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CDS 交易對公司取得銀行放款成本的影響

The Impact of CDS Trading on the Cost of Bank Loan

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摘要

本篇研究探討 2001 至 2012 年間信用違約交換的交易對公司取得銀行放款成本的影響。理論上，信用違約交換的交易提供了分散風險的機會並降低銀行監管與收集資訊的成本，因此有助於降低公司的借款成本。然而，整體而言我們發現信用違約交換對公司取得銀行放款成本的影響是有限的，但是對於規模較小、信用違約交換流動性較高的公司與亞洲放款市場有著明顯的影響。儘管如此，在金融海嘯期間，有信用違約交換的公司其借款成本反而是高於沒有信用違約交換的公司。

關鍵詞：信用違約交換、貸款利率、流動性

Abstract

This paper investigate the impact of Credit Default Swaps (CDSs) trading on the cost of bank loan during 2001 to 2012. Theoretically, the CDS trading have lowered the cost of bank loan to firms by creating risk sharing opportunities and reducing bank monitoring and information cost. However, as a whole, we only find limited evidence that the CDS trading have lowered the cost of bank loan but the impact is stronger for smaller firms, those firms with higher liquidity in the CDS market, and bank loan market in Asia. Nevertheless, there is strong evidence, during the recent financial crisis period, those firms with CDS trading faced higher bank loan spread than those not with CDS trading.

Keywords: Credit Default Swaps, Loan Spread, Liquidity

1. INTRODUCTION

Banks are the most source of external finance of corporations around the world.[1] In other words, banks that originated credit to corporate borrowers may have taken excessive risk. The bank can transfer credit risk by either selling the loan or buying a credit default swaps (CDSs)[2]. Although the loan sales market is rapidly growing but bank loans remain largely illiquid. In addition, although a number of studies have formed and tested theories of the loan sales market, a consensus has not been reached on the functioning of this market.[3]

The aim of this paper is to empirically analyze the impact of CDS trading on the cost of bank loan. In the most common form, the CDSs that the seller will compensate the buyer in the case of credit event, they insure against the default of a credit in return for a periodic payment to the seller of protection. This separation has implications for the distribution of credit risk across the financial system and, in turn, for the supply of credit (see Hirtle, 2009; Saretto & Tookes, 2013; Shan et al., 2014). Since CDS create new hedging opportunities, it seems that these instruments could indeed contribute to a reduction in the cost of bank loan. In other words, the development of the CDS market provided banks with a new, less expensive, way to hedge or lay off their risk exposures to firms. Even though the insurance provided by a CDS is tied to a specific security and not to the borrower, firms that have traded CDS give their creditors added opportunities to diversify their credit exposures (Duffee & Zhou, 2001; Hirtle, 2009).

CDS could also lower the cost of bank loan by revealing new information about firms because CDS's prices are a potentially important source of new

[1] Over the past two decades, the syndicated loan market has become the largest sources of worldwide corporate financing (Ivashina, 2009) and international syndicated lending amounted to $1.8 trillion in 2009, surpassing the $1.5 trillion of corporate borrowing in international bond markets (Chui et al., 2010).

[2] With a CDS, the originating bank retains the loan's control right; with the loan sales, control rights pass to the loan buyer. While both CDSs and loan sales can be used to lay off credit risk, tailor-made CDS are more flexible than loan sales (Duffee & Zhou, 2001) and Parlour & Winton (2013) obtain loan sales typically dominate CDSs for riskier credit but not for safer credits.

[3] See Thomas & Wang (2004) and Guner (2006).

information on firms. Indeed, the general results suggest that CDS play a leading role in price discovery (Blanco et al., 2005; Zhu, 2006; Baba & Inada, 2009). Hull et al. (2004) found that the CDS market anticipates credit rating events. This informational role of the CDS market could contribute to a reduction in the cost of bank debt by reducing the rents that banks extract from borrowers in connection with their informational advantage (Santos & Winton, 2008; Hale & Santos, 2009). It follows from these diversification and information channels that the development of the CDS market could indeed contribute to a reduction in the cost of bank loan. Moreover, since the price on CDS represents a bank's costs of hedging a loan, it should have a direct bearing upon loan rates. Both prices may further be linked because actively trade in CDS markets. Recent evidences suggest that this causes private information about borrowers to be revealed in the CDS market (Ashcraft & Santos, 2009). Ivanov et al. (2015) find that market based pricing, the practice of tying loan interest rates to credit default swaps, is associated with lower interest rates, both at origination and during the life of the loan.

However, besides previously arguments in favor of a strong link between the loans and CDS markets, there are also reasons why the relationship between the two markets may be weak. One considers CDS gives banks a new way to transfer their credit exposures, the CDS market also gives them a new way to server their credit links to borrowers in a fashion unobservable to the firm and investors. Because of banks without direct exposure to borrowers, they have reduced incentive to monitor them. As a result, the device that lead bank used to commit to ex post monitoring-holding a share of the loan at origination-loses some of its effectiveness for firms with trading CDS since it becomes easier for banks to buy credit protection for these firms. Anticipating this effect, syndicate participants may demand higher compensation to extend loans to these firms, in particular to those which monitor is the most valuable, riskiest, and informationally opaque (Ashcraft & Santos, 2009). The other considers loans may be priced based on relationship considerations (Berger & Udell, 1992), while CDS price may be driven by liquidity and risk premia. In addition to the lending business banks offer many additional financial services like payment transaction, underwriting, etc. to firms. Banks may underprice loans if they can compensate lower lending margins

with a relatively high net fee income (Bharath et al., 2007) or when there are informational economies of scope (Drucker & Puri, 2005; Chen et al., 2013). Especially, Minton et al. (2009) claim that the use of credit derivatives by US bank holding companies to hedge loan is limited.

