loans). The characteristics of the loans in the full sample and of those for which we have information on arranger shares and concentration ratios are, however, very similar. For instance, the difference in average loan amount is only USD 28 million and the difference in average maturity is about a week. The main difference between the two samples is that loans in the USA are underrepresented in the full information sub-sample while loans in Asia are somewhat overrepresented.

Finally, we create a set of borrower and lender variables that we use as independent variables. The first dummy variable captures whether the borrower is rated by a rating agency at the time of signing of the loan or not. In general, more information will be publicly available about rated borrowers. Pre-crisis about a third of all borrowers are rated. Surprisingly, the share of rated borrowers drops significantly during the crisis. We also create regional dummy variables that indicate whether the borrower is incorporated in the USA, the EU15, or in an emerging market. About 60 per cent of all borrowers are US firms. During the crisis there is a slight increase in the proportion of borrowers in emerging markets at the expense of the proportion of borrowers in Western Europe.

We also construct a variable that measures the reputation of borrowers. Reputation can attenuate the information asymmetries between borrowers and lenders or between arrangers and participants (Gorton and Pennachi, 1995). The borrower reputation variable equals the (log of the) number of previous syndicated loans that the borrower has raised successfully since 1980. We expect that information asymmetries between repeat borrowers and lenders are smaller than between first-time borrowers and lenders (Diamond, 1991). On average, the borrowers in our dataset had built up a history of just above four previous successful syndications since 1980.

Finally, we construct an arranger reputation variable that captures the experience and skills of the arranger group of a particular loan (Sufi, 2007; Goplan, Nanda and Yerramilli, 2007). Arrangers with a lot of prior experience know that the reputation they have built over time is valuable as it helps them to be involved in future deals as well. They will thus be less inclined to mislead participants as this may jeopardize their reputation and future deal flow. Indeed, Dennis and Mullineaux (2000) and Lee and Mullineaux (2004) find that arrangers with a long history of repeat transactions are able to sell off larger parts of the loan. Furthermore, Champagne and Kryzanowski (2007) find that the probability of a participant joining a syndicate is higher in case of more reputable arrangers. We first calculate for each year the market share of the top 200 arrangers in the global syndication market. For a loan in year *t*, we then add the market shares in year *t-1* of all arrangers of that loan. For each syndicated loan

we thus approximate the joint market share of all arrangers in the previous year. In case an arranger is not in the previous year's top 200, the market share for that arranger is set to zero. The joint market share of arrangers is a good proxy for their reputation since the financial press regularly publishes league tables in which the top arrangers – worldwide and for individual geographical regions – are ranked according to the total loan volume they arranged in the previous year. Higher rankings in league tables thus imply increased exposure and a better reputation in the financial community.

During the crisis the arranger reputation variable decreased sharply (23 per cent). This mainly reflects that a number of Japanese banks entered the global top 10 of arrangers for the first time in years, replacing some well-known Western institutions. These new arrivals in the league tables held smaller shares of the syndicated loan market during previous years – when they were not in the top 10 – and hence had built op less of a reputation through repeat transactions during the pre-crisis period.

3.2 Empirical methodology

Throughout the paper we report regressions in which the dependent variable is one of our measures of syndicate structure: the number of arrangers, the number of participants, the total share held by the arrangers, the average share held by the arrangers, the share held by the five largest syndicate members, or the Herfindahl index.

To measure the impact of the crisis on syndicate structure, we use the crisis dummy as a stand-alone independent variable and in some cases also to create interaction terms. We also include a standard set of loan-specific and borrower-specific control variables that can be expected to influence the structure of syndicates. Loan-specific variables such as maturity, amount and collateral are usually decided upon before the syndication process (during the negotiations between the arrangers and the borrower) and as such are exogenous to the syndicate structure. We experimented with sector dummies but these turned out to be mostly statistically insignificant and we thus exclude them to preserve degrees of freedom. However, including sector dummies does not change any of our results.

We estimate Tobit regressions since our dependent variables are either censored at one side (number of participants and arrangers) or on both sides (share variables). Throughout all tables the coefficients are marginal effects and all standard errors are heteroskedasticity robust and clustered at the borrower level. We obtain very similar results when clustering at the sector level and when using an OLS regression technique or – in the case of discrete and non-negative dependent variables like the number of arrangers or participants – a Poisson technique.

