"Testing the Small Bang Theory of the Financial Universe"

From Bank-Firm Exposures to Changes in CDS Trading and Credit

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Abstract

Is the trading of credit default swaps related to hedging motives? And does denser CDS trading increase the availability of credit as well? To answer these questions we couple unique and comprehensive bank-firm CDS trading data with a credit register containing bilateral bank-firm credit exposures. We study how following the Small Bang the trading of CDS on specific firms by individual banks is determined and how it affects the future supply of credit to these firms by these banks. We find that existing credit relationships to riskier firms increase banks' CDS trading of these firms. Interestingly, banks allocate relatively more credit to higher quality firms if they hold more CDS contracts of these firms. (124 words)

Keywords: Credit default swaps, credit exposure, hedging, bank lending.

JEL Codes: G21.

I. Introduction

Credit default swaps (CDS) are insurance-type contracts that offer their buyers protection against default by a debtor.[1] The default risk of the outstanding bank-firm exposures should determine the extent to which financiers buy this protection to hedge their credit risk. At the same time the ease of hedging could in principle affect their new lending.[2] To convincingly identify any causal effect in this regard however remains an empirical challenge that has not been fully tackled so far.

In this paper we therefore provide comprehensive empirical evidence linking outstanding bank-firm credit exposures, hedging with CDS, and granting of new credit. To identify this link we exploit the effects of the so-called "Small Bang" which in 2009 brought contract and convention changes that facilitate a higher degree of standardization in the CDS market.[3] The Small Bang improved liquidity (Fulop and Lescourret (2015)) and spurred more trading of CDS (we will show later). We investigate how outstanding bank-firm exposures help explain this extra trading and if and how this exogenously induced

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[1] See Stulz (2010) and Augustin, Subrahmanyam, Tang and Wang (2014) for a review. A large empirical literature explains CDS spreads and trading volume (e.g., Ericsson, Jacobs and Oviedo (2009), Tang and Yan (2009), Gârleanu, Pedersen and Poteshman (2009), Zhang, Zhou and Zhu (2009), Tang and Yan (2010), Bongaerts, De Jong and Driessen (2011), Tang and Yan (2011) and Gehde-Trapp, Gündüz and Nasev (2014).

[2] CDS allow financiers that buy this protection to hedge their credit risk; therefore, these financiers should increase the supply of credit to the underlying firms. CDS have important ex ante commitment benefits. In Bolton and Oehmke (2011) for example CDS raise the debtor's pledgeable income and help reduce the incidence of strategic default by strengthening creditors' bargaining power. In Arping (2014) CDS improve the credibility of foreclosure threats, which can have positive implications for borrower incentives and credit availability ex ante. See also e.g., Shan, Tang and Winton (2014).

[3] The Small Bang entailed contract changes related to restructuring, alongside separate convention changes to the European corporate CDS market and Western European Sovereign CDS trades (Markit (2009)). The Small Bang was considered to be a natural extension of the Big Bang, which entailed global contract and convention changes in North American contracts, and which came into effect on April 8, 2009.

extra trading by individual banks of CDS contracts on specific firms altered the provision of credit by these banks to these firms.

Coupling unique and comprehensive bank-firm CDS trading data with a credit register containing all relevant bank-firm credit exposures we can investigate hedging activity with CDS, before, during and after the Small Bang. We are particularly interested in whether the default risk in bank-firm exposures before the Small Bang determines changes in CDS hedging by banks and whether changes in bank-firm CDS positions then led to changes in bank-firm credit exposures. Using an identification strategy that is applied in this literature for the first time, our results show that after the Small Bang larger credit exposures to riskier firms held by banks led to increases in CDS on these firms held by these banks. Banks that increased their holdings of CDS then also re-allocated their credit granting, maintaining lending to safer firms despite a concurrent lending contraction (that started in Germany in 2009). These effects are not only statistically significant but also economically relevant.

We are not the first to investigate the CDS – credit nexus, but as far as we are aware we are the first to couple bank-firm CDS trading information to bank-firm level credit exposures to uniquely identify the effect of bank-firm exposures on CDS trading and on the supply of new credit.[4] At the bank level Norden, Silva Buston and Wagner (2014) for example banks with larger gross positions in credit derivatives charge significantly lower corporate loan spreads, while banks′ net positions are not consistently related to loan

[4] A somewhat related literature investigates the impact of loan securitization on bank lending (e.g., Loutskina and Strahan (2009); Kara, Marqués-Ibáñez and Ongena (2011); Loutskina (2011)).

pricing. Shan, Tang and Yan (2014) on the other hand find that banks become more aggressive in risk taking after they begin using credit derivatives. Loans issued to CDS-referenced borrowers are larger and have higher yield spreads if the lead banks in the syndicate are active in CDS trading.

At the firm level Ashcraft and Santos (2009) for example fail to find evidence that the general onset of CDS trading in the financial system lowers the cost of debt financing for the average borrower in their sample; yet, they uncover economically significant adverse effects on risky and informationally opaque firms. Saretto and Tookes (2013) find that firms with traded CDS contracts on their debt are able to maintain higher leverage ratios and longer debt maturities. They find this to be especially true during periods in which credit constraints become binding, a finding which is consistent in timing with the ability to hedge, helping to alleviate frictions on the supply side of credit markets. Subrahmanyam, Tang and Wang (2014) for example use credit default swaps (CDS) trading data to demonstrate that the credit risk of reference firms, reflected in rating downgrades and bankruptcies, increases significantly upon the inception of CDS trading at the firm level (a finding that seems robust after controlling for the endogeneity of CDS trading). Additionally, distressed firms are more likely to file for bankruptcy if they are linked to CDS trading.