This paper addresses the following five objectives. First, what is the impact of CDS trading on bank loan? Second, how the CDS trading affect the bank loan market which is in the different stage of development. Because the bank loan markets in the Asian countries are in their infancy, it is likely the introduction of CDS has a jump-start effect on bank loan market. Third, since the diversification channel will likely benefit riskier firms the most while the information channel will likely benefit informationally opaque firms the most, this research considers these differences in an attempt to identify which channel has had a larger effect on the cost of bank loan. Fourth, did the impact of CDS trading on the bank loan exhibit new characteristic during the recent global financial crisis? Before the onset of the global financial turmoil that started in mid-2007, the use of CDS as an instrument to trade credit risk had increased exponentially. Since 2008, however, activity in the CDS market has shrunk substantially. In particular, CDS notional amounts outstanding dropped from roughly $60 trillion at the end of 2007 to about $33 trillion at the end of 2009, reflecting severely strained credit markets and the increased multilateral netting of offsetting positions by market participants (Shim & Zhu, 2014). Finally, those firms with higher liquidity in the CDS market benefit more in the bank loan in terms of cost and condition. Since CDS increase the liquidity of credit markets, lower credit risk premia and offer investors a broader menu of assets and hedging opportunities (Duffie, 2008).

We find that, on average, firms with CDS trading have limited evidence of reducing their bank loan cost and this finding is still robust when consider selection bias problem. However, there is strong evidence that CDS trading is related to lower the cost of bank loan in Asia. In addition, the impact of CDS trading is different during the financial crisis period. Further, we also examine the impact of firm become traded with CDS trading. Our findings show that the firms that became traded has benefit from the spreads they pay to banks, especially for those risky and informationally opaque firms. Finally, we find that CDS liquidity is

beneficial for lowering the cost of bank loan as well.

Our study extends the existing literature in the following directions. First, the limited number of CDS studies have so far focused on the US market. To our knowledge, this is the first paper to explore the impact of CDS trading on the cost of bank loan using multiple countries data. Second, we follow Ashcraft & Santos (2009) and further examine what the effect of CDS trading during financial crisis. One would expect that such impact would be different in various stages of the credit cycle. In particular, the relative magnitude of benefits and costs associated with CDS trading tends to exhibit distinctive features during a crisis period compared to normal times. Our data cover the global financial crisis that started in mid-2007, which offers a natural experiment to look into the inter-linkages between the CDS and loan markets at different phase of the credit cycle. Third, this paper also includes a liquidity measure in the CDS market and analyses what is the impact of CDS liquidity on the bank loan market in terms of borrowed cost? Forth, our study provides useful evidence for ongoing regulatory debates such as Dodd-Frank Act of 2010, Basel III, and the ban of naked CDS. Finally, our study adds the burgeoning literature to examine the implications of CDS trading, such as the studies of Saretto & Tookes (2013) on leverage and Subrahmanyam et al. (2014) on bankruptcy risk.

The reminder of the paper is organized as follows. The next section reviews previous literature associated with loan and credit derivatives. Section 3 describes the data and model and reports summary statistics. Section 4 contains the empirical results. The final section is conclusions.

2. LITERATURE REVIEW

The typical framework of such analysis assumes that the bank loan is inefficient for various reasons, including asymmetric information between the firm and bank, restriction on bank loans remain illiquid. The introduction of the CDS

market can mitigate or aggravate some aspects of market inefficiencies in the bank loan market. However, form a theoretical perspective, CDS trading has both benefits and costs to the loan market.

In terms of benefits, Ashcraft & Santos (2009) summaries two channels through which trading in the CDS market can lead to a reduction in the credit spreads. The first, called the diversification or hedging channel, refers to the situation in which firms that have traded CDS give their creditors added opportunities to hedge their risk exposures, so that they can lowered the cost of corporate debt. The second channel, called the information channel, focuses on the possibility that CDS could reveal new information about firms and thus reduce the cost of corporate debt. Duffee & Zhou (2001) show that CDS make it easier for banks to circumvent the "lemons" problem caused by banks' superior information about the credit quality of their loans, because CDS are more flexible at transferring risks than loan sales. In addition, Santos & Winton (2008) noted that the impact of credit risk transfer instruments on asymmetric information problems between borrowers and lenders applies more to the bank loan market. Many empirical papers provide evidence that the CDS market is a source of information on firms. Acharya & Johnson (2007) find significant incremental information revelation in the CDS market under circumstances consistent with the use of non-public information by informed banks, though they find no evidence that the degree of asymmetric information adversely affects prices or liquidity in either the equity or CDS markets. Norden & Wagner (2008) find that changes in CDS spreads explain about 25% of subsequent monthly changes in aggregate loan spreads for syndicated loans to US corporate during the period of 2000 to 2005.

In the light of costs, CDS trading can adversely affect the cost of debt financing due to agency problems associated with asymmetric information. Banks typically have informational advantages on a borrower's credit quality. Ashcraft & Santos (2009) have been concerns that bank can use CDS to exploit sellers of credit protection, or that their incentive to monitor and mitigate the default risk of bank loans is smaller when they are able to pass on the risk to other investors via credit risk transfer instruments. In addition, Allen & Carletti (2006) show that credit risk transfer can be detrimental to welfare because, under certain circumstances, it can

lead to contagion between the banking and insurance sectors and increase the risk of crises.

Empirical papers have tried to investigate the different channels through which the CDS market affects the bond or loan market. Regarding the diversification channel in loan origination, Hirtle (2009) shows that the use of credit derivatives is associated with improved credit supply, in terms of longer loan maturity and lower spreads. Large corporate borrowers, which are likely to be "named credit" in the credit derivatives market, are the main beneficiaries. By contrast, Minton et al. (2009) claim that the use of credit derivatives by US bank holding companies to hedge loan is limited because of adverse selection and moral hazard problems and also because of the inability of banks to use hedge accounting when hedging with credit derivatives.

Prior literatures on the effects of CDS on bank loan also provide mixed results. Ashcraft & Santos (2009), which evaluates the impact of CDS trading on the credit spreads at loan origination. These authors find that an average non-financial firm has not benefited from CDS trading in terms of the cost of bank loan funding, which contradicts the prediction from the diversification or information channel. They also find that risky and informationally opaque firms actually have been adversely affected by the CDS market in terms of the cost of corporate debt. However, Norden & Wagner (2008) suggest that CDS prices contain, beyond general credit risk, to substantial extent information relevant for bank lending. Their results indicate that the markets for CDS have gained an important role for banks. To gain a better understanding of this controversy, the main goal for this research is to explore the effects of CDS on bank loan.