4. The financial crisis and bank behavior: empirical results

4.1 Main results

Table 3 provides the results of our basic regression estimates to examine the impact of the global financial crisis on various measures of syndicate structure. The first two columns show regressions for the full sample with the number of arrangers and participants as dependent variables, respectively. Columns three to eight show regressions for the sub-sample for which we have information on the distribution of the loan among the lenders, which allows us to create the share and concentration variables. Columns three and four replicate the first two columns but now for the sub-sample only. The overall similarity between the results in the first two columns and those in columns three and four adds further confidence to our earlier conclusion (cf. Section 3.1) that there are no systematic differences between the loans in our full and in our partial sample.

Even when taking into account loan size and other control variables, our results indicate a clear decrease in the number of participants during the crisis of about 21 per cent of the pre-crisis mean. There is no significant change in the number of arrangers. Arrangers have reacted to the crisis by jointly retaining about 10 per cent more of each loan on their own balance sheet, while the average share retained increased with 6 per cent. The total loan share held by the top 5 lenders goes up by 8 per cent. As a result of the reduced number of participants and the increased retention rate of the arrangers, lending syndicates become during the crisis much more concentrated, as evidenced by the significant increase in the Herfindahl index (9 per cent).

As explained in Section 2, this finding points to a tactic of increased screening and monitoring. As participants largely depend on the arrangers for ex ante due diligence and ex post monitoring they need a credible commitment from the arrangers that they will not shirk. The fact that arranging banks keep more of the loan on their own balance sheets during the crisis suggest that (prospective) participants demand stronger assurances that borrowers have been adequately screened and will be effectively monitored. To a certain extent the crisis thus partially reverses the typical pyramid structure of loan syndications, in which a small number of arrangers distributes a loan to a wide group of participants.

Table 2
Impact of Crisis on Syndicate Structure

This table shows the results of Tobit regressions estimating the impact of the crisis on the structure of loan syndicates. *Crisis* is a dummy which is one for the crisis period (October 2007 until December 2008) and zero for the pre-crisis period (January 2005-October 2007). *Volume* equals the log of the loan amount in dollars. *Maturity* is the log of the maturity of the loan in days. *Rated* is a dummy which is one if the borrower is rated. *Secured* is a dummy which are one if the loan is secured. *Guaranteed* is a dummy which is one if the loan is guaranteed. *Borrower reputation* equals (1 plus) the log of the number of previous syndicated loans the borrower raised between 1980 and the time of the current loan signing. *Arranger reputation* captures the joint market share of the arranger group prior to loan signing. *Refinancing, Acquisition* and *Corporate* are loan purpose dummies which are one if the main loan purpose is refinancing, acquisition or general corporate purpose, respectively. The omitted loan purpose group is "Other". *Sovereign rating* is the (numerical) rating of the country in which the borrower is located at time of signing (higher value implies lower risk). *USA* is a dummy which is one if the borrower is located in the United States. Full sample includes all loans. Partial sample includes only those loans for which the amount held by each syndicate member is available. Standard errors are heteroskedasticity robust and clustered by borrowing firm. All regressions include a constant and coefficients are marginal effects. Robust p-values appear in brackets and ***, ** and * correspond to one, five and ten percent level of significance, respectively.