Though most insightful in highlighting some of the potential consequences of CDS trading at the bank or firm level, none of these papers examine how bank-firm level credit exposures influence banks` trading of the CDS on the respective borrowing firms or identify how exogenously caused changes in bank-firm level CDS trading affects bank-firm level credit: This is the main contribution of our paper.

The remainder of the paper is organized as follows. In Section II, we briefly review the contours of the CDS market and the Small Bang. In Section III, we describe the data and the methodology. We present the main estimation results explaining the degree of concentration in Section IV, followed by a series of robustness tests. Section V concludes.

II. "Big Bang" and "Small Bang" on the CDS Market

"*On March 11, 2009 major European dealers made a commitment to European regulators to begin clearing index and single name CDS trades through a European central clearing party by July 31, 2009*" (Markit (2009)). Under this so-called "Small Bang", the contract and convention changes were not explicitly required for central clearing of CDS trades (any more than the changes were required under the equivalent "Big Bang" that took place in the U.S. on April 8, 2009).

The changes to promote greater standardization of contracts were expected to improve the ability of central clearing parties to conduct daily hedging operations and reduce systematic counterparty risk, as well as benefit trade compression and processing. Among several convention changes that enabled further standardization, European corporates started to trade with fixed coupons plus an upfront fee in the market. This, in effect, has facilitated a higher flexibility to dealers for their bilateral assignment and termination negotiations throughout the maturity. Second, the creation of an *event determination committee* created a central decision maker to indicate whether or not a credit event took place, prevent differing conclusions regarding the same event from arising, and again facilitating a higher standardization. Third, a hardwired auction mechanism would support a binding settlement price when such a credit event occurred.

In sum, the greater standardization was expected to lead to more trading and this is indeed what happened. Figure 1 visualizes our employment of three quarter averages before the first quarter of 2009 (2009:Q1), three quarter averages after the third quarter of 2009 (2009:Q3), and three quarter averages between 2009:Q1 and 2009:Q3. These two quarters, i.e., the first and third quarters of the year 2009, closely match the two event dates, i.e., March 11, 2009, when the European dealers made the commitment to start the changes that facilitate central clearing by July 31, 2009, when the Small Bang came into effect. We refer to these periods as “Pre”, “Post” and “Mid”, respectively.

As Figure 2 vividly illustrates, and as statistically shown in Panel A, Table 1, the Small Bang boosted CDS trading. When we compare the three-quarter average notional amount of CDS contracts of our sample banks before the Small bang (“Pre”) with the value after the Small Bang (“Post”), we find that the gross notional amount (the sum of buying and selling divided by two) increased from 62.11 Million € to 66.95 Million €: An increase of 4.84 Million € that is statistically significant at the 1 percent level. Similarly their average net CDS position increased significantly from -0.64 Million € to 3.93 Million €.[5]

Even more important for our purposes is the observation that the average number of banks in our sample with CDS positions increased from 14 to 17, the average number of firms on which a CDS contract is traded from 172 to 187, and the average number of bank-firm pairs with CDS positions from 973 to 1,090. It turns out that bank lending overall actually contracted during the studied period; for example the average on balance sheet bank-firm credit exposures contracted from 11.63 to 8.20 Million €. Yet, CDS trading may have substantially arrested this contraction for some types of firms we will show.

[5] Notice here that Table 1 Panel A presents the three-quarter averages of “Pre” and “Post” periods, which also include any non-trading activity. On the other hand, Figure 2 provides a time series of the cross-sectional averages of bank-firm pairs that are active in the CDS market.

III. Data and Methodology

A. Data Sources

We employ two data sources. A first unique dataset we access is from the *Depository Trust and Clearing Corporation* (DTCC). This position and trading data from the DTCC capture almost the entire market for standard single-name CDSs covering more than 95% of globally traded CDSs and making it by far the most comprehensive dataset for CDS positions and trading.[6] For each bank, we aggregate its CDS contracts across trades with different counterparties at the weekly level.

For our period of investigation we match DTCC set with the German credit register *(MiMik),* which makes it possible to observe individual exposures of German banks at the borrower level. We aggregate the weekly CDS data at quarterly level before matching it with the quarterly credit register data.[7]

As the fourth largest economy in the world and a bank-based system, Germany is a particularly interesting country to study how the trading of CDS contracts affects the supply of credit. The German universal banking system is structured along three pillars, i.e., commercial banks, public sector banks and credit cooperatives (Krahnen and Schmidt (2004)), and all three types of banks lend to corporates and could enter the CDS market.[8]

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[6] Using this dataset Oehmke and Zawadowski (2013) for example document trading and arbitrage activity on the CDS market. See also Kim, Koo and Liu (2015) on the matching between dealers and customers.

