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The Impact of Liability Guarantees on Dutch Credit Spreads

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ABSTRACT

This study investigates empirically the effect of the Dutch Credit Guarantee Scheme on the credit spreads of Dutch banks, proxied by their bond implied credit spreads and 5 year senior CDS premiums. By using the literature proven structural credit spreads determinants, this paper find evidence of crowding out for non guaranteed bonds of Dutch banks. Furthermore this research also finds evidence of a decrease in the CDS spreads of Dutch banks as a result of guaranteed issuance, reflecting in this way an introduction of market disturbances as a result of the DSTA measures.

***JEL* Subject Classification:**

E02, E44, G01, G15, G2, G28.

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CHAPTER 1 Introduction

The effects of the past financial crisis have been felt largely by financial institutions but they have also threatened the real economy. By impacting large institutions; banks specifically, the consequences have extended potentially to retail and institutional customers, resulting in threats such as bank runs, still stand of money markets and lack of investor confidence. Such characteristics of the crisis have given grounds to government intervention in order to avoid the failure of large interconnected institutions and to increase the credit supply of banks.

Policy responses by governments have been diverse in the sense that stand alone actions have been used to target specific institutions and market wide schemes have been established to target the financial system. The policies employed by governments can better be described in three categories: Liabilities Guarantees (Issuance of Government Guaranteed Debt), recapitalization measures (Capital Injections) and measures to provide relief from "toxic" assets (Asset Support Programs). Policy measures have been spread throughout 2008 and focused since the fall of Lehman Brothers on September 2008; however Liability Guarantees were among the first measures adopted widely on October 2008 as fears of contagion and uncertainty increased in the financial environment. They targeted bank's debt instruments offering a guaranteed source of investment to market participants and an important source of funding for banks. Liability Guarantees were slow to materialize but gained impulse around November 2008 as Europe led the way on the implementation of such measures among OECD countries. While economic conditions worsened and the development of the crisis set strains on bank's capital requirements, it became clear that not only liquidity was affected but also bank's solvency. As a response, several governments developed Capital Injection programs which were made trough instruments fulfilling the regulations of the Basel II agreements and the conditions for Tier 1 capital. In addition, the turmoil made very difficult to price certain assets held in bank's balance sheets; which arguably may have prevented banks to lend in the interbank market with the consequence that constant write downs by banks further decreased bank's capital reserves. Hence cleaning balance sheets was considered key to a rapid recovery, as a consequence large amounts were also destined in off loading these assets form bank's balance sheets.

Interestingly, the measures taken by governments succeeded in stabilizing the markets and in increasing investor confidence but there are some concerns. Critics to the rescue packages by governments show unease related to the consequences on how those measures have leveled the playing field between banks that have traditionally kept out of troubled waters and those who received the rescue packages in order to survive. An additional factor could be the use of the government aid by institutions that did not need them but used them as an easy way to increase liquidity. Naturally such evidence amounts to the issue of moral hazard by bank management but also to further add imperfections in the valuation of market related instruments.

Specifically at the level of guarantees for bank liabilities there is some evidence that Government Guaranteed Bonds (GGB hereafter) were preferred over other liability instruments of banks and as such "crowed out" those instruments in some markets. The overall effect resulting in unforeseen changes in instruments that have systemic relationship with normal liability instruments, specifically Credit Default Swaps (CDS hereafter) spreads. Panetta et al (2009) show that differences in spreads paid by GGB issued by similarly risky banks (e.g. S&P A rated) but different country guarantor, have been extensive; up to 100 basis points for some Spanish banks vs. 20 basis points for some US banks reflecting in that way, a substitution of the true economic risk of the institution by the risk of the country guarantor which by itself introduces bias in the pricing and valuation of such institution. This means that "weak" banks from "strong" countries may have cheaper access to funds than "strong" banks from "weak" countries.

Additionally on the issue of bank funding, the effect of GGB has had unclear consequences with respect of the strategies banks have decided to pursue in order to fund their investments. In times of turmoil, fear of bank runs and lack of credit, influences banks to keep considerable amounts to meet short term commitments and consequently would lead banks in conflicting choices whether to use the government credit scheme or to recur to other means of funding as seasoned equity offerings (SEO), securitization or the issuance of debt securities. It is important to note that recurring to GGB in some markets would give signals to the market that perhaps the institution is in distress, holding the risk that the market perceives this as a trigger for a run on the institution: in a fashion similar to what seem to have happened to Bear Stearns, which succumbed to its hedge fund clients in the US following a late acceptance of a deal with Goldman Sachs that was perceived as a denial by the market. Moreover, due to the fact that historically commercial banks have held a far smaller share of equity in their balance sheet compared with their investment counterparts (Saunders and Cornett, 2008); a relatively small amount of loan defaults could leave a commercial bank insolvent. As commercial banks have different roles in the economy and different types of clients, they are in a privileged position to obtain funds other than debt or equity instruments. Banks can also rely on asset securitization which implies the packaging and selling of loans and other asset backed securities (ABS) to hedge their interest rate exposure but also to increase liquidity and provide a source of fee income.

To summarize, it is relevant to investigate the effect of the governments measures on market related instruments by which banks obtain funds, however funding is not only executed by these measures (as banks also rely on demand deposits, other short term mechanisms and additionally on securitization), these are the mechanisms that facilitate the maturity mismatch of banks and as such give banks an edge and guarantee long run profitability and growth opportunities; as such they give continuity on the institutionalized importance of banks on the real economy, development and soundness of financial markets.

Of the measures enumerated above this paper considers relevant to focus on bank's debt securities. Liability Guarantees were one of the instruments with the most availability to banks during the past crisis, they were also one of the easiest to implement. There is evidence that liabilities guarantees influenced more than just the credit availability of banks. This effect is more likely to be felt first by similar non guaranteed debt as they are perceived with different inherent characteristics than GGB and could be preferred by investors and the market allowing the pricing of other debt instruments to deviate from their normal determinants. Additionally the Credit Guarantee Scheme could have also influenced the price of insurance against default on the debt of a bank which is represented by a bank's CDS and therefore also the market price of such instrument.

This study analyses the influence of the Dutch Liability Guarantee Scheme on normal credit instruments of banks during the financial crisis, using a sample of the Dutch banking system. This document uses panel data to investigate these effects at the cross section by looking at the credit spreads of bond issues and CDS spreads. Chapter 2 introduces the Credit Guarantee Scheme in The Netherlands; Chapter 3 discusses the recent empirical determinants of bonds and CDS and elaborates on the hypothesis leading to the test of the effect of the Credit Guarantee Scheme. Chapter 4 shows the methodology and analyzes the data used for the empirical analysis. Chapter 5 presents the results of the panel regressions patterns and the following discussion. Chapter 6 concludes.

CHAPTER 2 The Dutch Credit Guarantee Scheme

To realize the commitment of government's response to the crisis, we can look at Table 1[1], which provides an overview of the extent of European government's support and intervention since October 2008 until May 2010. It is interesting to note that some governments dedicated a large amount of their wealth on aid packages, to be specific: The Netherlands, Sweden and the UK with a proportion of aid to GDP of 51.7, 44.1 and 33.5% respectively, while the total share of Europe's GDP dedicated to support the financial systems was in the order of 26.8%.

Table 1 Total Government Support

Amounts in billions of Euros. GDP represents the value of each country's 2008 GDP at current market prices without any adjustments.