	Full Sample		Partial Sample					
	No. Arrangers	No. Participants	No. Arrangers	No. Participants	Total Share Held By Arrangers	Average Share Held By Arrangers	Total Share Held By Top 5 Lenders	Herfindahl Index
Crisis	0.024	-0.662***	0.144	-1.610***	0.089***	0.015**	0.047***	0.022***
	[0.483]	[0.000]	[0.126]	[0.000]	[0.000]	[0.016]	[0.000]	[0.000]
Volume	0.672***	0.740***	0.811***	1.306***	0.009*	-0.057***	-0.100***	-0.052***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.062]	[0.000]	[0.000]	[0.000]
Maturity	0.052*	-0.019	0.098	-0.087	-0.003	-0.010*	-0.003	-0.002
	[0.092]	[0.784]	[0.157]	[0.544]	[0.749]	[0.055]	[0.631]	[0.701]
Rated	0.501***	0.358***	0.865***	1.395***	0.009	-0.037***	-0.072***	-0.028***
	[0.000]	[0.001]	[0.000]	[0.000]	[0.553]	[0.000]	[0.000]	[0.000]
Secured	-0.374***	-0.705***	-0.280***	-0.469**	0.021	0.044***	0.042***	0.035***
	[0.000]	[0.000]	[0.007]	[0.033]	[0.164]	[0.000]	[0.000]	[0.000]
Guaranteed	0.107	-0.089	-0.250	-0.727**	-0.005	0.002	0.018	0.021*
	[0.370]	[0.698]	[0.135]	[0.019]	[0.810]	[0.834]	[0.181]	[0.055]
Borrower reputation	0.253***	0.372***	0.314***	0.332*	0.003	-0.030	-0.030***	-0.026***
	[0.000]	[0.000]	[0.002]	[0.052]	[0.797]	[0.000]	[0.000]	[0.000]
Arranger reputation	-0.187***	-0.042***	-0.124***	0.326***	-0.027***	-0.015***	-0.017***	-0.014***
	[0.000]	[0.006]	[0.002]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Refinancing	0.568***	0.626***	0.907***	0.988***	0.000	-0.078***	-0.109***	-0.080***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.991]	[0.000]	[0.000]	[0.000]
Acquisition	0.197***	-0.335***	0.738***	-0.410	0.103***	-0.048***	-0.030*	-0.038***
	[0.000]	[0.008]	[0.000]	[0.231]	[0.000]	[0.000]	[0.059]	[0.000]
Corporate	0.259***	0.114	0.672***	0.857***	-0.020	-0.067***	-0.089	-0.070***
	[0.000]	[0.321]	[0.000]	[0.000]	[0.227]	[0.000]	[0.000]	[0.000]
Sovereign rating	-0.073***	-0.141***	-0.043**	-0.196***	0.007***	0.007***	0.011***	0.005***
	[0.000]	[0.000]	[0.011]	[0.000]	[0.002]	[0.000]	[0.000]	[0.000]
USA	-0.192***	-0.865***	-0.732***	0.523**	-0.092***	0.038***	0.020**	0.028***
	[0.000]	[0.000]	[0.000]	[0.038]	[0.000]	[0.000]	[0.043]	[0.000]
Observations	16000	16000	3113	3113	3113	3113	3113	3113
LR chi2	3913.671	1168.682	1026.153	780.568	212.756	1937.767	2544.139	1977.689
Log Likelihood	-32920.152	-43109.922	-6998.882	-8564.116	-1233.934	1635.609	-848.022	1943.493

We argue that the increased retention rates by arrangers are not caused by an inability of arrangers to sell loans to (less liquid) participant banks, but that it results from the need to assuage agency problems between arrangers and potential participants. In other words, we interpret our results as evidence of a tactical decision by banks to intensify monitoring and screening of (prospective) borrowers. If our findings would just reflect a sudden reduction across the board in participants'

willingness or ability to buy syndicated loans, we would expect to find many transactions in which arranging banks tried to reduce the loan volume during the syndication process. However, during the crisis the loan amount was scaled back in only 1 per cent of all transactions (compared to 0.2 per cent before the crisis).

This still leaves the possibility that arrangers decide to take on a larger portion of the loan than originally planned because, although selling down turns out to be difficult, arrangers might not want to renegotiate the loan with the borrower as this could harm their reputation and potentially lower future fee income. While this may have happened in some individual cases, it is hard to imagine this as an equilibrium outcome. The syndicated loan market is transparent and information on increased difficulties to sell down loans spreads easily through the market. An arranger might make the mistake to implicitly or explicitly underwrite a loan that turns out to be too large to sell down once, but likely not several times in a row. Instead, the next time the arranger will likely only agree to underwrite a smaller loan, perhaps with the option of increasing the loan amount if the loan would be oversubscribed. Indeed, our data show that during the crisis the loan amount was increased in 5 per cent of the cases. Furthermore, as we discuss in Section 4.2, the change in syndicate structure during the crisis has not been uniform but instead depends on the level of agency problems that are present.