[7] Almost all financial institutions active in the CDS market that are not matched with credit register data (*MiMiK*) are either investment companies or asset management companies, and although these financial companies do trade CDS there are no credit exposures to the firms involved.

[8] According to the Bundesbank Banking Statistics, by the end of 2008, there were 1981 banks in the country of which 61 percent were credit cooperatives. However, as credit cooperatives are very small institutions,

The Deutsche Bundesbank's credit register *(MiMiK)* is the main data source for the individual exposures of German banks to firms.[9] Despite obtaining, withdrawing and repaying loans − possibly frequently − firms keep their individual exposures to banks surprisingly constant over time (3/4 of all individual exposures vary less than 20 percentage points over time, with a median growth of -3.8 percentage points). This persistency in individual exposures makes our ensuing estimates of the impact of CDS trading on credit even more credible.

The credit register contains information on large credit exposures of 1.5 Million € (formerly 3 Million Deutsche Mark) and above.[10] Therefore, exposures to small and medium-sized firms might be underrepresented in this database. However, for this study this threshold is less of a concern as most if not all CDS contracts that are traded pertain to large firms with commensurately large exposures.

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and commercial banks include the four largest institutions in the country, the picture in terms of market shares is substantially different. Commercial banks account for 44 percent of all bank assets, whereas public sector banks also take 44 percent, and credit cooperatives together with their central institutions only 12 percent. These figures clearly indicate the importance of the public sector banks which include the savings banks ("Sparkassen") and their central institutions ("Landesbanken").

[9] Bank exposures to firms in the credit register are defined fairly broadly, e.g., they include not only corporate loans but also corporate bonds. For a more detailed definition of the bank exposures see Section 19 of the Banking Act (Deutsche Bundesbank (2001)). The following items are deemed not to be bank exposures: Shares in other enterprises and securities in the trading portfolio. Details on this credit register can also be found in Schmieder (2006), and in published work by Schertler, Buch and Westernhagen (2006), Hayden, Porath and Westernhagen (2007) and Ongena, Tümer-Alkan and von Westernhagen (2012) for example. The Bundesbank also maintains a website with working papers based on its credit register.

[10] If the sum of the exposures to firms in a borrower unit exceeds the threshold of 1.5 Million €, the individual exposure to a firm in that borrower unit is also reported, even if it is a small exposure below this threshold. For a more detailed definition, see Section 14 of the Banking Act (Deutsche Bundesbank (2001)). If exposures of 1.5 Million € or above existed during the reporting period but are partly or fully repaid, the remaining exposure is reported even if the amount is zero. We take the actual amounts of the exposures into consideration.

B. Methodology

We investigate whether or not existing credit relationships lead to higher trading of CDS of these firms by the same banks, especially for riskier firms. In our sample, we focus only on banks and firms that actively participate in the CDS market in "Pre" period. We estimate by OLS regression models of the form:

$$\begin{aligned}\Delta CDS\ Contracts_{ij} = \alpha + \beta_1 Bank - Firm\ Exposure\ (\text{Before})_{ij} + \beta_2 Firm\ CDS\ Price\ (\text{Before})_j \\ + \beta_3 Bank - Firm\ Exposure\ (\text{Before})_{ij} * Firm\ CDS\ Price\ (\text{Before})_j + \varepsilon_{ij}\end{aligned} \quad (1)$$

where *ij* indexes a bank *i* – firm *j* pair. The left-hand side of the equation measures the change in the average levels of firm CDS contracts held by banks around the Small Bang ("Post" minus "Pre", "Post" minus "Mid" and "Mid" minus "Pre" respectively). The level of CDS contracts is measured both with the *gross* and *net* number and the notional amount of contracts alternatively. Bank – Firm Exposure Before refers to the amount of credit exposure the bank has to the firm before the Small Bang, namely in the first quarter of 2008, and Firm CDS Price Before is the premium paid for a CDS contract on the firm at the end of the last week of March 2008. All variable names, definitions and summary statistics are presented in Panel B, Table 1. We note that the standard errors in the above specification cannot suffer from serial correlation (Bertrand, Duflo and Mullainathan (2004); Petersen (2009)).

In Panel A, Table 1, we already documented the increase in the number and notional amounts of CDS contracts held by banks around the Small Bang ("Post" minus "Pre"). Our aim is to explain these changes with an existing bank-firm exposure and the riskiness of a firm before the Small Bang, whereas the control group consists of bank-firm pairs without any credit relationship. We are mainly interested in the differential effect measured by the coefficient of the interaction term in Equation 1 above; whether or not existing credit exposures to riskier firms influence banks' trading of CDS of these firms.

In a next step, we examine the final impact on lending, i.e., the association between trading of credit default swaps and the availability of credit. We estimate the following model:

$$\begin{aligned} \Delta Bank - Firm\ Exposure_{ij} = \alpha &+ \beta_1 \Delta CDS\ Contracts_{ij} \\ &+ \beta_2 Firm\ CDS\ Price\ \text{(Before)}_j \\ &+ \beta_3 \Delta CDS\ Contracts_{ij} * Firm\ CDS\ Price\ \text{(Before)}_j + \varepsilon_{ij} \end{aligned} \tag{2}$$

ΔBank – Firm Exposure is defined as the absolute difference in the amount of exposure the bank has to the firm between the indicated periods (averaged across the three quarters for "Post" minus "Pre", "Post" minus "Mid" and "Mid" minus "Pre" respectively). ΔCDS Contracts is measured again by the change in the average levels of firm CDS contracts held by banks around the Small Bang.