Country	Liability Guarantees			Capital Injection			Asset Support			Total Government Aid		
Euro Area	Wihin Schemes Issued.	Commit.	Other Guar. on loans	Wihin Schemes Provided.	Commit.	Other Outside Schemes	Within Schemes Provided.	Commit.	Other Outside Schemes	Total Commit.	T. Support Commit. & Other In Billions	GDP %
Austria	21.8	75		5.8	15	0.6				90	90.6	32.0
Belgium	34		90.8			19.9			16.8	0	161.5	46.8
Cyprus		3								3	3	17.4
Finland		50			4					54	54	29.2
France	134.2	320		8.3	21	3				341	344	17.7
Germany	110.8	400	75	29.4	40	24.8	17	40	39.3	480	619.1	25.0
Greece	14.4	30		3.2	5		4.4	8		43	43	18.2
Ireland	72.5	485		12.3	10	7	8	90		585	592	328.9
Italy				4.1	12			50		62	62	4.0
Luxembourg	2.5		4.5			2.5				0	9.5	24.0
Malta											0	0.0
The Netherlands	54.2	200	50	10.2	20	16.8			21.4	220	308.2	51.7
Portugal	5.4	16			4					20	20	11.6
Slovakia		3			1					4	4	6.2
Slovenia		12								12	12	32.2
Spain	56.4	100	9	11	99	1.3	19.3	50	2.5	249	261.8	24.1
TOTAL	**506.2**	**1694**	**229.3**	**84.3**	**231**	**75.9**	**48.7**	**238**	**80**	**2163**	**2548.2**	**27.6**
Other EU												
Bulgaria										0	0	0.0
Czech Republic										0	0	0.0
Denmark	36.9			3.5	13	2.2				13	52.1	22.4
Estonia										0	0	0.0
Hungary		5	2.3	0.1	1					6	8.3	7.8
Latvia		6				0.3				6	6.3	27.3
Lithuania										0	0	0.0
Poland		5			5					10	10	2.8
Romania										0	0	0.0
Sweden	25.4	142	0.5	0.5	5					147	147.5	44.1
United Kingdom	157.2	300		33.7	55	35.8			217.8	355	608.6	33.5
TOTAL	**219.5**	**458**	**2.8**	**37.8**	**79**	**38.3**	**0**	**0**	**217.8**	**537**	**795.9**	**24.5**
EUROPE TOTAL	**725.7**	**2152**	**232.1**	**122.1**	**310**	**114.2**	**48.7**	**238**	**297.8**	**2700**	**3344.1**	**26.8**

Furthermore some of the measures were outside dedicated schemes, i.e. as standalone action *vis-à-vis* independent institutions with considerable amounts; effectively bailing out such institutions as in the case

[1] Table 1 is adapted from Stolz and Wedow (2010), GDP data extracted from ECB.

of Belgium with € 19.9 billion dedicated to the salvage of Dexia and Fortis in the form of capital injections and € 90.8 billion in other loans guarantees. On the liability guaranteed side is worthy to note that Ireland committed an amount of € 485 billion on Liability Guarantees in the form of Government Guaranteed Bonds (GGB hereafter), which is more than 3 times its 2008 GDP signaling a strong involvement in rescue packages. Likewise many relatively big European countries have guaranteed large amounts to GGB instruments aimed to regain liquidity and have become the guarantor of last resort.

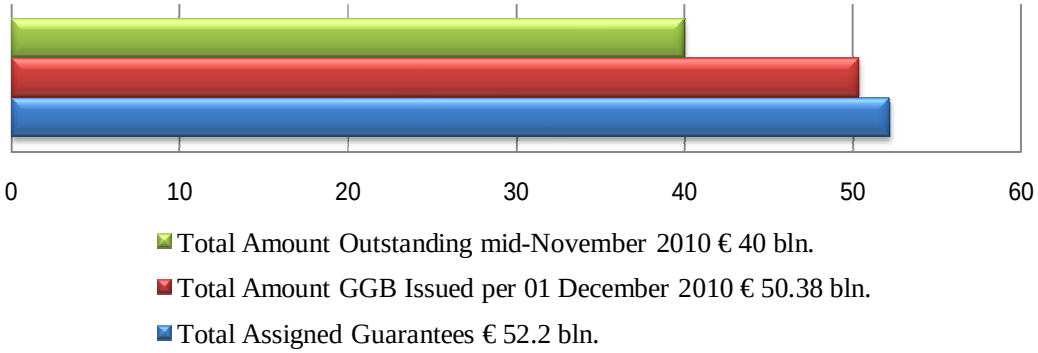
In The Netherlands, the Dutch State Treasury Agency (Agentschaap van de Generale Thesaurie, DSTA hereafter) introduced its Credit Guarantee Scheme on October 2008 in coordination with the Dutch Ministry of Finance in order to protect and to stimulate the Dutch financial sector. The program started with a proposed budget of € 200 billion in guarantees for the issuance of medium term bank debt. The program aimed at attaching a government guarantee to new debt issues of banks by the DSTA to facilitate bank funding and in that way it intended to preserve financial stability. That meant that in case of default by the bank, the Dutch state would stand ready to honor the debt in exchange of a fee by the participating bank. Such characteristic of the debt issue would make it desirable to investors because in uncertain times, such bank bond issues will have the certainty of repayment by the DSTA. The debt under the conditions of the scheme were limited to non-complex senior unsecured loans, with maturities between 3 to 36 months which includes commercial paper, certificates of deposit and plain-vanilla medium term notes. Furthermore the guaranteed debt could not be issued in currencies other than Euro, Sterling Pound or US Dollars.

The cost for banks to make use of the guarantee scheme was established on a fixed fee based on the bank's credit rating and the maturity of the debt issue. For debt maturing prior to one year only a fixed fee was charged; while debt issues of longer than one year also included a variable fee based on the median 5 year CDS spread of the eligible bank applying for the guarantee. The fees charged to make use of the guarantee scheme were raised on January 2010; such measure was taken to discourage the use of the government's guarantees and to be in line with the European Commission on state aid but also to avoid competition distortions. An additional criterion was the publication of a viability review by the granted institution if a threshold was reached: a ratio of 5% of outstanding Guaranteed Liabilities to total liabilities and a total amount of Guaranteed Liabilities of € 500 million. No additional guaranteed debt was issued after November 2009; whether this was directly related to the changes in line with the European Commission remains open to discussion.

Originally the scheme was intended to be implemented until the end of 2009 but the continued volatility on financial markets has made the prolongation of the scheme a necessity. The scheme has been extended two times, first from January 2010 until July 2010 and later extended until the end of 2010. Recently the scheme has been deemed suspended from January 2011 onwards. According to the rules of the scheme, all

institutions holding a Dutch bank permit could apply for the guarantees by which the determination of the amount, fees, market and such complimentary information would be awarded after due consulting with the Dutch Central Bank (De Nederlansche Bank) in regard of liquidity and solvency of the applying institution. The Credit Guarantee Scheme covers both the principal and the interest payments.[2] Similar schemes were set in place by other European countries, in Britain the guarantee scheme felt under the traditional jurisdiction of the United Kingdom Debt Management Office (DMO)[3] whereas in other countries special purpose facilities were created as in the case of Germany with the Financial Market Stabilization Fund (SoFFin) by the German Federal Agency for Financial Market Stabilization (FMSA) under the German Financial Market Stabilization Act.[4] Currently there are 17 European governments with such schemes in place.

Figure 1 Assigned Guarantees Dutch State Treasury Agency (DSTA) / Ministry of Finance



Source: DSTA, Author's Calculations

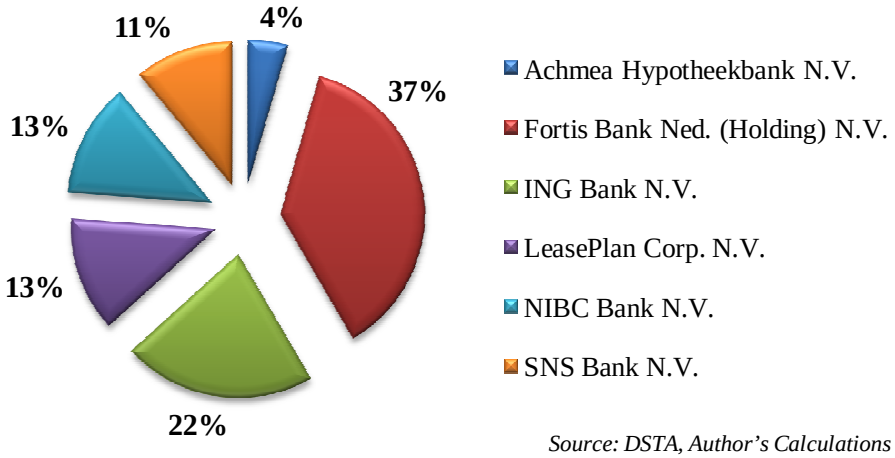
Figure 1 provides an overview of the assigned guarantees by the DSTA. Keeping in mind that the initial committed amount was set at € 200 billion, it is interesting to note that the assigned guarantees only reached a bit more than one quarter from their initial budget. That fact provides evidence that Dutch banks considered the scheme a last resort facility, as it should be, other than diving e*n masse* to use these resources. This fact also provides evidence that Dutch banks have succeeded in finding alternative ways of funding. From the figure is easy to see that although a higher amount was assigned, it was never issued; as there is roughly a difference of € 2 billion less for GGB issued. This means than some banks decided not to issue the assigned guarantee and perhaps decided to keep the option open to use this amount for an extreme necessity but perhaps the difference could also be due to a strategic decision of bank's management with respect to the costs of issuing GGB. The graph also shows that as of mid-November 2010 roughly € 10 billion have been repaid by banks.