Our various control variables tell an interesting story as well. Unsurprisingly, larger loans are distributed among larger syndicates as each lender needs to take account of exposure limits to individual borrowers. As a result, lending syndicates for large loans are on average less concentrated, which is in line with earlier findings by Lee and Mullineaux (2004) and Sufi (2007).

Next, we find that loans secured by collateral tend to be syndicated by smaller, more concentrated lending syndicates that consist of both a smaller number of arrangers and of participants. Whereas there are fewer arrangers, they each hold a bigger stake of the loan (there is no effect on the joint stake that the arrangers hold). These findings are in line with banks monitoring guaranteed and secured loans more intensely, presumably because lenders regard secured loans as *more* risky, notwithstanding the presence of collateral. This is consistent with Berger and Udell's (1990) observation that collateralized loans are more risky ex ante because they are granted to borrowers that need more intense monitoring. Indeed, Barbosa and Ribeiro (2007) find that the presence of collateral leads to higher interest rate spreads on syndicated loans. Dennis and Mullineaux (2000) find that the retention rate of collateralized loans is higher so that incentives to monitor are less diluted.

The interpretation of our findings on secured loans is further strengthened by our finding on the impact of borrower ratings. While having a rating does not mean that a borrower is less risky per se, a rating implies that the borrower has been scrutinized by one or more rating agencies such as Moody's or Standard & Poor's. The results of this due diligence, in the form of the rating and the accompanying research notes, are publicly available. The information asymmetry between a lending

syndicate and a rated borrower will thus be lower than between a lending syndicate and a non-rated borrower. In line with Lee and Mullineaux (2004) and Sufi (2007) we find that loans to rated borrowers tend to be granted by larger and less concentrated lending syndicates that consist of both more arrangers and more participants. Importantly, each arranger retains a smaller stake on its own balance sheet compared to non-rated borrowers. When information asymmetries are low, there is less need for arranger banks to retain a large part of the loan to convince participants that they sufficiently screen and monitor.

Next, we look at the impact of borrower and lender reputation.[11] We find that syndicated loans to repeat borrowers are granted by larger, less concentrated syndicates in which each individual arranger retains less of the loan. Repeat borrowers are thus perceived as less risky and loans to such reputable borrowers are plagued by fewer agency problems. As for lender reputation, we find that experienced and reputable arrangers are able to syndicate a loan with fewer arrangers and to a broader group of participants.[12] As with reputable borrowers, syndicates led by experienced arrangers are less concentrated and these arrangers, individually and jointly, need to retain less of each loan. Arranger reputation reduces agency problems within the lending syndicate.

Finally, we find a highly significant impact of the sovereign country rating where the borrower is based: loans to borrowers in riskier countries (a lower rating) are spread among more syndicate members. This likely reflects that both arrangers and participants have to abide by strict internal limits on aggregate country exposure. All else equal, banks will thus have a greater incentive to diversify a loan to a borrower in a risky country as in that case exposure limits will be more binding.

4.2 The differentiated impact of the financial crisis on lending to various borrower types

The preceding section showed that banks reacted to the financial crisis by stepping up their screening and monitoring efforts, as reflected in smaller and more concentrated lending syndicates. We also found that when information asymmetries are relatively large, such as in the case of risky loans to unrated borrowers, banks tend to lend in small groups. We argued that this stresses the importance of overcoming agency problems. If this is indeed the underlying cause, one would expect that the onset of the global financial crisis has impacted upon different types of borrowers in different ways. To analyze this, we estimate a set of regressions in which we interact the crisis dummy with a number of variables that proxy for the importance of agency problems. Table 3 summarizes the results (control variables are included in all regressions but not shown for reasons of brevity).

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[11] We measure borrower reputation as the log of the number of times that the borrower successfully raised a syndicated loan since 1980. We find similar results, when we measure borrower reputation through a dummy variable that indicates whether the borrower raised one or more loans during the preceding three or five years.
[12] The impact on the number of participants is negative in the full sample.