In the regressions we will also control for firm and bank fixed effects. The inclusion of firm fixed effects is made possible by the fact that following the Small Bang not all banks that have a credit exposure to a particular firm will commence trading a CDS on this firm. Their inclusion results in a comparison of change in individual bank exposures to the *same* firm for which some banks trade its CDS, while others do not. The inclusion of bank fixed effects focuses on the behavior of the same bank with an existing credit exposure and the effect on CDS trading.

The change in CDS trading could *per se* explain most differences in the bank's exposures. However, we again aim to examine the heterogeneity of the effect, the influence of trading of riskier firms. Our empirical strategy is to analyze how bank-firm exposures respond to the *changes* in bank-level CDS trading (mainly driven by the Small Bang) on specific firms.

IV. Results

A. Change in CDS Trading around the Small Bang

Table 2 displays the cross sectional regressions of the change in the number of firm CDS contracts held by banks around the Small Bang on the existing bank-firm credit exposure and the firm CDS price before the Small Bang. That is we estimate Equation (1) introduced before. Recall that “Pre” refers to three quarters from 2008Q2 to 2008Q4, “Mid” refers to the periods from 2009Q1 to 2009Q3 (that includes the implementation of the Small Bang from March 11 to July 31, 2009), and that “Post” refers to three quarters from 2009Q4 to 2010Q2.

In the first six specifications, we use the *gross* changes in the number of CDS contracts. Gross refers to the sum of buy and sell contracts. We are mainly interested in the “Post” minus “Pre” changes in the variable. However we also employ “Post-Mid” and “Mid-Pre” changes in the last two specifications of the set. We start by regressing our dependent variable on a constant first. Then we include Bank-Firm Exposure Before to investigate how existing credit exposures between bank-firm pairs influence CDS trading of these firms by the banks. The coefficient is imprecisely estimated suggesting that having a lending relationship before the Small Bang may not lead to an increase in trading of CDS for that particular firm.

In Model 3, we include Firm CDS Price (again before the Small Bang) as a proxy for default risk, and interact it with the credit exposure. The coefficient on the Firm CDS Price equals to -1.165, however only significant at 20 percent level. The estimated coefficient on the interaction variable equals 0.049**.[11] This result implies that banks with a previous credit exposure of 59.39 million € to a firm in 2008:Q1 are expected to increase the gross number CDS contracts held of that particular firm by 2.87 contracts when the firm had a higher CDS Price by 165 basis points in 2008:Q1 (= -1.165 x 1.65 + 59.39 x 0.049 x 1.65); recall that the mean number equals 4.14.[12] In Model 4, we include bank and firm fixed effects. In this case we are explaining the change in CDS trading of the *same firm* around the Small Bang by the *same bank* that has an existing credit exposure to this firm. The coefficient on the interaction term is slightly smaller, equal to 0.038***, still economically relevant. The next two models use alternative timings for the dependent variable; "Post-Mid" and "Mid-Pre". The results are in line with the one in Model 4. The magnitudes of the coefficients are similar where the sum equals to the coefficient explaining the "Post-Pre" period. This suggests that the impact has a similar pattern in all these three periods.

The next set of specifications in Table 2 takes the changes in the net number of CDS contracts. Here, we subtract the number of CDS contracts sold from the number of contracts bought in order to reach a net value. We use the same approach and interact the

[11] *** Significant at 1 percent, ** significant at 5 percent, and * significant at 10 percent. For convenience we will also indicate the significance levels of the estimates that are mentioned further in the text.

[12] For computing the economic relevancy of the estimated coefficients, we consider the standard deviations of the variables interacted. 59.39 million € for Bank-Firm Exposure in 2008:Q1 and 1.65 bps/100 for Firm CDS Price in 2008:Q1. Notice that equivalently banks are expected to increase their gross trading of CDS contracts of a firm with a CDS price of 1.65 in 2008:Q1 by a 5.27 contracts when the bank had a higher credit exposure of 59.39 million € to the firm in that quarter.(= 0.008x59.39 + 0.049x1.65x59.39).

previous credit exposure and firm CDS price in the third specification (Model 9). The coefficient equals 0.007***, referring to an increase of 0.43 in the net number of CDS contracts held by the bank (= -0.153x1.65 + 0.007x59.39x1.65). It is not surprising to have a smaller effect when we consider changes in the net number. However, we also note that the average change in the net number of CDS contracts in the "Post-Pre" period equals to 0.38 (see Table 1, Panel A). The positive and significant coefficient indeed reveals the hedging motives of banks which buy more credit protection than they sell for a riskier firm, to which they have an existing credit exposure.

In Table 3, we explain the change in the notional amount of firm CDS contracts held by banks around the Small Bang. The results are mainly unchanged except that we observe a strong negative effect of the past firm CDS price on the net notional amount of contracts; -0.996***. This result suggests a simple price effect rather than the influence of an increased probability of default of a firm.