The Institutions benefiting from the Credit Guarantee Scheme in The Netherlands are depicted in figure 2. It is convenient to note that according to the regulations of the scheme, not only banks were allowed to

[2] Joint press release by "De Nederlandshe Bank" and the Dutch State Treasury Agency (DSTA). 21 October 2008.
[3] United Kingdom Debt Management Office. http://www.dmo.gov.uk/index.aspx?page=CGS/CGS_about
[4] SoFFin. http://www.soffin.de/de/

make use of the Credit Guarantee Scheme, but also other financial institutions. We can observe that LeasePlan Corp. N.V. and Achmea Hypotheekbank N.V. did comply with the eligibility criteria even though their business models are not entirely corresponding to commercial banking. Furthermore LeasePlan is 50% owned by the Volkswagen Group but apparently its business is substantial enough in The Netherlands to be eligible as receiver of the Credit Guarantee Scheme. This shows the variety of institutions that used the aid programs from the Dutch government. There is a latent issue on this fact; large interconnected business groups may have access to Liabilities Guarantees issued in several countries through subsidiaries. Depending on the costs for access to such guarantees, institutions could play then a strategic game where they hoard guarantees in one country and use those funds in another country. Investigating these relationships is beyond the scope of this paper but it adds relevance to the role of guarantees, issuing Liabilities Guarantees permeates beyond credit instruments of banks.

Figure 2 Assigned Guarantees DSTA by Entity in percentages of Total Amount GGB Issued



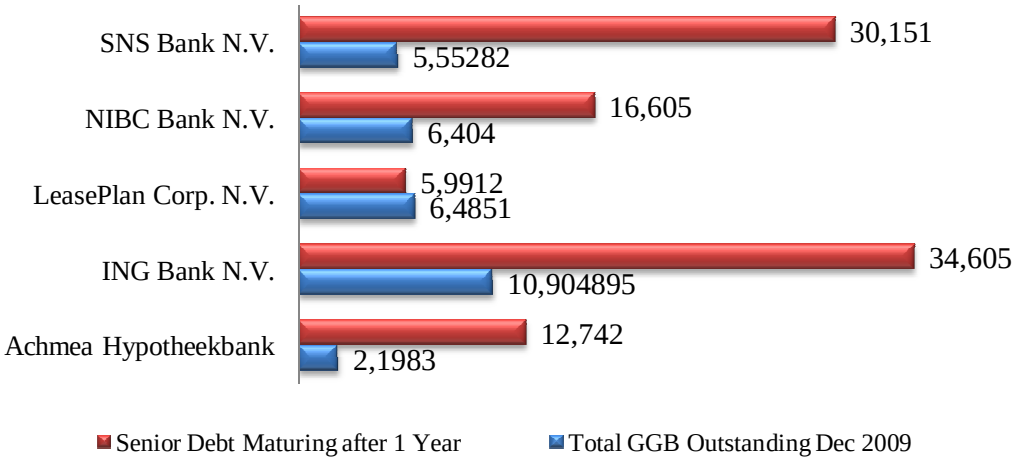
Source: DSTA, Author's Calculations

Another fact of the issued guarantees is reflected in the size of the institution recurring to the DSTA. The institutions that used most guarantees are not necessarily the biggest, rather the ones in dire need. Such was the case of Fortis Bank regardless of the best efforts by management; the institution had to be bailed by two governments. In the end their Dutch assets were nationalized and merged with ABN AMRO Bank N.V. as of today ABN AMRO is honoring the outstanding debt issued under Fortis including the guaranteed debt. Furthermore regarding institution size, LeasePlan Corp. N.V. issued as much as NIBC Bank N.V. in terms of government guaranteed debt, even though NIBC was twice the size (in terms of total assets) of LeasePlan at the end of 2007's fiscal year.

Figure 3 provides evidence of the share of the GGB within each institution's debt. For simplicity Fortis is not included on this graph given the unavailability of year reports on Bankscope and its merger with ABN AMRO Bank N.V. Although short term issues are not included it is enough to make the point that for the majority of the institutions, GGB did not represent the majority of a bank outstanding senior debt. That is to say that GGB issues did not constituted the backbone for funding needs of banks (except for LeasePlan

Corp. N.V.) and that banks did use the normal medium term instruments that are traditionally used. This paper elaborates further on this issue on later Chapters, for now it is sufficient to see the trends on the issuance of GGB.

Figure 3 Share of Dutch Bank's Government Guaranteed Debt in Billions



Source: DSTA, Bankscope, Author's Calculations

An interesting fact appears when analyzing the case from LeasePlan, the total issued amount of GGB at the end of 2009 was in the order of € 6.48 billion whereas the figure on its annual report states a total of senior debt maturing after 1 year lower than this figure. This suggest an important point; that LeasePlan depended entirely on GGB for its funding between 2009 and 2010 neglecting other types of medium term notes. This represent the extreme case on which the effect of the implementation of the Credit Guarantee Scheme had unforeseen consequences on the market instruments of the institutions involved on the scheme. The fact that this is an extreme case provides further grounds to investigate if other institutions were affected in a similar fashion.

CHAPTER 3 Hypothesis Development

3.1 Credit Instruments of Banks

The first implication to explore is related to the effect of GGB issuance by banks on to other similar assets. These instruments are relevant in the sense that such securities could be substitutes for investors or to the systemic relationship between debt instruments of institutions (bonds) and their natural corresponding hedge *i.e.* CDS.

Traditionally banks issue Medium Term Notes (MTN) in the form of bonds; these are securities traded in both the primary and the secondary market that are used by banks as a steady way of obtaining funds at several maturities but also as an easy way to refinance its obligations. Bonds can be secured or unsecured with respect to an asset or institution which is considered as collateral in the event of default. In addition bond issues can also be of different seniorities which represent the order of payment to creditors should default arise.

With respect to the use of collateral, bonds can be secured or unsecured. Secured bonds have a specified type of institution or credit facility which offers investors an alternative way to recover their initial investment in case of default. Unsecured bond issues rely only on the institution's name and credibility in order to provide protection to investors in the event of default: they have a senior claim on the institution assets above that of equity investors, but it depends on the seniority of the other bond issues and the collateral held by any outstanding secured debt. Banks have an special kind of secured bond called covered bonds which are safeguarded against default by a cover pool of mortgage loans (property as collateral) or public sector debt in which investors have a preferred claim in the event of default, the mechanisms and types of which, depend individually on the framework of issuance[5]. Covered bond can be seen as a special case of securitization on which there are underlying assets backing the issue; these assets are not the same type for all covered bonds but they can be considered as having the highest rating. Opposed to securitization, the cover pool of assets usually remains on the balance sheet of the issuer. Covered bond holders also have recourse against the bank, not only to the pool of assets; hence investors have a dual claim on the issuer.[6] Unsecured bonds are the traditional instruments that banks use in order to fund their long term financial means without the resort to collateral; they constitute by far the majority of the investable bond universe.