Table 3
Information Asymmetry and Impact Crisis on Syndicate Structure

This table presents evidence on how the impact of the crisis on loan syndicate structure depends on the level of information asymmetry between the borrower and the lenders. The crisis dummy is interacted with a number of variables capturing differences in information asymmetry. *Crisis* is a dummy which is one for the crisis period (October 2007 until December 2008) and zero for the pre-crisis period (January 2005-October 2007). *Rated* is a dummy which is one if the borrower is rated. *Borrower reputation* equals (1 plus) the log of the number of previous syndicated loans the borrower raised between 1980 and the time of the current loan signing. *Secured* is a dummy which is one if the loan is collateralised. *Arranger reputation* captures the joint market share of the arranger group in the year prior to loan signing. All regressions include the same control variables as the baseline model (Table 2). The sample includes only those loans for which the amount held by each syndicate member is available. The regressions are estimated using Tobit. Standard errors are heteroskedasticity robust and clustered by borrowing firm. All regressions include a constant. Coefficients are marginal effects. The robust p-values appear in brackets and ***, ** and * correspond to one, five and ten percent level of significance respectively.

	Mean Share Held By Arrangers				Herfindahl Index			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Crisis	0.017**	0.021**	0.022***	0.025***	0.022***	0.027***	0.024***	0.031***
	[0.024]	[0.033]	[0.001]	[0.002]	[0.000]	[0.000]	[0.000]	[0.000]
Crisis*Rated	-0.007				-0.007			
	[0.516]				[0.357]			
Crisis*Borrower rep.		-0.006				-0.010**		
		[0.195]				[0.022]		
Crisis*Secured			-0.039**				-0.018	
			[0.027]				[0.201]	
Crisis*Arranger rep.				-0.013***				-0.013***
				[0.008]				[0.000]
Observations	3113	3113	3113	3113	3113	3113	3113	3113
LR chi2	1941.64	1946.11	1950.26	1945.39	1998.19	1998.24	1991.03	2000.07
Log Likelihood	1635.77	1636.23	1639.23	1638.65	1943.89	1945.55	1944.73	1948.41

Table 4 replicates our earlier finding that lending syndicates became more concentrated and that arrangers started to retain larger loan shares during the crisis. This crisis impact holds for both rated and unrated borrowers: we do not find a significant coefficient for the interaction term of the crisis dummy and the rating dummy. So while we find evidence that a credit rating reduces agency problems during normal economic times, we do not find any evidence of a differentiated impact of the crisis on rated versus unrated borrowers. For both types of borrowers, screening and monitoring by banks has become more important.

Second, we investigate whether there is a differentiated impact of the crisis on experienced borrowers that have built up a good reputation over the years. Interestingly, borrower reputation matters during the crisis: syndicated loans to repeat borrowers become less concentrated. Whereas having a credit rating does not shield borrowers from the impact of the crisis, having built up a reputation as a 'good' borrower over the years does help to contain the increase in information asymmetries between borrowers and lenders. What mattered most during the crisis was whether the borrower has been

exposed to banks' scrutiny during earlier syndications and not so much whether the borrower has been rated by an external rating agency.

Next, we find that during the crisis, compared to non-secured loans, collateralized loans see a significantly smaller increase in retention rates among arrangers. While monitoring and screening gain in importance during the crisis across the board, this is less the case for secured loans. So while collateral does not yield much protection to lenders in general, we find some evidence that collateralized loans suffered somewhat less from increased agency problems during the crisis than non-collateralized loans.

We also test whether there is a differentiated crisis impact across arrangers with a varying amount of reputation (measured as the market share in the syndicated loan market in the previous year). We find strong evidence that lender experience is particularly important during a financial crisis. Experienced arrangers need to increase their retention rates far less than competitors with a weaker market position and loans put together by these arrangers show a much smaller increase in concentration during the crisis. Clearly, lender reputation is a crucial mechanism to control agency problems within the lending group, in particular during episodes of financial turmoil.

4.3 An alternative interpretation: moral hazard versus adverse selection

Up till now we have interpreted our results as evidence of an increased need to screen and monitor borrowers during the crisis. Participants want to make sure that borrowers have been adequately screened and will be adequately monitored before agreeing to participate in a syndicate. Arrangers need to keep a larger share on their books as participants are concerned about *moral hazard* with respect to arrangers' screening and monitoring efforts. However, an alternative interpretation is also possible. It is possible that participants' main worry is not so much that arrangers will not screen and monitor sufficiently, but rather that because the arrangers have private information about the borrower, there will be scope for *adverse selection*. In this case arrangers do not keep a larger loan share to convince participants that they adequately screen and monitor the borrower, but to convince them that they do not only sell down the relatively risky loans. If this is the case, our results should not be interpreted as evidence that banks react to the crisis by increasing monitoring and screening.