3. DATA, VARIABLES and METHODOGY

3.1 Data

The first part of our sample includes information of loans relies on revolvers in Dealscan to document the bank borrowing. We attain 210,092 observations then extended to include information on implied financial information from CRSP-Compustat database. We receive 157,013 observations from Compustat after deleting the missed value. We merge two database by the data provided by Chava & Roberts (2008). This leaves a sample of 26,713 observations.

The other type of firm-level information is CDS data, which are provided by Markit database. For this study, we examined CDS contracts written on US entities since 2001 to 2012. We restricted ourselves to the most popular types of CDS contracts, i.e., five-year maturity, denominated in US dollars. With Markit database, we can identify whether the firm has traded CDS or not. In addition, we included the macro-financial data which comes from World Bank.

Also, we follow Ashcraft & Santos (2009) to limit our observations that have credit rating no better than A plus or on worse than B. This limitation ensures enough observations in each rating level. Additionally, the firm which has the highest rating imply the default risk close to none and vice versa. Finally, this leaves a sample of 4,396 observations and includes 22 countries. A majority of our sample is collected from America (4,107 observations), the rest is Canada, Japan, Australia, United Kingdom, etc.

3.2 Variables definitions

3.2.1How to measure the cost of bank loan?

It is important for both banks and firms that how to determine the loan spread. *Spread* is the amount the borrower pays in basis points over LIBOR for each dollar drawn down. It also adds the spread of the loan with any annual (or facility) fee paid to the bank or bank group. We use *Spread* as our independent variable to explore how CDS trading affects the cost of bank loan.

3.2.2 How to measure the CDS trading?

We create a dummy variable *Trading* that takes the value one for the loans that firm issues after its CDS starts to trade. This variable tells us whether the credit

spreads on loans issued after the firm's CDS starts to trade are different from those observed on loans issued beforehand.

3.2.3 Control variables

A. Firm-specific variables

X is a set of the following firm-specific variables. *Ln (sale)* (log of the firm's sales) is used to control for firm's overall risk. We use this variable to control for the firm's overall risk. Since larger firms are usually better diversified, this variable will likely have a negative effect on spreads. The set also has variables to control for the risk of the firm's debt, including *Leverage* (debt over assets), *Rating* (the firm's credit rating) and *Mktbook* (the firm's market to book ratio). More profitable firms will likely pay lower credit spreads on their bank loans. Firms with higher leverage are more likely to default and will likely pay higher spreads. We account for the firm's credit rating to control for the risk of its debt because of rating agencies claim they have information on the firm that is not publicly available. Although growth opportunities are vulnerable to financial distress, we already have controls for the tangibility of book value assets. Thus, this variable could have a negative effect on spreads if it represents additional value (over and above book value) that debt holders can in part access in the event of default.

B. Loan-related variables

Y is a set of loan features that include *Ln amount* (log of loan amount) and *Ln maturity* (log of loan maturity in years). Large loan issues may represent more credit risk, but they may also allow economies of scale. Similarly, loans with longer maturities may face greater credit risk, but they are more likely to be issued by safer firms. So the effect of these variables on loan spread is ambiguous. We also include dummy variables for secured loans, Secured, loans to borrowers that face dividend restrictions, *Dividend rest*., and loans to borrowers with a guarantor, *Guarantor*. All else equal, any of these features should make the loan safe, but since lenders are more likely to impose these restrictions on riskier borrowers, the relationship may be reversed. We further include dummy variables to distinguish loans for corporate purpose, *Corporate purp*.; to repay existing debt, *Refinance*; to finance takeovers, *Takeover*; and for working capital, *Working cap*. Lastly our set

of loan contracts accounts for the number of lenders in the syndicate, *Lenders*. Since larger loans usually have larger syndicates, the effect of this variable on spreads is ambiguous for the same reasons regarding the effect of loan size on spreads.

C. Macro-financial variables

Z is a set of macro-financial variables of the issuing firm's home country, which include the output gap, represented by the deviation of real GDP from its trend, and the term structure of interest rates. We expect the output gap to have a negative effect on the pricing of bank loans, because default risk tends to be lower during the high-growth period. The effects of interest rates, however, are more likely to be ambiguous. A higher spot rate can be associated with a higher return in the firm value process and by extension reduces the default rate and the cost of debt financing. Nevertheless, it may also reflect a tightened monetary policy stance and therefore is associated with a higher probability of default of issuing firms.

3.3 The baseline model

The basis empirical approach is to do Tobit regressions, due to our dependent variable must be positive, relating CDS trading and loan spread. We build on the following model:

Table 1 Variables definitions

Variable	Definition	Source
Dependent variable		
Spread	Loan spread over LIBOR plus fees in the issue date in basis point.	Dealscan
Independent variables		
Trading	Dummy variable that takes the value of one if the firm issues loans after its CDS starts to trade.	
Liquidity score	The liquidity score which is defined as 1 to 5 represents the CDS liquidity. The higher liquidity score represents the higher liquidity it is.	Markit
Firm-specific variables		
Ln(Sale)	Log of the firm's sales to control for the firm's overall risk.	Compustat
Leverage	Debt over asset is used to control the risk of the firm's debt.	Compustat
Rating	The firm's credit rating is used to control the risk of the firm's debt. We transform the credit rating as follows AAA=1, AA=2, … , CCC=9.	Dealscan
Mktbook	The firm's market-to-book ratio is used to control the risk of the firm's debt.	Compustat
Loan-related variables		
Ln(amount)	Log of loan amount.	Dealscan
Ln(maturity)	Log of loan maturity in years.	Dealscan
Secured	Dummy variable that takes the value of one if loan is secured by collateral.	Dealscan
Dividend rest	Dummy variable that takes the value of one if loan has restrictions on paying dividends.	Dealscan
Guarantor	Dummy variable that takes the value of one if loan has guarantor.	Dealscan
Corporate purp.	Dummy variable that takes the value of one if loan is for corporate purposes.	Dealscan
Refinance	Dummy variable that takes the value of one if loan is to repay existing debt.	Dealscan
Takeover	Dummy variable that takes the value of one if loan is to finance takeover.	Dealscan
Working cap.	Dummy variable that takes the value of one if loan is for working capital.	Dealscan
Lenders	The number of lenders in the syndicate.	Dealscan
Macro-financial variables		
Interest rate	The term structure of interest rates.	World bank
Output gap	The deviation of real GDP.	World bank

Data source: this research

$$Spread_{it} = c + \alpha_1 Trading_{it} + X_{it-1}\varphi + Y_{it}\eta + Z_t\theta + \varepsilon_{it} \quad (1)$$

Where $Spread_{it}$ is the loan spread over LIBOR plus fees in the issue data in basis points. $Trading_{it}$ s a dummy variable to tell whether the credit spreads on loans issued after the firm's CDS starts to trade are different from those observed on loans issued beforehand. *X, Y* and *Z* are our explanatory variable that related to firm, loan features and macro finance respectively. To familiarize with our variables, we summary our variables' definition and report on Table1.