[5] European Covered Bond Council (ECBC). Covered bonds comprise the following special features:

i. The bond is issued by a credit institution which is subject to public supervision and regulation.
ii. Bondholders have a claim against a cover pool of financial assets in priority to the unsecured creditors of the credit institution.
iii. The credit institution has the ongoing obligation to maintain sufficient assets in the cover pool to satisfy the claims of covered bondholders at all times.
iv. The obligations of the credit institution in respect of the cover pool are supervised by public or other independent bodies.

[6] 2010 ECBC European Covered Bond Fact book. September 2010 5th edition.

The primary market is the part of the bond market, dedicated to the dealing of issuance of new securities. Banks issue new debt through themselves as originator investment bank or through other investment banks, as an underwriting syndicate. As with stock offerings there is also a case when bonds are offered through private placements and under the "book building technique" where the securities are offered to a selected group of investors in which the selected covenants and price are negotiated with the investors; the likes of, often guarantees better conditions than in the public market and eliminates the risk of under subscription that the syndicate no longer wants to assume. The secondary market is the part of the bond market in which previously issued bonds are exchanged between investors. For bank bonds there is traditionally less liquidity on this market as investors rather hold to maturity than sell them, as opposed to government bonds which trade more frequently. Conditions changed severely in this market as a result of the crisis of credit. Investor confidence deteriorated and fears of contagion and bankruptcy spread particularly trough September 2008, as a result valuations became scarce for both covered and uncovered bonds because investors became increasingly risk averse and market arrangement mechanisms were not present or stopped functioning altogether.

With respect to bond substitutability it is convenient to consider the whole investable bond universe; for benchmark composition purposes, any change in market events and issuance patterns will affect fixed income index composition in a mean variance framework. Upbin et al (2009) recognize three principal trends affecting benchmark composition namely greater single name issuer concentration, continued issuance of government guaranteed bank debt and increase in government debt issuance during 2009. They conclude further that the trends affecting fixed income portfolio management have caused investors to reevaluate benchmark selection and benchmark composition which affects returns and portfolio performance.

Beber et al (2009) determined empirically that fixed income investors are concerned about credit quality and liquidity in two approaches. Unconditionally at all times and conditionally in times of heightened market uncertainty; which is the case at hand, i.e. investors care about the effects of credit quality and liquidity especially during times of uncertainty. They focused on yield spreads on the Euro-Area government bond market to investigate whether liquidity risk is a factor that changes the relative trade-off between credit quality and liquidity for determining credit spreads. They follow Pástor and Stambaugh (2003) who define liquidity risk as the possibility that liquidity may be scarce precisely when a market participant wants to exit a position. The conclusions from their work provide grounds to evaluate whether spreads on other debt instruments of banks were affected due to the increase in liquidity provided by government guaranteed debt instruments.

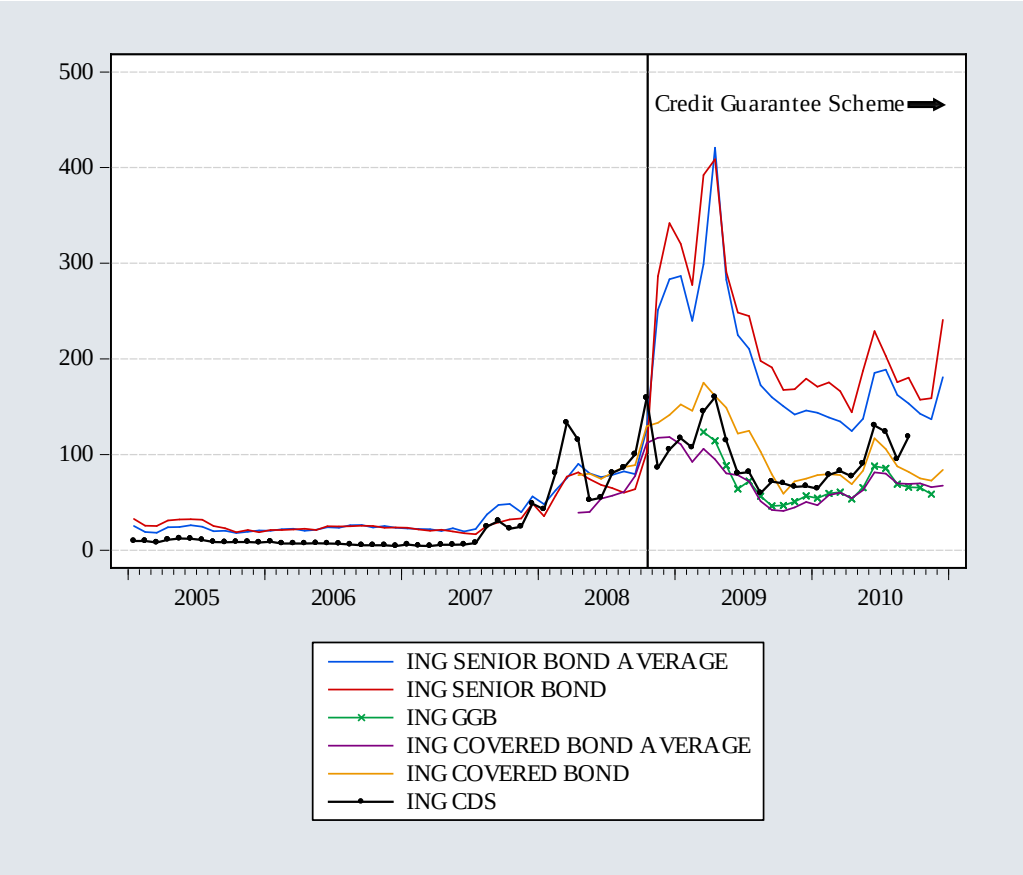


Figure 4 Credit Spreads; the case of ING Bank N.V.

Figure 4 above provides evidence of the movements of the credit spreads of different types of bonds by using stylized instruments of ING Bank N.V.; credit spreads are given over the government bond of the closest maturity where the bond is trading. ING Bank N.V. did make use of the Credit Guarantee Scheme, it is possible to see in the graph that the spread for the GGB bond issue is well below other MTN's, it is therefore considered to have less credit risk than the senior bond issue. However the credit spread of the GGB is closely matched by the average of the outstanding Covered Bonds, this implies that both are perceived to have a lower probability of default: GGB by being government guaranteed and the Covered Bond by the pool of assets behind it; this characteristic is reflected in the bond issue rating, both have the highest possible rating. In the graph is also possible to see the increase of credit spreads of MTN instruments as the crisis unfolded: first during the second half of 2007 as uncertainty spread throughout capital markets and later a sharply increase of senior debt during the last quarter of 2008 following the collapse of Lehman Brothers; this level was maintained during 2009 and still has not managed to return to the levels of 2006. By looking at the movement of CDS we can see the panic peak on the first quarter of 2008 as it became apparent that the crisis had a systemic nature. Later the effect of the announcement of the Credit Guarantee Scheme on October 2008 decreased sharply CDS premium before it continued its movement on an upward trend as the crisis extended reflecting uncertainty in fixed income markets. Credit Default Swaps are explained in detail in the following section.