In order to distinguish between these two possible explanations of our findings, we follow Sufi (2007) and measure the number of previous relationships between the arrangers and the particular borrower. We construct two *relationship* variables. The first one equals the log of (1 plus) the number of times (one or more of) the arranger(s) in the current loan structured a loan in the past for the same borrower. The second one is a dummy which is 'one' if at least one of the arrangers in the current loan structured a loan in the past for the same borrower and 'zero' otherwise. We add these variables (one

at a time) to our baseline regression and interact them with our crisis dummy. We also continue to include our standard control variables, including the number of previous loans of the borrower as a proxy for the *general* level of information that is available in the market about the borrower.

If moral hazard on the part of the arrangers is driving our results, then the fact that the arrangers keep part of the loan reflects that both arrangers and participants have imperfect knowledge about the borrower and that the participants fear that the arrangers will not sufficiently screen and monitor the borrower. In this case, we expect that if there have been previous lending relationships between the arrangers and the borrower, potential participants will be less worried: they know that the arrangers already know the borrower quite well and that additional screening and subsequent monitoring is less crucial. This would translate into a negative coefficient for the *relationship* variable, as participants feel less need to force arrangers to retain a large portion of the loan in order to prevent shirking.

In the case of adverse selection, the existence of a previous relationship between the arrangers and the borrower implies that the arranger has an information advantage over the participants. Especially for these types of loans the arranger has then to signal to the participants that the loan is not risky. So in the adverse selection scenario, we would expect a positive coefficient for the *relationship* variable: in case of loans to previous clients, the arrangers will be forced to retain more of the loan and to form a more concentrated syndicate. The participants main worry is not so much that the arrangers have insufficiently screened the borrower or will not monitor her adequately, but rather that the arrangers actually now the borrower quite well and will abuse this information.

The results in Table 4 show that we can interpret our findings as evidence of increased monitoring and screening by banks during the crisis in order to reduce credit risk (other control variables are not shown for reasons of brevity). The relationship variable shows that in case of previous lending relationships between the same arrangers and a borrower, the arrangers need to retain less of the loan and the syndicate becomes more diffuse. In case of risky clients retention rates thus increase, and lending syndicates become more concentrated, because participants fear that arrangers will shirk when monitoring, not because they expect arrangers to sell bad loans. During the crisis the impact of previous relationships between the borrower and the same arrangers does not change, or becomes even more negative, implying that the increased share retained by arrangers and the stronger concentration of the syndicate during the crisis is the result of moral hazard and not adverse selection.

Table 4
Adverse Selection versus Moral Hazard

This table presents evidence on how the impact of the crisis on loan syndicate structure depends on the level of information asymmetry between the borrower and the lenders. The crisis dummy is interacted with a number of variables capturing differences in information asymmetry. *Crisis* is a dummy which is one for the crisis period (October 2007 until December 2008) and zero for the pre-crisis period (January 2005-October 2007). *Relationship* equals the log of the number of times the arranger(s) of the current loan structured a loan for the same borrower in the past. *Relationship (dummy)* is one if the arranger(s) in the current loan structured at least one loan in the past for the same borrower. All regressions include the same control variables as the baseline model (Table 2). The sample includes only those loans for which the amount held by each syndicate member is available. The regressions are estimated using Tobit. Standard errors are heteroskedasticity robust and clustered by borrowing firm. All regressions include a constant. Coefficients are marginal effects. The robust p-values appear in brackets and ***, ** and * correspond to one, five and ten percent level of significance respectively.