4. EMPIRICAL RESULTS

4.1 Summary statistics

Table 2 displays summary statistics such as mean, standard deviation, etc. for all of our variables. It can be seen that loan spread *Spread* exhibits a mean of 173.583 basis points, ranging between 1 and 1330 basis points during sample period. The ratio of debt over asset *Leverage* is account for more than half of our sample and making bank loans for corporate purpose is major part of our sample. In addition, more than seventy percent of our sample is secured loans or limited by dividend restrictions.

Table 2 Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Median	Max
Dependent variables						
Spread	4396	173.585	143.547	1.000	150.000	1330.000
Independent variables						
Trading	4396	0.220	0.414	0.000	0.000	1.000
Firm-specific variables						
Ln(Sale)	4396	21.885	1.730	14.508	21.781	32.147
Leverage	4396	0.622	0.160	0.057	0.634	0.982

Rating	4396	4.455	1.010	3.000	4.000	6.000
Square(Rating)	4396	20.867	9.184	9.000	16.000	36.000
Mktbook	4396	2.265	1.455	0.000	1.890	8.049
Loan-related variables						
Ln(Amount)	4396	19.997	1.118	16.118	20.030	24.124
Ln(Maturity)	4396	1.121	0.746	-2.485	1.540	4.101
Secured	4396	0.351	0.477	0.000	0.000	1.000
Dividend rest	4396	0.405	0.491	0.000	0.000	1.000
Guarantor	4396	0.091	0.288	0.000	0.000	1.000
Corporate purp.	4396	0.436	0.496	0.000	0.000	1.000
Refinance	4396	0.057	0.232	0.000	0.000	1.000
Takeover	4396	0.085	0.279	0.000	0.000	1.000
Working cap.	4396	0.189	0.392	0.000	0.000	1.000
Lenders	4396	10.435	8.013	0.000	9.000	83.000
Macro-variables						
Interest rate	4396	5.347	2.292	0.500	4.675	55.383
Output gap	4396	2.168	1.372	-7.821	2.317	15.240

This table reports the observation, mean, standard deviation (Std. Dev.), minimum, median, and maximum of all variables.

Data source: this research

4.2 Tobit regression

4.2.1 The impact of CDS trading on bank loan

Table 3 shows the results of our multivariate analysis on bank loan spreads. Model 1 use firm controls effect and model 2 add to these covariates our loan controls. According to our findings, the result indicates that, on average, the bank loans that firms borrowed after their CDS has started to trade carry lower spreads without statistically significant than the bank loans they had borrowed beforehand.[4]

[4] The baseline OLS regression results on the effect of CDS Trading on loan spreads are also considered. To save space, we do not report these results; the tenor of the results remains unchanged and they are available from the authors upon request.

The result is similar to however, it is possible that it affects the firm which is informationally opaque and risky most. We will explore those possible afterward.

The impact of other explanatory variables is largely consistent with economic intuitions. For firm-specific variables, larger firms are always well-diversified and thus priced less. Firms with higher leverage imply higher default risk, hence those firms will be charged higher spread. The higher the M/B ratio, the higher the potential of growth in the future. Thus, the cost of bank loan is relatively lower.

For loan-related variables, the longer maturity is associated with higher default risk, and thus be charged higher spread. Lenders who is risky are more likely be imposed some restrictions. Hence, borrowers who make loan that is secured by collateral is likely pricey. Turn to the purpose of making bank loan, we find borrow for routine activities like corporate purpose and working capital seems to be seen as lower risk and, pay lower cost. In addition, the number of lenders in the syndicate has a significant negative effect on the loan spread.

Table 3 Baseline: Effect of CDS trading on the cost of bank loan

	Model 1		Model 2	
	Coef.	Std. Err.	Coef.	Std. Err.
Constant	214.054 ***	(55.289)	121.504 **	(59.534)
Trading	1.082	(4.479)	-0.134	(4.426)
Firm-specific variables				
Ln(Sale)	-11.572 ***	(1.293)	-9.457 ***	(1.495)
Leverage	48.920 ***	(10.614)	63.127 ***	(10.694)
Rating	-11.896	(14.729)	-3.620	(14.845)
Square(Rating)	9.825 ***	(1.609)	7.753 ***	(1.626)
Mktbook	-4.323 ***	(1.110)	-4.901 ***	(1.101)
Loan-related variables				
Ln(Amount)			2.684	(1.898)
Ln(Maturity)			9.257 ***	(2.417)
Secured			19.884 ***	(4.494)
Dividend rest			4.036	(3.819)
Guarantor			8.814	(5.369)
Corporate purp.			-10.396 **	(4.223)

Refinance			16.822 **	(7.657)
Takeover			16.018 **	(6.473)
Working cap.			-17.081 ***	(5.072)
Lenders			-1.511 ***	(0.226)
Macro-variables				
Interest rate	3.241	(4.410)	1.831	(4.354)
Output gap	2.584	(4.303)	4.157	(4.241)
Year dummy	Yes		Yes	
Country dummy	Yes		Yes	
Observations	4396		4396	
R-squared (%)	5.330		5.580	

This table explores the impact of CDS trading on the cost of bank loan. It reports Tobit regression results and standard errors are reported in a separate column. See Table 1 for definition of our variables. Model 1 examines firm controls effect on loan spread and model 2 add to these covariates our loan controls. ***, ** denote that the coefficient is statistically significant at the 0.01 and 0.05 level.
Data source: this research

We also do pairwise correlation of variables and report on Appendix A. In Appendix A, we provided correlation-coefficient matrix of all variables and this table shows that the variables in our sample have significant low correlation expect the correlation between Rating and Square *(rating)* as the latter is the result of square the former.