3.2 A CDS Primer

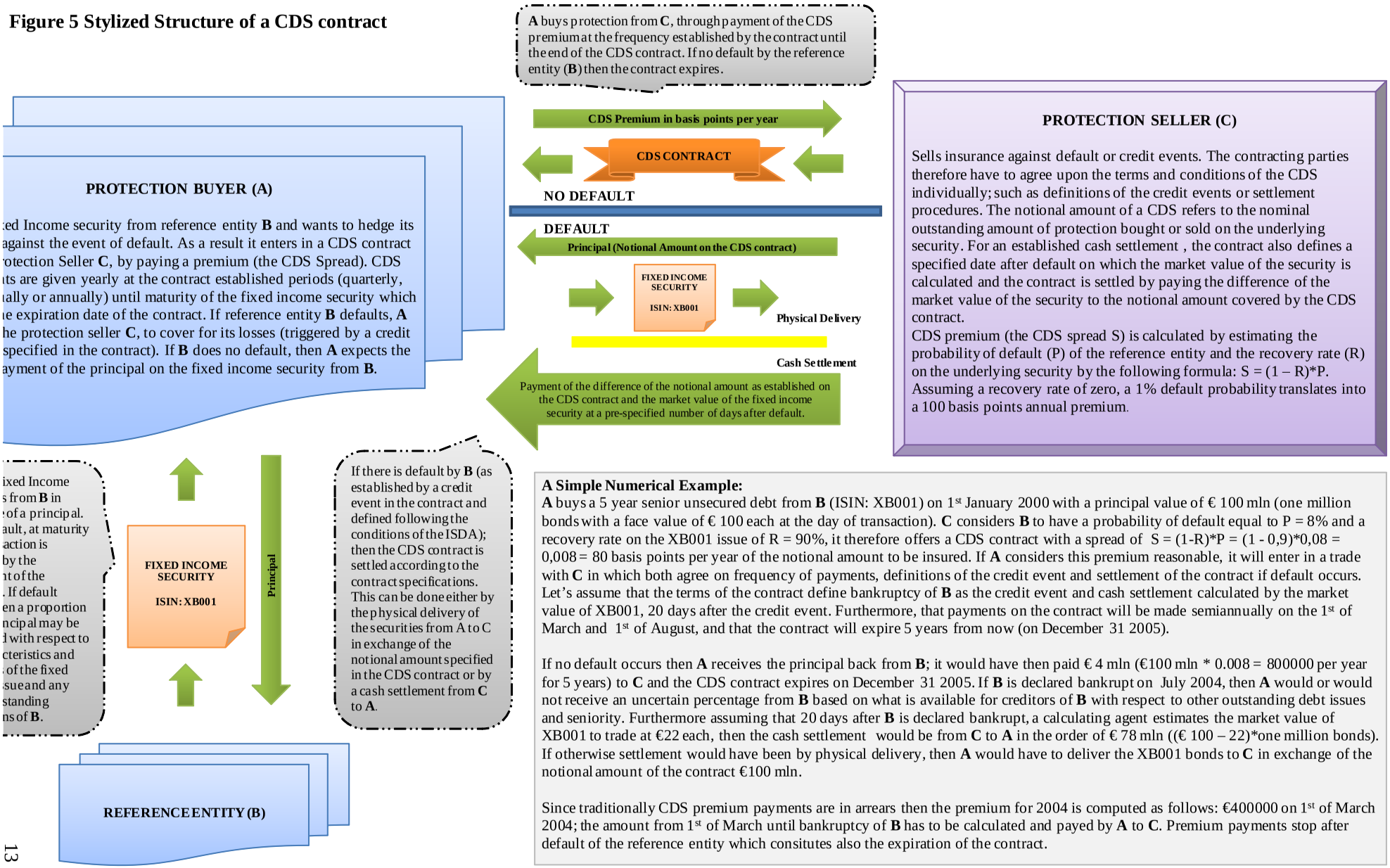
The generic definition of a CDS is that of a bilateral contract to trade the risk that a reference entity (a firm or a government) defaults on its debt obligations. They are a product within the credit derivative asset class, a type of Over the Counter (OTC) derivative. The two sides entering the contract are a protection buyer and a protection seller. The protection seller assumes the financial loss in case of default of the underlying security or insolvency by part of the reference entity, in exchange of yearly payments (the CDS premium or spread) made by the protection buyer.

When entering a contract, the two parties agree on the CDS spread, which compensates the protection seller for bearing the risk of a default, i.e. to cover the expected loss of the reference entity. The CDS spreads are calculated based on two parameters: the probability of default (P) of the reference entity and the recovery rate (R) on the underlying security. CDS spreads are then stated in basis points and payments to the protection seller are made yearly on basis of the CDS spread over the notional amount that is specified in the contract. These payments continue until the end of the contract or until a credit event occurs on the reference entity[7]. Figure 4 is self explanatory with respect to the structure of a CDS trade; here the mechanics of settlement and spread computations are made clear.

CDS make available an easy way to trade credit risk; many corporate and sovereign bonds are bought by investors, who rather hold to maturity than trade on them, therefore creating poor secondary market liquidity which in turn makes the purchase of credit risk in the secondary cash market difficult and costly, it is here where CDS allow investors to short credit risk over a longer period of time at a known cost by buying protection (Schultz (2001) and Alexander et al (2000)). The CDS spread is an indication of the perceived risk on the reference entity. Therefore they can be used to hedge the credit risk of on-balance sheet assets (MTN's or ABS's held to maturity) by buying protection on them. There is a connection between CDS spreads and bond implied credit spreads. In an ideal world both values should be aligned to represent the risk premium on the debt obligation of a given entity. In practice there is integration between both markets through arbitrage and they reveal significant differences. Bond yields are influenced by other factors than just credit risk; particularly interest rate risk and liquidity risk which require distinct assumptions in order to arrive at probabilities of default. Similarly CDS spreads depend on the uncertainty attached on recovery rates of the underlying asset, counterparty risk or the specifications or the contract before arriving at default probabilities.

[7] Credit events as defined by the International Swap and Derivatives Association (ISDA):
Bankruptcy.
Obligation Acceleration: Obligation becomes due and payable before its normal expiration date.
Obligation Default: The technical default, violation of a bond covenant.
Failure to pay: The failure of the reference entity to make any due payments.
Repudiation/Moratorium: provides compensation after specified action of a government (delayed payments)
Restructuring: The reduction or renegotiation of delinquent debt in order to improve or restore liquidity.
Source: http://www.isda.org/

Figure 5 Stylized Structure of a CDS contract



A Simple Numerical Example:

A buys a 5 year senior unsecured debt from **B** (ISIN: XB001) on 1st January 2000 with a principal value of € 100 mln (one million bonds with a face value of € 100 each at the day of transaction). **C** considers **B** to have a probability of default equal to P = 8% and a recovery rate on the XB001 issue of R = 90%, it therefore offers a CDS contract with a spread of S = (1-R)*P = (1 - 0,9)*0,08 = 0,008 = 80 basis points per year of the notional amount to be insured. If **A** considers this premium reasonable, it will enter in a trade with **C** in which both agree on frequency of payments, definitions of the credit event and settlement of the contract if default occurs. Let's assume that the terms of the contract define bankruptcy of **B** as the credit event and cash settlement calculated by the market value of XB001, 20 days after the credit event. Furthermore, that payments on the contract will be made semiannually on the 1st of March and 1st of August, and that the contract will expire 5 years from now (on December 31 2005).

If no default occurs then **A** receives the principal back from **B**; it would have then paid € 4 mln (€100 mln * 0.008 = 800000 per year for 5 years) to **C** and the CDS contract expires on December 31 2005. If **B** is declared bankrupt on July 2004, then **A** would or would not receive an uncertain percentage from **B** based on what is available for creditors of **B** with respect to other outstanding debt issues and seniority. Furthermore assuming that 20 days after **B** is declared bankrupt, a calculating agent estimates the market value of XB001 to trade at €22 each, then the cash settlement would be from **C** to **A** in the order of € 78 mln ((€ 100 – 22)*one million bonds). If otherwise settlement would have been by physical delivery, then **A** would have to deliver the XB001 bonds to **C** in exchange of the notional amount of the contract €100 mln.

Since traditionally CDS premium payments are in arrears then the premium for 2004 is computed as follows: €400000 on 1st of March 2004; the amount from 1st of March until bankruptcy of **B** has to be calculated and payed by **A** to **C**. Premium payments stop after default of the reference entity which consitutes also the expiration of the contract.

The two instruments make available two sources of information, by studying them together CDS spreads allows credit risk to be separated from interest rate risk, excluding a source of uncertainty in the pricing mechanism. Due to these characteristics CDS's have gained acceptance as an indicator of distress, rating agencies use information derived from CDS prices to calculate "market implied ratings"[8]. To summarize, CDS's are not only risk management tools, but also make available completeness of the market by providing participants with a view on the default risk of a reference entity.