	Mean Share Held By Arrangers		Herfindahl Index	
	(1)	(2)	(1)	(2)
Crisis	0.021**	0.022**	0.032***	0.031***
	[0.013]	[0.034]	[0.000]	[0.000]
Crisis*Relationship	-0.007		-0.011**	
	[0.199]		[0.022]	
Relationship	-0.017***		-0.014***	
	[0.001]		[0.003]	
Crisis*Relationship (dummy)		-0.008		-0.016
		[0.515]		[0.134]
Relationship (dummy)		-0.019**		-0.019**
		[0.016]		[0.010]
Observations	3113	3113	3113	3113
LR chi2	2131.986	2041.029	2230.646	2094.544
Log Likelihood	1643.113	1639.87	1952.632	1950.397

5. Conclusions

We use data on almost 17,000 syndicated loans to borrowers across 60 countries to examine how banks adapt their lending during a crisis. Our results show that during the financial crisis banks stepped up their screening and monitoring efforts. This finding confirms earlier more descriptive evidence that during the financial crisis banks became more selective in lending to new customers (Ivashina and Scharfstein, 2008). We find that during a crisis arranging banks retain larger portions of loans and form more concentrated syndicates, reflecting the increased importance syndicate participants attach to the adequate screening and monitoring of borrowers. We show that our results reflect participants' concerns about moral hazard with respect to arranger efforts and not about possible adverse selection problems.

Importantly, we do not find an equal increase across the board in arrangers' retention rates – which could merely reflect liquidity constraints among potential participants – but instead show that the increase in retention rates is stronger when agency problems are larger. In particular, we show that both lender and borrower reputation are important mechanisms to control such agency problems and that this attenuating role of reputation has been particularly useful during the financial crisis. Lending

standards needed to be tightened less during the crisis in the case of repeat borrowers that had built up a good reputation during the pre-crisis years. Similarly, while agency problems increased between arrangers and participants as a result of the financial crisis, this was less of an issue in case of experienced arrangers with a strong market position. In contrast to reputation, having a rating by an official rating agency does little to stem the increase in agency problems due to the financial crisis.

Our results indicate that a credit rating has been of limited use to borrowers during the financial crisis. Instead, the only borrowers that were able to limit the increased scrutiny of lenders, and the reduced interest among participant banks, have been those that had built a reputation in the syndicated loan market during previous years. This is not to say that having a credit rating, and the associated transparency, is unimportant. We clearly find that in general agency problems are much smaller in the case of rated borrowers. During the crisis, however, what mattered most was whether the borrower had been (repeatedly) exposed to banks' own scrutiny during earlier syndications. In particular during periods of increased overall risk, banks clearly still rely more on their own judgment than on that of external rating agencies.

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Annex 1

Table A1
Geographic distribution of the sample

Region	Country	Per cent	Region	Country	Per cent
USA	United States of America	**61.96**	**Asia**	Papua New Guinea	0.01
				Laos	0.02
EU 15	Austria	0.18		Bangladesh	0.04
	Luxembourg	0.29		Sri Lanka	0.07
	Ireland	0.31		Pakistan	0.09
	Finland	0.36		Viet Nam	0.24
	Portugal	0.41		Philippines	0.25
	Denmark	0.43		Thailand	0.28
	Belgium	0.55		Indonesia	0.48
	Greece	0.58		Malaysia	0.50
	Sweden	0.72		China	1.71
	Netherlands	1.50		India	1.78
	Italy	2.49		**Total Asia**	**5.47**
	Germany	2.92	**Latin America**		
	Spain	3.50		Guatemala	0.01
	France	4.30		Uruguay	0.01
	United Kingdom	5.75		Honduras	0.02
	Total EU 15	**24.29**		El Salvador	0.02
				Costa Rica	0.03
Transition countries	Estonia	0.03		Venezuela	0.05
	Georgia	0.04		Dominican Republic	0.07
	Serbia	0.04		Colombia	0.08
	Lithuania	0.05		Argentina	0.15
	Slovakia	0.07		Peru	0.15
	Belarus	0.11		Panama	0.19
	Bulgaria	0.14		Chile	0.39
	Latvia	0.14		Mexico	0.76
	Slovenia	0.14		Brazil	0.87
	Azerbaijan	0.15		**Total Latin America**	**2.80**
	Croatia	0.16			
	Hungary	0.19			
	Czech Republic	0.21			
	Poland	0.24			
	Romania	0.26			
	Kazakhstan	0.51			
	Ukraine	0.60			
	Russian Federation	2.43			
	Total transition countries	**5.51**			