4.2.2 Sample split by area: Asia versus non-Asia

Since the distinct development in the financial market around the world, we try to examine how is CDS trading influence on Asian loan market which is developed lately and infant. Compare to other region, we expect to introduce CDS into Asian market is helpful for lower the cost of bank loan by revealing extra information and providing investors a broaden menu of assets and hedge opportunities.

In our sample, the Asian subsample which is consistent with Shim & Zhu (2014) comes from five countries: Hong Kong, Japan, Korea, Malaysia and Singapore. Table 4 reports the result of the effect of CDS trading on Asia. The left

side of the table is the result of Asian subsample while the right side shows the result of non-Asia. According to our findings, CDS trading has a significantly negative effect on the cost of bank loan in Asia. Loan spread in Asian market decrease on average by 27.3.818 basis point relative to non-Asia market.

Our result is also consistent with Shim & Zhu (2014), who find CDS trading has lowered the cost of issuing bonds in Asia. Because the bank loan market still in its infancy in Asia, the CDS market is an important channel to improve information transparency and enhance efficiency in the derivative market.

Table 4 Sample split by area: Asia versus non-Asia

	Asia		Non-Asia	
	Coef.	Std. Err.	Coef.	Std. Err.
Constant	1493.292 ***	(436.937)	-19.684	(68.784)
Trading	-273.818 ***	(95.420)	-0.378	(4.452)
Firm-specific variables				
Ln(Sale)	-19.333 ***	(6.440)	-9.341 ***	(1.531)
Leverage	-108.731	(77.996)	64.805 ***	(10.783)
Rating	-587.634 ***	(199.843)	0.412	(15.035)
Square(Rating)	83.699 ***	(26.641)	7.325 ***	(1.644)
Mktbook	44.631 **	(21.783)	-4.916 ***	(1.105)
Loan-related variables				
Ln(Amount)	-5.820	(10.474)	3.336 *	(1.929)
Ln(Maturity)	41.372 ***	(8.197)	8.550 ***	(2.474)
Secured	-2.171	(40.906)	20.050 ***	(4.521)
Dividend rest	-31.760	(85.434)	4.461	(3.834)
Guarantor	59.468	(44.029)	9.725 *	(5.411)
Corporate purp.	18.647	(32.949)	-11.118 ***	(4.261)
Refinance	72.469 **	(27.867)	13.944 *	(7.983)
Takeover	-94.449	(72.477)	15.492 **	(6.508)
Working cap.	-31.033	(27.338)	-16.205 ***	(5.132)
Lenders	4.385 ***	(1.621)	-1.616 ***	(0.228)
Macro-variables				
Interest rate	-2.677	(30.529)	18.524 ***	(6.213)
Output gap	13.822	(14.432)	6.378	(5.282)

Year dummy	Yes	Yes
Country dummy	Yes	Yes
Observations	83	4313
R-squared (%)	8.570	5.550

This table examines the impact of CDS trading on the cost of bank loan in Asia. It reports Tobit regression results and standard errors are reported in a separate column. See Table 1 for definition of our variables. ***, **, * denote that the coefficient is statistically significant at the 0.01, 0.05 and 0.10 level.
Data source: this research

4.2.3 The influence of CDS trading during global financial crisis

Because our sample period covers the recent global financial crisis, to answer the question what is the impact of CDS trading during different period, we divided our sample period into three part, from 2001 to 2006, 2007 and 2008, and from 2009 to 2012, respectively.

Table 5 displays the result of the effect of CDS trading during difference period. The most interesting result is the impact of CDS trading during 2007 and 2008. We find a significantly positive effect of CDS trading on loan spread during crisis. Our findings are similar to Shim & Zhu (2014). One explanation is market investors are highly risk averse during the crisis period. Meantime, banks which are limited to hedge loans by credit derivatives (Minton et al., 2009) became more risk-sensitive and demanded more derivatives, as CDS provides extra information and for risk management. Thus, the demand of CDS contracts raise sharply in order to risk-shifting and hedge and are correspond with higher CDS spread which is transferred to borrowers.

Table 5 Sample split by period

	Before financial crisis 2001-2006		During financial crisis 2007-2008		After financial crisis 2009-2012	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Constant	66.903	(84.637)	191.605	(174.996)	192.595	(128.816)
Trading	0.003	(6.221)	33.146 ***	(11.363)	-13.045 *	(7.415)
Firm-specific variables						
Ln(Sale)	-4.679 **	(1.857)	-13.931 ***	(4.064)	-16.007 ***	(3.119)
Leverage	73.267 ***	(13.179)	28.346	(28.633)	41.424 *	(22.529)
Rating	-38.743 **	(17.642)	61.817	(42.609)	14.899	(32.847)
Square(Rating)	11.585 ***	(1.956)	-0.976	(4.637)	5.676	(3.517)
Mktbook	-5.652 ***	(1.291)	-0.559	(3.006)	-4.428 *	(2.585)
Loan-related variables						
Ln(Amount)	-0.096	(2.381)	-3.369	(4.777)	9.901 **	(4.048)
Ln(Maturity)	11.197 ***	(2.799)	-7.593	(6.521)	19.393 ***	(5.946)
Secured	31.622 ***	(5.778)	20.264 *	(12.130)	-0.315	(8.293)
Dividend rest	6.309	(4.680)	9.987	(10.276)	4.742	(7.827)
Guarantor	13.232 **	(6.501)	-13.212	(14.952)	2.090	(11.315)
Corporate purp.	11.842 **	(4.908)	-45.265 ***	(12.734)	-68.064 ***	(10.312)
Refinance	41.042 ***	(8.657)	-105.335 ***	(28.610)	-53.553 ***	(19.246)
Takeover	3.969	(8.163)	-4.841	(16.082)	11.344	(14.295)
Working cap.	0.674	(5.733)	-59.114 ***	(14.440)	-75.909 ***	(13.701)
Lenders	-1.301 ***	(0.264)	-1.826 ***	(0.656)	-1.619 ***	(0.543)
Macro-variables						
Interest rate	10.133	(7.997)	32.721	(22.301)	52.080 ***	(18.305)
Output gap	7.714	(9.141)	118.060 ***	(44.327)	14.631 *	(7.805)
Year dummy	Yes		Yes		Yes	
Country dummy	Yes		Yes		Yes	
Observations	2760		584		1052	
R-squared (%)	5.470		5.700		5.950	

This table examines the impact of CDS trading during different period. It reports Tobit regression results and standard errors are reported in a separate column. We divide our sample period into three parts: 2001-2006, 2007-2008, and 2009-2012, and reports the result at the left, medium and right column, respectively. See Table 1 for definition of our variables. ***, **, * denote that the coefficient is statistically significant at the 0.01, 0.05 and 0.10 level.