Hull et al (2004) clarified the systemic relationships between CDS spreads, bond yields and credit rating announcements: theoretically CDS spreads should be aligned to bond yield spreads. Consider y as the yield on a n-year par yield bond issue (that means that the yield to maturity equals the interest payments on the bond issue and that the bond is selling at its face value), issued by a reference entity M (BM); consider further r as the yield on a n-year par yield riskless bond (GRF) and s as the n-year spread on a CDS on the entity M (CDSM). The cash flows from a portfolio consisting of the n-year par yield bond of BM and CDSM would be very closely related to the cash flows from the n-year par yield GRF in all states of the world. Equation one summarize these findings;

$$y - s = r \tag{1}$$

That means that buying a bond from an institution and hedging against the institution default by buying a CDS contract should equal the return obtained by investing in a similar risk free instrument. Note that the sign of s is negative representing payments whereas y represents inflows. Furthermore the relationship when solving for s, is a no arbitrage condition, if s is greater than $y - r$, an arbitrageur will find it profitable to buy GRF, sell short BM and sell CDSM. If s is smaller than $y - r$ the opposite strategy will be used. Naturally several assumptions apply; specifically that market participants can short bonds instruments including riskless bonds which in turns means that market participants can borrow at the risk free rate, furthermore that interest rates are constant so that par yield bonds stay par yield bonds, that there is no counterparty risk in a CDS trade, that there might be reasons for investors to prefer a riskless bond over a corporate bond plus CDS or vice versa (such as a decrease in investors' appetite for risk as happened during the past crisis or perhaps for tax and liquidity reasons) and that the CDS agreement circumstances of the CDS contract are on par and carefully defined with the International Swaps and Derivatives Association (ISDA) protocols which aim to match payoffs as closely as possible in default events i.e. there are no imperfections in the contract specification.

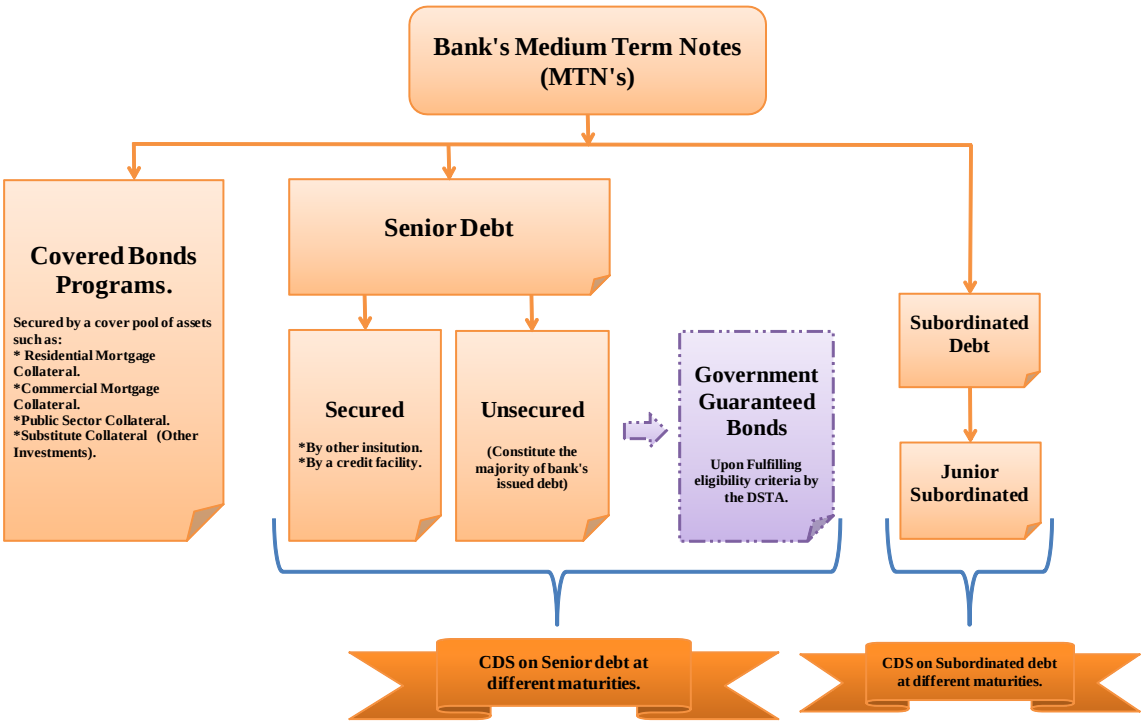
The findings of Hull et al (2004) conclude that the theoretical relationship explained above holds fairy well and that it could be used to estimate the riskless 5-year rate used by participants in the CDS market. With respect to credit ratings announcements, CDS spread increase conditionally to the review for downgrade

[8] ECB August 2009. "Credit Default Swaps and Counterparty Risk". European Central Bank August 2009. ISBN 978-92-899-0454-4 (online)

announcement by rating agencies but not for downgrade or negative outlook announcements and as such these announcements contain less significant information. Blanco et al (2005) found further evidence in which the way both CDS and Bonds on the same institutions, follow each other. Specifically that corporate credit spreads defined as the yield of corporate bond over the yield of a riskless bond (in the equation above) lag behind the movement of the CDS spread. These results are in line with Longstaff et al (2005) which conclude on the same findings; CDS premiums lead bond implied credit spreads.

The findings in the literature give a full picture of why it is important to include CDS spread changes with respect to changes in bonds instruments in investigating the effect of GGB bonds issuance. Since Liability Guarantee Schemes introduce a guarantee on the default risk on the debt instruments issued with GGB, they change the perceived riskiness by investors and as such they might also affect other instruments that are closely related to credit risk changes in the form of credit instruments (other bonds) or the instruments designed to hedge against such credit risk (CDS). Figure 5 summarizes the relationship between different debt types and their hedge instruments currently traded in the market. Banks can issue bonds either at senior or subordinated level and as such the insurance against default (CDS) can also be obtained at the senior or subordinated level. Additionally banks engage in covered bonds programs which have their own pool of assets that hedges investors against default, usually due to the high quality of such assets they often obtain the highest ratings. Apparently the market perceives the pool of assets to be a sufficient guarantee on these bonds, making insurance against default of these bonds redundant, as a result there are no CDS contracts on covered bonds (a discussion on the types of CDS follows on the data description section).

Figure 6 Bank's Medium Term Notes Asset Classes



In economics "Crowding-Out" is a concept that better describes the unintended effect of an increase of government activity. For example in macroeconomic theory by increasing government expenditures governments "crowd out" private consumption or investment as most likely – *ceteris paribus* – this expansion in spending will come at the cost of an increase in taxes: therefore giving consumers no other choice than decrease consumption. If otherwise this expansion is financed by issuing government debt, the effect will be most likely reflected in an increase of interest rates: leading to a reduction of private investing; the more governments borrow, the higher the interest rate will become, approaching to a point in which corporations and individuals can no longer afford to borrow in the lending markets.

Here I define "Crowding-Out" as an increase in the lending rates that debt issuers have to pay in order to obtain funding in the lending markets as an unintended effect of the Liability Guarantee Scheme. This means that the issuance of GGB might have resulted in an increase in the credit spreads of other debt instruments and in a decrease of the spreads of CDS contracts used to hedge against the default of the institutions that used GGB. Putting this discussion together the hypotheses aimed to test the effects of government's Liability Guarantee Schemes on other liability instruments can better be summarized as follows:

Hypothesis 1. *The Issuance of GGB crowed out other credit instruments, i.e. Credit Spreads on bank bonds on the same markets that issued GGB increased, the more GGB were issued.*

Hypothesis 1 aims to test the direct effect of the guarantees issued by the government on the current outstanding bank debt and the subsequent debt issues. As mentioned above debt instruments are traded in both markets, investors may have reacted differently in the purchase of bonds issues due to the introduction of the guarantees. Such policy was publicly divulged and as such knowledge on it was readily available, making debt issues carrying government guarantees well known for all kinds of investors. The credit spreads on banks bonds during the crisis might reflect several factors. It might reflect the characteristics of the bonds issued (volume or rating). It might reflect the characteristics of the issuer, such as rating or its legal from (bank vs. nonbank) or for GGB the characteristics of the country guarantor. Therefore including these characteristics for both types of bonds would add clarity on the effects of GGB over the other credit instruments.