The coefficient on the interaction term of the previous credit relationship and the past CDS price equals to 0.043*** in Model 9. This implies again that the long position in CDS contracts is determined by the previous credit exposure to that particular firm if the firm is considered as riskier (This refers to an increase of 2.57 million € in the net notional amount of firm CDS contracts held by a bank with a previous credit exposure of 59.39 million € to that firm, which had a higher CDS Price by 165 basis points in 2008:Q1 (= -0.996x1.65 + 0.043x59.39x1.65). These results provide evidence on the fact that the default risk in bank-firm exposures before the Small Bang determines the extent of banks' CDS hedging activity.

B. Impact on Lending around the Small Bang

In Table 4, we estimate the Equation (2) to explain the change in bank - firm exposure from mid- to post-Small Bang with the change in firm CDS contracts held by banks during the same period and the firm CDS price before the Small Bang. We use a similar approach in our estimations and the use of measures for the change in CDS trading. First, we start regressing the dependent variable on a constant. Next, we include the change in firm CDS contracts held by banks in the model. In the first set of models, we measure the change with the (gross and net) number of CDS contracts, whereas the second set includes the (gross and net) notional amounts. The coefficient on the change in firm CDS contracts is negative in several models but only significant for gross changes and when the model does not include any other variable. When Firm CDS Price Before (in 2008:M3) is included, we have a reverting sign for the coefficient on the change in CDS contracts or it loses significance. However the coefficient on Firm CDS Price Before is negative and significant in all specifications, suggesting that an increase in firm risk is expected to decrease credit exposure to those firms. The coefficient equals to -0.162* in Model 3, implying that a one standard deviation increase in the CDS price would lead to a decrease in credit exposure by 267,300 € to that firm. The interaction term for the Change in Firm CDS Contracts Held by Bank from "Mid" to "Post" and Firm CDS Price Before is negative and significant in all models ranging from -0.010*** to -0.051***. The latter estimate implies that following the Small Bang, if a bank increases its CDS trading by one buy contract for a less riskier firm, that is Firm CDS price lower by one hundred basis points before the Small Bang, the additional change in bank-firm level credit exposure averaged over three quarters ("Post-Mid"), increases by 5.1 million €. The magnitude of the coefficient is always larger when net changes in CDS contracts are taken into account.

Table 5 includes a similar exercise to check the robustness of our results in alternative periods, i.e., “Post-Pre” and “Mid-Pre”. The results are mainly unchanged with respect to the interaction term, which is negative and statistically significant in most models with a smaller magnitude compared to Table 4. This is potentially driven by the overall contraction in lending by German banks during the crisis, especially after the third quarter of 2008 (Deutsche Bundesbank, Monthly Report, 9/2009). But our results shows that this contraction is mitigated for lower risk firms which bank may trade even more of. Another interesting result is that the coefficient on Change in the Notional Amount of Firm CDS Contracts Held by Bank is positive in all models, suggesting that banks that hedge their positions do increase their credit exposure to the same firm. This pattern was also observed in Table 4 once the complete model is estimated.

V. Conclusion

We investigate the link between outstanding bank-firm credit exposures, hedging with CDS, and granting of new credit. To identify this link we exploit the effects of the so-called “Small Bang” which brought contract and convention changes and facilitated a higher degree of standardization in the CDS market in 2009.

This is the first paper to couple unique and comprehensive bank-firm CDS trading data with a credit register containing all relevant bank-firm credit exposures. We study how following the Small Bang changes in trading of CDS on specific firms by individual banks is determined by an existing credit exposure to a firm with higher default risk, and how exogenously caused changes in bank-firm level CDS trading affected the provision of credit by these banks to these firms. We find that the riskier the firm and the higher the existing credit exposure, the higher will be the long position in credit default swaps of that particular firm. Moreover, an increase in firm CDS trading of a safer firm increases the change in bank-firm level exposure during the Small Bang.

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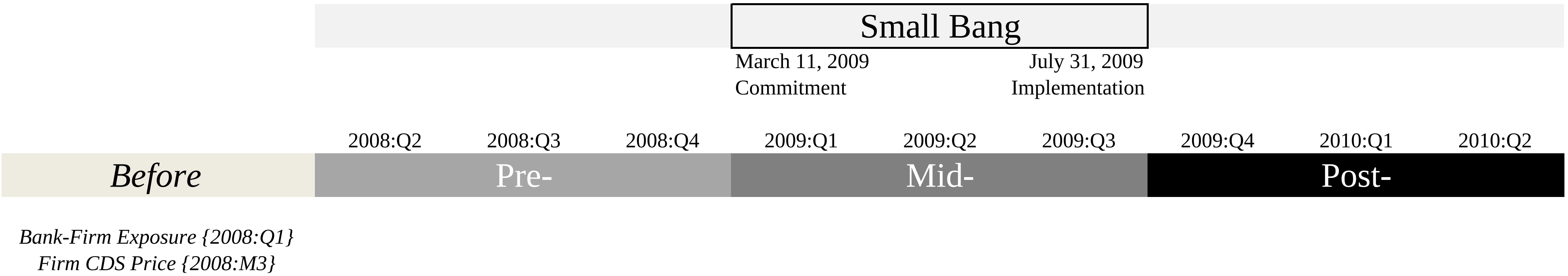
Figure 1
Time line of Small Bang in European CDS market