Data source: this research

5. ROBUST TEST

5.1 Heckman two-step selection bias

A possible problem exists in literature is the selection bias. We focus on making bank loan during our sample period. However, the decision of when to make loans is endogenous. Firms may choose to make loans when favorable financial condition or anticipate to negotiate with lower cost.

We control for selection bias by Heckman's (1979) approach. The list of independent variables includes variables in baseline regression and expends to include several additional variables to ensure the analysis provides extra information. In this section, we add firm size, leverage, and rating to determine firm's financial demand and the ability to make loans. In addition, we include GDP gap and interest rates in each economy to indicate country-specific economic condition. Also, we use the Baa minus Aaa spread in US market which is relation to the risk premium to control global financial state.

We re-examine the impact of CDS trading on bank loan by including the inverse Mills ratio and additional variables illustrate above. The result shows on Table 6. The Heckman selection model does not change the baseline conclusion. In average, firms having CDS in credit derivative market have limited evidence of lowering cost of bank loan. Additionally, the statistical and economic significance of other explanatory variables is robust.

Table 6 Effect of CDS trading on loan market: Heckman two-step selection model

	Coef.	Std. Err.
Trading	-10.875	(12.090)
Firm-specific variables		
Ln(Sale)	-3.104	(4.083)
Leverage	97.690 ***	(27.765)
Rating	56.772	(40.409)
Square(Rating)	0.095	(4.420)
Mktbook	-9.859 ***	(2.761)
Loan-related variables		
Ln(Amount)	5.217	(5.393)

Ln(Maturity)	1.110	(6.882)
Secured	40.130 ***	(12.987)
Dividend rest	0.607	(10.302)
Guarantor	13.214	(14.215)
Corporate purp.	-13.424	(12.466)
Refinance	1.852	(19.267)
Takeover	-9.563	(19.291)
Working cap.	-15.572	(15.141)
Lenders	-1.605 ***	(0.578)
Macro-variables		
Interest rate	-9.339	(7.197)
Output gap	10.810	(9.930)
Baa-Aaa spread	-0.099	(0.080)
Inverse Mills ratio	-112.533	(87.851)
Year dummy	Yes	
Country dummy	Yes	
Observations	4378	

This table examines whether our baseline result exist selection bias. It reports Heckman two-step regression results and standard errors are reported in a separate column. See Table 1 and Section 5.1 for definition of our variables. *** denote that the coefficient is statistically significant at the 0.01level.
Data source: this research

5.2 Effect of CDS trading on the cost of bank loan for traded firm

5.2.1 What is the effect of the CDS trading on traded firm?

We start by limiting our baseline model for traded firms which had borrowed at least once in three year before its CDS started trading and again in two year thereafter. We try to investigate whether CDS trading reduced the cost of bank loan compare the spreads before and after CDS trading.

Table 7 displays the result of the effect of the CDS trading on traded firm. The result shows that trading CDS is beneficial to decrease, on average, 22.603 basis points on loan spread. In addition, as describe in Section 4.1.4, higher M/B ratio is correspond with potential growing opportunities and thus reduce the cost of bank

loan. And, loans with longer maturities may encounter greater default risk, hence will be charged higher spread. Firms with restrictions imply relatively risky, and are increased the borrowing cost.

Table 7 The impact of CDS trading on loan spread for traded firms

	Coef.	Std. Err.
Constant	-24.349	(209.324)
Trading	-22.603 *	(12.782)
Firm-specific variables		
Ln(Sale)	3.873	(5.479)
Leverage	53.594	(38.292)
Rating	42.838	(46.008)
Square(Rating)	2.052	(5.176)
Mktbook	-7.671 **	(3.165)
Loan-related variables		
Ln(Amount)	-6.388	(5.205)
Ln(Maturity)	16.147 **	(7.281)
Secured	44.319 ***	(14.666)
Dividend rest	27.282 **	(11.053)
Guarantor	-10.175	(15.681)
Corporate purp.	-6.604	(12.649)
Refinance	-55.060 **	(24.530)
Takeover	-20.694	(23.518)
Working cap.	-42.074 ***	(14.816)
Lenders	-1.652 **	(0.647)
Macro-variables		
Interest rate	-5.335	(17.661)
Output gap	6.829	(16.969)
Year dummy	Yes	
Country dummy	Yes	
Observations	395	
R-squared (%)	7.580	

This table explores the effect of CDS trading on traded firms. We defined traded firm as the firm which had borrowed at least once in three year early and at least once again in two year afterward. It reports Tobit regression results and standard errors are reported in a separate column. See Table 1 for definition of our variables. ***, **, * denote that the coefficient is statistically significant at the 0.01, 0.05 and 0.10 level.
Data source: this research

5.2.2 Which group is affected most?

To distinguish which group is affected most by CDS trading, we rank our sample by their sale with proxy for size and divide into 30, 40, and 30 percent, respectively. The result reported on Table 8, the left side of the table shows that the result of small size firms while the right side displays the large one.

According to our finding, there is evident that making bank loan after the CDS start to trade is corresponds with lower interest rate on small firm compare to the large. Due to CDS exists is benefit for revealing information. For small company which is more informationally opaque, the CDS trading provide extra information to investor compare to large firm. Lenders appear to react to the benefit by demanding lower spreads on traded firms with small size.