With respect to CDS spreads the following hypothesis aims to test the effect on CDS premiums:

Hypothesis 2. *GGB Issuance narrowed the CDS spreads of Dutch banks.*

Hypothesis 1 and 2 can be seen as being both sides of the same coin; both test measures of creditworthiness of banks one by testing the payoff to investors and the other by testing the price on protection on the entity issuing those debt instruments. Modifying Equation 1 above solving for s left us

with the value of the spread of CDS equaling the value of the credit spread of a bond issue $(y - r)$ leaving us with a testable model to find the relationships in which the spreads of both instruments are related.

To look at the model specification more closely first is necessary to find the empirical findings on the determinants on both spreads.

3.3 The Determinants of Credit Spreads

Credit spreads arise for the need to measure credit risk. Credit risk is an important risk for financial institutions and therefore most institutions devote considerable amounts of resources to the measure and management of this risk given the share of debt instruments on their balance sheets. These efforts are aimed at complying with the capital requirements established by regulators to reflect the credit risk they are bearing. Since credit risk arises from the possibility that borrowers and counterparties might default, credit risk can be modeled by estimating probabilities of default. Such default probabilities can be estimated using historical probabilities on default intensities and recovery rates; furthermore they can also be estimated by using bond prices assuming that the only reason a corporate bond trades for less than a similar risk free bond is a greater possibility of default. Similarly equity prices can be also used since equity prices can provide more up to date information for estimating default probabilities. All these prices and the probabilities of defaults behind them depend on the economic situation.

Assuming that Equation (1) holds, and that credit spreads on bond issues $(y - r)$ equal the spread paid on CDS contracts (s), the determinants of bonds spreads would have the same characteristics. For example Tang and Yan (2010) use CDS spread to count for the credit spread on investigating market conditions since credit risk and market risk are closely linked. They use structural models of market risk and their impact on credit spreads consisting of cross sections of corporate credit spreads tested against a variety of market variables such as GDP growth, GDP volatility, Investor's Sentiment and the jump in a firm's asset process. The later is deemed as an indicator to match observed default probabilities with theoretical ones. They proceed to test the effect of market conditions on three different approaches, first by averaging CDS spreads and then by controlling at the firm level in a cross sectional regression and later by performing a panel regression to assess the relative explanatory power of macroeconomic conditions and firm level characteristics on the credit spread.

The findings related to their study highlight the importance of market conditions: specifically GDP growth and investor sentiment are found to be negatively related and statistically significant to corporate credit spreads. In a macroeconomic model the influence of GDP growth on credit spreads to account for default risk makes economic sense, a decrease in economic activity and output would stress firms in their output

production but also in finding ways to fund their relevant investments, decreasing their creditworthiness or at the very least making valuations more difficult. This observation is supported by the positive relationship found in GDP volatility and credit spreads, the more volatile macroeconomic conditions become (a measure of market uncertainty) the higher the price of protection against default which is also measured by a decrease of investor sentiment.

It is possible to look at the changes in credit spreads in both aggregated and fundamental economic factors or to the financial markets and banking sector in particular. As in Tang and Yan (2010) above several authors incorporate aggregated macroeconomic variables, inflation, unemployment, consumer confidence measures of country indebtedness, nominal and real GDP growth rates, changes in GDP growth rates, national savings rates market liquidity premiums, ratio of high yield debt to total debt outstanding and market returns as well as volatility of equity indices (Imbierowicz 2008; Tang and Yan 2008; Pu and Zhao 2008). By looking beyond macroeconomic variables other studies target firm-specific variables, industry-specific variables and sector-fundamentals variables. For example firm-specific variables target the degree of earnings forecast, jump risk, default probability, credit rating, the change of several financial ratios, ROA, and ROE. Industry and sector specific variables comprehend; dividend payout, corporate leverage, systematic risk, industrial production percentage and treasury yields (Hull, Predescu and White 2004; Tang and Yan 2006; Longstaff, Mithal and Neis 2004; Ericsson, Jacobs and Oviedo 2009). Ngow and Hassan (2009) make an excellent literature review on the CDS determinants, documenting the fact that the empirical results have been mixed. Altman et al (2005) find that firm-specific variables add little to the explanatory power or statistical significance to CDS spread. Tang and Yan (2006) do find positive results for the role of cash flow beta by improving the fit of default probabilities and credit spreads. Furthermore they show that by adding macroeconomic variables to the cash flow model, it significantly helps improving the model. Furthermore on firm specific variables: Ericsson, Jacobs and Oviedo (2009) look at the theoretical determinants of default risks as firm leverage, the volatility of the underlying assets and the riskless interest rate. Their findings provide evidence of a positive and significant effect for both leverage and volatility whereas the risk free rate is found to be negatively related to credit spreads.

The findings on the theoretical determinants of CDS spreads provided by the literature can be summarized in 3 categories: firm level variables, macro level variables and market level variables. The most frequent firm level variables in the literature are leverage, dividend payout ratio, volatility (asset volatility or firm's equity volatility) return on equity and default probability. A highly leveraged firm is considered to be more likely to default, this probability must be encapsulated by the prices of CDS; similarly the effect of a higher dividend payout ratio transforms into a higher CDS premium since a firm that distributes its earnings lowers its asset base value should the threat of default arise. The same holds true for equity volatility, higher volatility means higher default risk underlying the uncertainty of the security's value. Default probability is also a determinant of CDS spreads. Blanco, Brennan and Marsh (2005) as well as Tang and

Yan (2008) found evidence that default probability measured by credit ratings agencies and CDS spreads are positively related.

With respect to macro level variables, GDP growth and Investor sentiment are important determinants of CDS spreads, in fact almost any variable that determines economic growth could be included in determining CDS spreads. Ngow and Hassan (2009) include inflation rate, since inflation triggers a decrease on real economic activity hence inflation and CDS spreads are positively related. Moreover these findings are consistent with the evidence that when economic conditions are on an upward trend CDS spreads tend to be low and that credit spreads increase during economic downturns. This effect could better be explained by looking at the effect of short term interest rate on default risk. Theory would predict a negative relationship between both as an increase in interest rates proxies for economic cycles. However an increase in interest rates could also mean an economic condition with increased inflation and tightened monetary policy signaling an increased default probability.

Among market level variables, those indicating an increase in market volatility, market leverage or a decrease in market return would suggest worsening market conditions which could be related to increase in credit risk as studied by Pu and Zhao (2008). Similarly Lando and Nielsen (2008) include a proxy of market return in their prediction of default intensity.

CHAPTER 4 Methodology and data description

4.1 A Panel Regression

This paper uses a panel data regression methodology to find the influence of GGB on credit spreads of bank's bonds and CDS premiums. The advantages of panel data include: the study of a broader range of issues (variables) and the analysis of complex problems arising from the differences of bond issues. The generic equation testing panel data is given by:

$$y_{it} = \alpha_i + \beta x_{it} + u_{it} \quad (2)$$

Where y_{it} is the dependant variable, α_i is the intercept term, β is a $k\ x\ 1$ vector of parameters to be estimated on the explanatory variables, and x_{it} is a $1\ x\ k$ vector of observations on the explanatory variables, $t = 1,\ldots..,\ T$; $i = 1,\ldots..,\ N$. In this setting k is defined as the number of slope parameters to be estimated; in addition u_{it} represents a disturbance (error) term of the regression. β Does not have a subscript implying that it is the same for every unit and every time period, variation on the parameters overtime or with some characteristics can be reintroduced by including time dummies or unit dummies. The α_i can be interpreted as the individual effects. When they are treated as intercept terms that vary across units, the model is considered as a fixed *effect* model. Moreover these differences can be assumed to arise from differences in the intercepts across time or cross sectionally. When the α_i are interpreted as components of the disturbance that vary randomly across units, the model receives the name of *random effect* model. Additionally for the random effect model the intercepts for each cross-sectional unit are assumed to arise from a common intercept α (which is the same for all cross-sectional units and over time) plus a random variable ϵ_i that varies cross-sectionally but is constant over time. ϵ_i Measures the random deviation of each entity's intercept term from the "global" intercept term α.