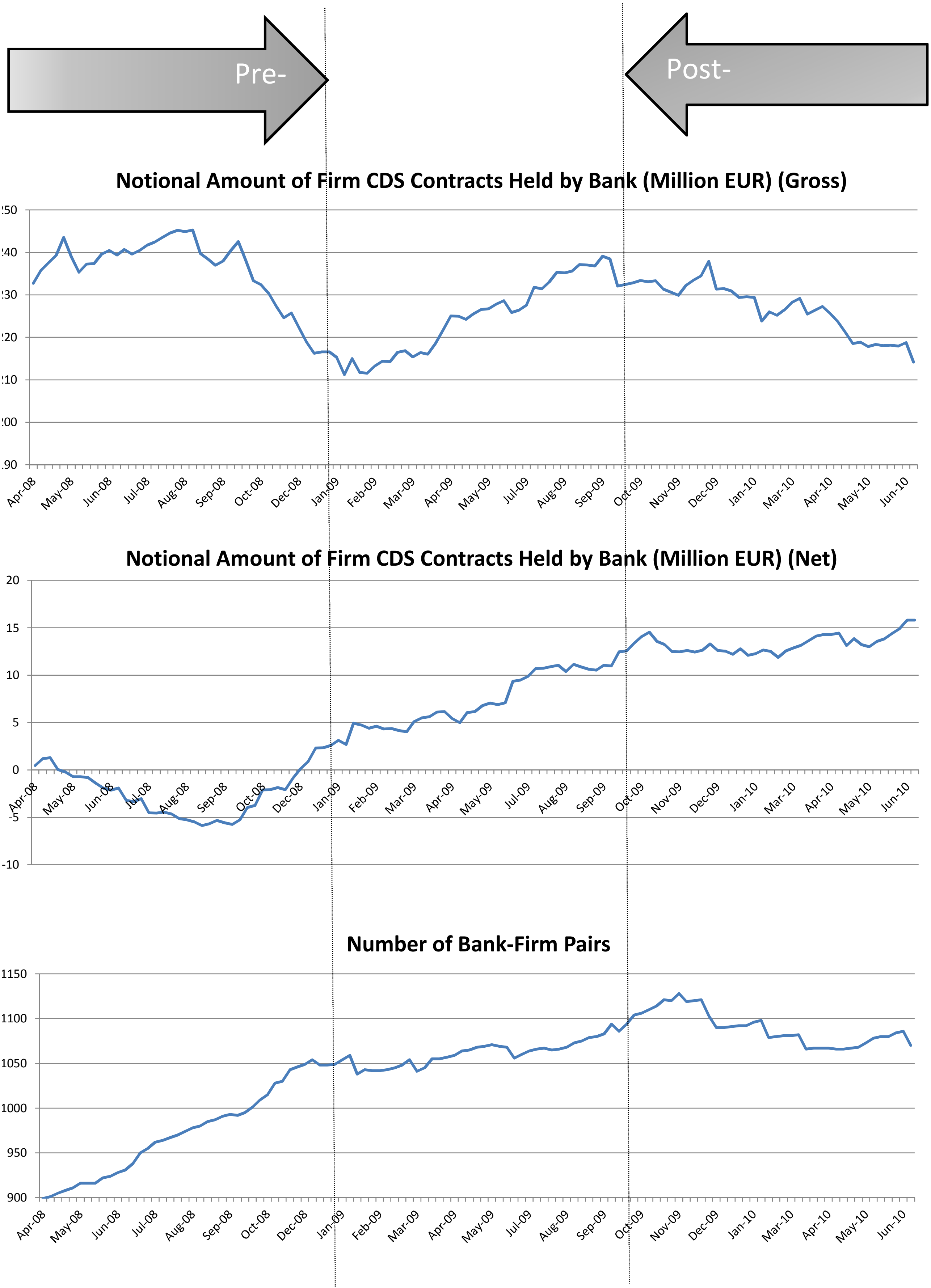


Figure 2
CDS trading before and after the Small Bang in Europe.

The figure presents the Notional Amount of Firm CDS Contracts Held by Bank both in gross and net values and the number of bank-firm pairs involved in CDS trading before and after the Small Bang. "Pre" refers to the period before January 1, 2009 and “Post” refers to the period after September 30, 2009.

Table 1
Panel A
Summary statistics- Pre and Post

	Pre	Post	Post - Pre	P-value
CDS trading				
Number of Firm CDS Contracts Held by Bank (Gross)	17.93	22.07	4.14***	0.00
Number of Firm CDS Contracts Held by Bank (Net)	-0.09	0.28	0.38***	0.00
Notional Amount of Firm CDS Contracts Held by Bank (Million EUR) (Gross)	62.11	66.95	4.84***	0.00
Notional Amount of Firm CDS Contracts Held by Bank (Million EUR) (Net)	-0.64	3.93	4.57***	0.00
Average Number of Banks with CDS Contracts	14	17	3	
Average Number of Firms with CDS Contracts	172	187	15	
Average Number of Bank-Firm Pairs with CDS Contracts	973	1,090	117	
Credit exposure				
Average Bank-Firm Credit Exposure (Million EUR)	11.63	8.20	-3.43***	0.00