Table 8 Effect of CDS trading on traded firm: sample split by firm size

	Small		Large	
	Coef.	Std. Err.	Coef.	Std. Err.
Constant	-1460.994 ***	(503.089)	266.062	(476.316)
Trading	-47.946 **	(24.038)	-24.947	(16.170)
Firm-specific variables				
Ln(Sale)	38.742 ***	(14.619)	-18.973	(12.500)
Leverage	132.281 *	(68.367)	117.904 **	(55.287)
Rating	281.145 ***	(96.709)	50.230	(65.271)
Square(Rating)	-22.005 **	(10.592)	2.879	(7.419)
Mktbook	-8.667	(6.013)	7.355	(4.734)
Loan-related variables				
Ln(Amount)	4.534	(9.783)	-11.930	(8.124)
Ln(Maturity)	5.386	(11.575)	-2.985	(8.990)
Secured	-20.446	(26.071)	27.007	(21.390)
Dividend rest	54.349 ***	(19.382)	16.505	(15.790)
Guarantor	-11.438	(31.644)	2.484	(16.252)
Corporate purp.	37.234	(26.141)	25.971 *	(15.259)
Refinance	-32.865	(43.448)	-67.678	(50.960)
Takeover	11.414	(42.725)	6.213	(43.159)
Working cap.	-40.701	(26.956)	-15.114	(18.026)

Lenders	0.995	(1.619)	-1.355 **	(0.681)
Macro-variables				
Interest rate	-26.391	(42.224)	41.584	(43.115)
Output gap	21.260	(56.137)	-94.514 ***	(31.834)
Year dummy	Yes		Yes	
Country dummy	Yes		Yes	
Observations	118		118	
R-squared (%)	10.340		15.510	

This table displays the result of the effect of CDS trading on traded firms with distinct size. We defined traded firm as the firm which had borrowed at least once in three year early and at least once again in two year afterward. We rank our sample by their sale with proxy for size and divide into 30, 40, and 30 percent, respectively. It reports Tobit regression results and standard errors are reported in a separate column. See Table 1 for definition of our variables. ***, **, * denote that the coefficient is statistically significant at the 0.01, 0.05 and 0.10 level.

Data source: this research

5.2.3The effect of CDS trading on traded firms during crisis

We would like to know whether the impact of CDS trading has new characteristic feature during crisis period, so we divide our sample period into three term. The result of the effect of CDS trading on traded firms vary in time is reported on Table 9.

This table has the same structure as Table 5. The result is consistent with we discuss in Section 4.2.3. Our findings suggest that there is a significantly positive effect of CDS trading on the cost of bank loan on traded firms. Because the higher risk averse in market and demand of CDS surge rapidly, the cost of CDS contract raises and leads to contagion the cost of bank loan.

Table 9 Effect of CDS trading on the loan spread for traded firms: sample split by period

	Before financial crisis 2001-2006		During financial crisis 2007-2008		After financial crisis 2009-2012	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Constant	43.356	(377.827)	149.401	(224.926)	-3719.630 ***	(897.157)
Trading	-45.413 **	(18.696)	30.758 **	(15.047)	-24.570	(23.365)
Firm-specific variables						
Ln(Sale)	-5.330	(8.055)	1.819	(6.876)	11.737	(10.115)
Leverage	60.201	(56.897)	-41.662	(46.693)	146.781 *	(73.278)
Rating	-75.732	(68.482)	-0.488	(70.456)	277.397 **	(132.920)
Square(Rating)	17.375 **	(8.112)	7.868	(7.658)	-25.428 *	(13.928)
Mktbook	-9.241 **	(4.493)	2.340	(3.958)	-11.955 *	(6.879)
Loan-related variables						
Ln(Amount)	4.262	(8.690)	1.767	(5.740)	-0.681	(9.953)
Ln(Maturity)	16.292 *	(9.851)	4.409	(8.285)	-40.873	(36.123)
Secured	35.566 *	(20.924)	-4.059	(24.460)	32.818	(22.735)
Dividend rest	19.423	(15.569)	5.309	(13.926)	36.472	(22.119)
Guarantor	-19.535	(24.485)	5.386	(20.887)	6.557	(21.031)
Corporate purp.	6.522	(16.554)	8.983	(17.150)	-38.027	(33.992)
Refinance	-35.065	(38.140)	-57.288 **	(23.888)	2.832	(55.324)
Takeover	-50.492	(38.203)	4.295	(20.336)	-113.845	(85.704)
Working cap.	-52.190 **	(20.405)	-15.585	(19.302)	-35.430	(37.391)
Lenders	-1.432	(0.888)	-2.627 ***	(0.962)	-2.913 *	(1.575)
Macro-variables						
Interest rate	11.422	(39.411)	-49.741 ***	(17.731)	707.101 ***	(168.716)
Output gap	33.008	(40.077)	-85.767 *	(43.989)	-283.776 ***	(66.195)
Year dummy	Yes		Yes		Yes	
Country dummy	Yes		Yes		Yes	
Observations	239		83		73	
R-squared (%)	6.040		13.970		15.410	

This table examines the impact of CDS trading during different period. It reports Tobit regression results and standard errors are reported in a separate column. We divide our sample period into three parts: 2001-2006, 2007-2008, and 2009-2012, and reports the result at the left, medium and right column, respectively. See Table 1 for definition of our variables. ***, **, * denote that the coefficient is statistically significant at the 0.01, 0.05 and 0.10 level.
Data source: this research

5.3 How CDS liquidity influence the cost of bank loan

In previous section, we always try to distinguish the effect of the firm has CDS trading or not on the loan cost. Turn to the nature of CDS character, we explore whether the CDS liquidity has impact on the cost of loan spread. Higher CDS liquidity allows investors make transactions with lower cost and correspond with the demand of the loan issued by firms whose CDS contracts are traded may increase. In addition, it draw more attention from investors while new information is likely to become available. Thus, the CDS liquidity may benefit to reduce the cost of loan spread.

In this section, we replace *trading* by *liquidity score* which provide by Markit database. The higher liquidity score represents the higher liquidity it is. Due to the data limited, this leaves our sample of 246 observations. Table 10 reports the result of the impact of CDS liquidity on loan spreads.

Our findings are consistent with our anticipation and Shim & Zhu (2014), CDS liquidity significantly decrease the cost of bank loan. In addition, the other explanatory variables are largely consistent with economic intuitions. The reason why higher CDS liquidity is beneficial to lower loan spread is the higher liquidity provides the market participants an easy and costless way to diversify their assets' risk. Also, the transaction frequencies increase is correspond with information disclosure. Both of them is beneficial to lower the borrow cost.

Table 10 The impact of CDS liquidity on the cost of bank loan.

	Coef.	Std. Err.
Constant	-429.737	(609.287)
Liquidity score	-11.379 ***	(4.183)
Firm-specific variables		
Ln(Sale)	-12.410 **	(6.147)
Leverage	65.327	(51.972)
Rating	72.837	(52.725)
Square(Rating)	-0.202	(5.773)
Mktbook	-0.304	(4.922)
Loan-related variables		
Ln(Amount)	5.237	(6.812)
Ln(Maturity	16.295 *	(8.606)

Secured	-17.921	(17.502)
Dividend rest	8.918	(14.504)
Guarantor	-14.115	(19.947)
Corporate purp.	-63.606 ***	(18.245)
Refinance	-13.278	(34.936)
Takeover	-4.982	(25.366)
Working cap.	-79.627 ***	(23.403)
Lenders	-0.205	(0.853)
Macro-variables		
Interest rate	174.631	(170.817)
Output gap	-17.728	(17.128)
Year dummy	Yes	
Country dummy	Yes	
Observations	246	
R-squared (%)	7.790	

This table explores the effect of CDS liquidity on loan spreads. It reports Tobit regression results and standard errors are reported in a separate column. See Table 1 for definition of our variables. ***, **, * denote that the coefficient is statistically significant at the 0.01, 0.05 and 0.10 level.
Data source: this research

6. CONCLUSION

The goal of this paper is to examine the relationship between CDS and loan spreads. We find that the average borrower with a CDS has limited evidence of reducing the cost of bank loan. However, there is a significantly negative impact on Asia due to the different development stage of market and small firms as CDS benefit to information disclosure. In addition, the effect of CDS trading varies with time. During the crisis period, the firm with CDS is charged for higher cost because of the demand of CDS contracts increase sharply and higher risk averse in the market.

We also try to explore the effect of CDS trading on the cost of loan spread for

the firms that start from never trade with CDS to have in the market. Our findings support that the CDS trading significantly decreases the interest rate charged by banks, especially for those risky and informationally opaque firms. Also, the impact of CDS trading of loan spread on traded firms displays the distinct feature during crisis. The firm with CDS pays higher spread for making loan due to the cost of CDS contrasts is transferred to the borrowers.

Lastly, we investigate how CDS character influence the cost of bank loan. We rely on CDS liquidity and find that higher liquidity is beneficial to lower the loan spread. Since the higher liquidity is convenient for hedging and is associated with receiving investors' attention while those information be reflected into the market. It seems that participants react to this advantage and demand lower loan spreads.

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Appendix A Pairwise correlation of variables

	Spread	Trading	Ln (sale)	Leverage	Rating	Square (rating)	Mktbook	Ln (amount)	Ln (maturity)	Secured	Dividend rest	Guarantor	Corporate purp.	Refinance	Takeover	Working cap.	Lenders	Interest rate
Trading	**0.166**																	
Ln(sale)	**-0.342**	**-0.113**																
Leverage	**0.046**	**-0.105**	**0.230**															
Rating	**0.627**	**0.161**	**-0.446**	**0.046**														
Square(rating)	**0.628**	**0.161**	**-0.439**	**0.048**	**0.994**													
Mktbook	**-0.165**	-0.027	0.022	-0.026	**-0.169**	**-0.159**												
Ln(amount)	**-0.155**	**0.033**	**0.424**	-0.015	**-0.197**	**-0.194**	**0.118**											
Ln(maturity)	**0.218**	**0.182**	**-0.164**	**-0.128**	**0.320**	**0.314**	0.011	**0.100**										
Secured	**0.439**	**0.071**	**-0.346**	**-0.042**	**0.623**	**0.626**	**-0.087**	**-0.122**	**0.284**									
Dividend rest	**0.211**	**-0.043**	**-0.293**	**-0.063**	**0.351**	**0.342**	**-0.031**	**-0.077**	**0.195**	**0.471**								
Guarantor	**0.082**	**0.030**	**-0.061**	-0.020	**0.096**	**0.096**	-0.026	**-0.039**	**0.039**	**0.137**	**0.130**							
Corporate purp.	**-0.040**	**0.096**	**0.075**	**0.088**	**-0.065**	**-0.073**	0.017	0.004	**0.060**	**-0.194**	**-0.165**	-0.007						
Refinance	**0.048**	-0.027	0.030	**0.046**	0.025	0.024	**-0.094**	**-0.030**	0.022	**0.043**	**0.035**	**-0.037**	**-0.217**					
Takeover	**0.106**	0.023	**-0.098**	**-0.158**	**0.115**	**0.112**	**0.044**	**0.166**	0.024	**0.181**	**0.150**	0.020	**-0.268**	**-0.075**				
Working cap.	0.004	**-0.081**	**-0.076**	-0.008	**0.087**	**0.081**	**-0.067**	**-0.180**	**0.057**	**0.140**	**0.240**	**0.045**	**-0.425**	**-0.119**	**-0.147**			
Lenders	**-0.241**	**-0.096**	**0.244**	**0.035**	**-0.241**	**-0.250**	0.025	**0.438**	-0.002	**-0.138**	0.029	-0.003	-0.001	-0.022	**-0.033**	0.012		
Interest rate	**-0.115**	**-0.121**	**-0.074**	**-0.037**	0.028	0.027	**0.116**	0.015	**0.055**	**0.045**	**0.063**	-0.015	**-0.095**	0.017	**0.053**	-0.009	-0.013	
Output gap	**-0.120**	**-0.041**	-0.028	**-0.042**	0.022	0.025	0.005	-0.001	**0.108**	-0.013	**0.033**	0.013	-0.016	-0.021	-0.024	**0.051**	**0.055**	**0.070**

This table reports the result of Pairwise correlation. See Table 1 for definition of our variables. And, the number with boldface means statistic significant at 5% level or higher for the two-tailed test.

Data source: this research

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