Table 1
Panel B
Variable names, definitions and summary statistics

Variable Name	Definition	Type	Periods	Mean	Standard Deviation	Min	Max
Change in the Number of Firm CDS Contracts Held by Bank	The difference in the number of CDS contracts on each individual firm held by each individual bank between the indicated periods (averaged across the three quarters in the period)	Gross	Post - Pre	4.14	30.47	-379.15	885.62
			Post - Mid	2.72	15.55	-62.33	386.41
			Mid - Pre	1.41	20.73	-369.03	523.05
		Net	Post - Pre	0.38	4.72	-63.64	65.90
			Post - Mid	0.14	3.20	-40.56	42.82
			Mid - Pre	0.24	3.42	-42.56	0.00
Change in the Notional Amount of Firm CDS Contracts Held by Bank (Million EUR)	The difference in the notional amount of CDS contracts on each individual firm held by each individual bank between the indicated periods (averaged across the three quarters in the period)	Gross	Post - Pre	4.84	102.50	-1482.69	2,870.96
			Post - Mid	2.40	48.46	-425.45	1,429.77
			Mid - Pre	2.44	71.35	-1161.36	1,849.41
		Net	Post - Pre	4.57	32.33	-555.62	548.93
			Post - Mid	1.84	22.66	-330.64	326.14
			Mid - Pre	2.74	23.21	-257.69	413.76
Change in Bank-Firm Exposure (Million EUR)	The difference in the amount of exposure the bank has to the firm between the indicated periods (averaged across the three quarters in the period)	-	Post - Pre	-3.43	47.64	-2038.56	901.58
			Post - Mid	-2.80	27.02	-703.17	348.08
			Mid - Pre	-0.63	50.75	-2038.56	1,604.75
Bank - Firm Exposure Before (Million EUR)	The amount of exposure the bank has to the firm in 2008:Q1			9.92	59.39		
Firm CDS Price Before (pp)	The premium paid for a CDS contract on the firm at the end of 2008:M3			1.75	1.65	0.03	10.75

Notes. The table reports the variable names, definitions and summary statistics of all dependent and independent variables. The number of observations is 3,693.

Table 2

The change in the number of firm CDS contracts held by banks around the Small Bang

Dependent Variable: *Change in the Number of Firm CDS Contracts Held by Bank*	(1) *Gross* *Post - Pre*	(2) *Gross* *Post - Pre*	(3) *Gross* *Post - Pre*	(4) *Gross* *Post - Pre*	(5) *Gross* *Post - Mid*	(6) *Gross* *Mid - Pre*	(7) *Net* *Post - Pre*	(8) *Net* *Post - Pre*	(9) *Net* *Post - Pre*	(10) *Net* *Post - Pre*	(11) *Net* *Post - Mid*	(12) *Net* *Mid - Pre*
Bank - Firm Exposure Before		0.061	0.008	0.015	0.007	0.008		0.007	-0.001	-0.001	0.000	-0.001
		(0.045)	(0.023)	(0.025)	(0.014)	(0.012)		(0.005)	(0.003)	(0.002)	(0.002)	(0.002)
Firm CDS Price Before			-1.165						-0.153*			
			(0.882)						(0.076)			
Bank - Firm Exposure Before * Firm CDS Price Before			0.049**	0.038***	0.018***	0.020***			0.007***	0.007***	0.005***	0.003**
			(0.018)	(0.012)	(0.006)	(0.007)			(0.002)	(0.003)	(0.001)	(0.001)
Constant	4.136**	3.529**	5.859*	3.931***	2.901***	1.030***	0.376*	0.304*	0.616**	0.347***	0.092**	0.255***
	(1.944)	(1.631)	(3.048)	(0.417)	(0.224)	(0.198)	(0.181)	(0.165)	(0.276)	(0.044)	(0.034)	(0.011)
Bank Fixed Effects	No	No	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
Firm Fixed Effects	No	No	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
R-Squared	0.000	0.014	0.033	0.198	0.344	0.136	0.000	0.008	0.020	0.102	0.076	0.095
Number of Observations	3,693	3,693	2,998	2,998	2,998	2,998	3,693	3,693	2,998	2,998	2,998	2,998

Notes. The table reports estimates from ordinary least squares regressions. The dependent variable is the change in the number of firm CDS contracts traded by banks around the Small Bang. Table 1 contains the definition of all variables and the summary statistics for each included variable. Figure 1 displays the timing on all variables. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table 3

The change in the notional amount of firm CDS contracts held by banks around the Small Bang

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent Variable: *Change in the Notional Amount of Firm CDS Contracts Held by Bank*	*Gross*	*Gross*	*Gross*	*Gross*	*Gross*	*Gross*	*Net*	*Net*	*Net*	*Net*	*Net*	*Net*
	Post - Pre	*Post - Pre*	*Post - Pre*	*Post - Pre*	*Post - Mid*	*Mid - Pre*	*Post - Pre*	*Post - Pre*	*Post - Pre*	*Post - Pre*	*Post - Mid*	*Mid - Pre*
Bank - Firm Exposure Before		0.165	0.044	0.049	0.033	0.016		0.050	0.003	0.001	-0.004	0.005
		(0.147)	(0.096)	(0.098)	(0.071)	(0.032)		(0.033)	(0.026)	(0.023)	(0.007)	(0.018)
Firm CDS Price Before			-3.035						-0.996***			
			(2.198)						(0.323)			
Bank - Firm Exposure Before * Firm CDS Price Before			0.114**	0.116**	0.067***	0.049**			0.043***	0.031***	0.033***	-0.002
			(0.047)	(0.041)	(0.022)	(0.021)			(0.010)	(0.010)	(0.007)	(0.010)
Constant	4.840	3.201	7.725*	2.342	1.356	0.986	4.571***	4.070**	6.551***	5.025***	1.684***	3.342***
	(3.563)	(4.329)	(4.415)	(1.510)	(0.963)	(0.608)	(1.502)	(1.445)	(2.235)	(0.361)	(0.091)	(0.335)
Bank Fixed Effects	No	No	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
Firm Fixed Effects	No	No	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
R-Squared	0.000	0.009	0.138	0.198	0.125	0.152	0.000	0.009	0.018	0.106	0.096	0.097
Number of Observations	3,693	3,693	2,998	2,998	2,998	2,998	3,693	3,693	2,998	2,998	2,998	2,998

Notes. The table reports estimates from ordinary least squares regressions. The dependent variable is the change in the notional amount of firm CDS contracts traded by banks around the Small Bang. Table 1 contains the definition of all variables and the summary statistics for each included variable. Figure 1 displays the timing on all variables. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table 4

The change in bank - firm exposure from mid- to post-Small Bang

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Independent Variable: **Change in Firm CDS Contracts Held by Bank from Mid- to Post-**	-	**Number**	**Number**	**Number**	**Number**	**Number**	**Number**	**Notional Amount**	**Notional Amount**	**Notional Amount**	**Notional Amount**	**Notional Amount**	**Notional Amount**
	-	**Gross**	**Gross**	**Gross**	**Net**	**Net**	**Net**	**Gross**	**Gross**	**Gross**	**Net**	**Net**	**Net**
Change in Firm CDS Contracts Held by Bank from Mid- to Post-		-0.134***	0.055	0.036	-0.692	-0.393	-0.339	-0.043***	0.033*	0.033	-0.119	-0.014	0.016
		(0.031)	(0.038)	(0.036)	(0.565)	(0.540)	(0.431)	(0.012)	(0.018)	(0.021)	(0.071)	(0.051)	(0.050)
Firm CDS Price Before			-0.162*			-0.285***			-0.228**			-0.317***	
			(0.088)			(0.089)			(0.087)			(0.100)	
Change in Firm CDS Contracts Held by Bank from Mid- to Post- * Firm CDS Price Before			-0.029***	-0.025***		-0.050***	-0.051***		-0.011***	-0.010***		-0.025***	-0.025***
			(0.008)	(0.007)		(0.009)	(0.010)		(0.001)	(0.001)		(0.006)	(0.004)
Constant	-2.796***	-2.796***	-2.112**	-2.890***	-2.698***	-1.743**	-3.132***	-2.693***	-1.997**	-3.108***	-2.578***	-1.496*	-3.093***
	(0.808)	(0.000)	(0.772)	(0.108)	(0.777)	(0.723)	(0.071)	(0.811)	(0.732)	(0.059)	(0.770)	(0.732)	(0.118)
Bank Fixed Effects	No	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Firm Fixed Effects	No	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
R-Squared	0.000	0.006	0.022	0.175	0.007	0.013	0.170	0.006	0.026	0.181	0.010	0.029	0.181
Number of Observations	3,693	3,693	3,002	3,002	3,693	3,002	3,002	3,693	3,002	3,002	3,693	3,002	3,002

Notes. The table reports estimates from ordinary least squares regressions. The dependent variable is change in bank - firm exposure from mid- to post-Small Bang. Table 1 contains the definition of all variables and the summary statistics for each included variable. Figure 1 displays the timing on all variables. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table 5

The change in bank - firm exposure from pre- to post- and from pre- to mid- the Small Bang

	(1)	(2)	(3)	(4)
Timing on Dependent and on CDS Contracts variables	*Post - Pre*	*Post - Pre*	*Mid - Pre*	*Mid - Pre*
Independent Variable: **Change in Notional CDS Contracts Held by Bank**	**Gross**	**Net**	**Gross**	**Net**
Change in the Notional Amount of Firm CDS Contracts Held by Bank	0.013**	0.110	0.014	0.107*
	(0.005)	(0.088)	(0.008)	(0.055)
Change in the Notional Amount of Firm CDS Contracts Held by Bank * Firm CDS Price Before	-0.008***	-0.030**	-0.005***	-0.000
	(0.001)	(0.012)	(0.001)	(0.006)
Constant	-4.038***	-4.081***	-0.943***	-1.245***
	(0.024)	(0.302)	(0.024)	(0.226)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
R-Squared	0.108	0.089	0.075	0.074
Number of Observations	3,002	3,002	3,002	3,002

Notes. The table reports estimates from ordinary least squares regressions. The dependent variable is change in bank - firm exposure from pre- to post- and from pre- to mid- the Small Bang. Table 1 contains the definition of all variables and the summary statistics for each included variable. Figure 1 displays the timing on all variables. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. *** Significant at 1%, ** significant at 5%, * significant at 10%.