The literature studying credit spreads has traditionally used the fixed effect model. This allows for the differences at each cross sections (in this case bond implied credit spreads and CDS spreads) to be recognized by the model, while having constant slopes. This paper uses the established fixed effect model to address differences at each cross section. Furthermore the basic question regarding which effect to use (fixed or random) boils down to the sample: if the sample can be regarded as being randomly selected then the random effect is appropriated, if the sample can be considered not being random or if it may constitute the entire population then the fixed effect is deemed more plausible. A formal description of the panel techniques is beyond the scope of this paper.

A crucial distinction to draw first is the existence of missing data on the time series of the cross-sections. A balanced panel has the same number of observations for each cross-section unit or the other way around;

the same number of cross-sectional units at each point in time. An unbalanced panel has some missing observation on the structure of the cross-section; as a result for the cross-section units there are missing values for the time series of the cross-section. In other words, all the cross-sections do not have an equally matching number of observations.[9]

4.2 Model Specification

Based on the known determinants of credit spreads and considering the relations found above in Equation (1), the models specified aim at studying the bond implied credit spreads for the first hypothesis to investigate the effect of GGB on other bank bonds. With respect to the second hypothesis the CDS spread is taken as dependant variable. It is possible to look at the effect of the GGB by two ways. First, by taking into consideration a time dummy: this takes the value of 1 from the starting date of the Credit Guarantee Scheme by the DSTA and 0 otherwise. By measuring the impact of GGB in such a way it is possible to account for the news information effect on the market on current traded bank debt. The announcement by the DSTA represented a hard and visible commitment by the Dutch government to guarantee not only the banks in trouble due to liquidity problems, but also to any entity eligible and willing to participate in the scheme, literally the whole Dutch banking sector. Effectively bringing tranquility and helping restoring confidence on the market that the government would stand ready to act in behalf of debt buyers.

Second, as explained in Chapter 2 above: the Credit Guarantee Scheme started with an initial budget of nearly € 200 billion; almost 33 % of the Dutch GDP for 2008. Therefore it can also be investigated whether the increase of the cumulative size of the issued guarantees had a significant effect on the determinants of the credit spreads. Such amount might signal that the guarantees were in place and used by banks massively or on the contrary that it might be considered negative for banks to fall under such a scheme. With hindsight is easy to see that the program was not used to its fullest capacity (as shown in Figure 1 on Chapter 2), but at times of uncertainty could be very plausible that the amount dedicated would not be enough, in which case other issues could arise. In that mindset the cumulative size of the issued guarantees also measure the depletion of the budget and possible conflicts for banks to obtain additional guarantees.

With these two measures of GGB is possible to divide each Hypothesis into two models each with the same credit spreads determinants. With respect to the levels of the determinants I take the three recognized levels in the literature and additionally a bond level in which bond rating is also a determinant of the credit spreads. The tests on the hypothesis are performed including all of the levels. The chosen determinants for

[9] The same techniques can be applied for both types of panel data, statistical packages can automatically account for the missing observations in the case of unbalanced panels.

bank levels are bank size, bank leverage, bank liquidity and bank rating. For the macroeconomic level: GDP, bank lending to private sector, investor sentiment and the inflation rate are selected. Furthermore at the market level the Dutch equity index and the European market equity index for banks are considered important together with the European bond market index as the proxy for market variation on Dutch and international investors trading and influencing debt and equity of the banks issuing debt instruments. Furthermore this paper assumes that no additional effects are present other than the traditional determinants of credit spreads and the variables used to proxy for the effect of the Credit Guarantee Scheme by the DSTA.

To summarize the discussion above the equation representing the first model first hypothesis is:

$$CS_{it} = \alpha_i + \beta_1 \, GGB\ Time\ Dummy + \sum_{i=1}^{N} \beta_2 \, Control\ Variables + u_{it} \quad (3)$$

Here $GGB\ Time\ Dummy$ represents the GGB time dummy. Control variables represent the known determinants for credit spreads. Similarly for the second model first hypothesis the equation testing the effect of the amount of guarantees issued is:

$$CS_{it} = \alpha_i + \beta_1 \, Cum.Guarantees + \sum_{i=1}^{N} \beta_2 \, Control\ Variables + u_{it} \quad (4)$$

Where $Cum.Guarantees$ represents the cumulative GGB issued, such information was made publicly available on the DSTA website, reporting which entity did issue GGB. It was possible to read between the lines, for any amount guaranteed which amount was issued, either the totality of guaranteed or any amount *up – to* the authorized amount by the DSTA.

The test for the first hypothesis could then be performed by a Wald test on the coefficients for the $GGB\ Time\ Dummy$ and $Cum.Guarantees$ variables. More specifically by the rejection of the null of:

$$Ho: \ \beta_1 = 0$$

Against the alternative:

$$H1: \ \beta_1 > 0$$

This test will be performed on both models to highlight the predicted positive effect of GGB by both measures. To test the second hypothesis the same equations are employed but having as a dependant variable the CDS spread:

$$CDS_{it} = \alpha_i + \beta_1 \, GGB\ Time\ Dummy + \sum_{i=1}^{N} \beta_2 \, Control\ Variables + u_{it} \quad (5)$$

The dependant variable is the CDS spread available for the Dutch banks, a more detailed description is given on the next section. The control variables are here the same as in (3) and (4). Rejection of the second hypothesis can then be given by the rejection of the null of:

Versus the alternative:

Similarly to the first hypothesis, the rejection on both models is a necessary condition for the acceptance of the narrowing of CDS spreads as a result of GGB issuance.

4.3 Data Description

Table 2 present the descriptive statistics of the variables included in the study. As can be seen from the table, the sample period comprehends monthly observations from January 2005 until December 2010. Such period includes 72 month-data points that include the widely considered "good" economics times prior to the crisis, the subsequent decline and the ongoing economic recovery. A table of the correlations can be found at Appendix A.

Table 2 Summary Statistics sample January 2005 – December 2010

Summary Statistics. Using panel data from 2005 to 2010, this table summarizes the sample properties of Bond implied Credit Spreads and CDS Spreads. In addition it reports descriptive statistics of the main control variables. Data sources include Thomson Reuters Datastream, Bureau van Dijk Bankscope, Statistics Nederlands, Moody's Investors Service, Bloomberg, Dutch State Treasury Agency, CMA, MSCI Barra and Markit.

Variable	Unit	Mean	Maximum	Minimum	Std. Dev.	Obs.
Bond Credit Spreads	Basis points	98.28	1601.60	-722.20	155.98	4671
CDS Spreads	Basis points	79.57	1412.10	2.50	132.91	5734
Bond Rating Squared	Numeric (Ordinal)	16.23	81.00	1.00	17.95	5500
Bank Size	€ Billions	284.71	1034.69	5.14	291.93	7572
Bank Leverage	Numeric (Ratio)	46.01	119.79	8.29	28.94	7572
Bank Liquidity	Numeric (Ratio)	53.67	205.23	2.41	37.40	7572
Bank Financial Strength Sq.	Numeric (Ordinal)	14.84	81.00	1.00	16.74	7917
Monthly NL GDP Growth	Percentage	0.13	0.61	-0.85	0.33	8928
Monthly NL Bank Lending Growth	Percentage	0.38	1.98	-2.47	0.95	8928
Annual Inflation Rate	Percentage	1.57	3.22	0.19	0.60	8928
Investor Sentiment	Numeric (Index)	-11.65	17.00	-34.00	13.39	8928
AEX Equity Index Return	Percentage	-0.07	10.88	-20.94	6.53	8804
MSCI EMU Banks Equity Index Return	Percentage	-0.78	26.24	-29.25	9.64	8804
iBoxx European Banks Bond Index Return	Percentage	-0.01	2.31	-3.22	0.99	8804
GGB Time Dummy	Numeric (Discrete)	0.36	1.00	0.00	0.48	8928
Cum. Guarantees DSTA	€ Billions	14.64	50.39	0.00	21.65	8928

Cumulative Guarantees Issued by the DSTA is a variable which measures the cumulative value of the issued guarantees. It represents the outstanding amount on GGB issued from the initial budget of € 200 billion. It starts only from December 2008, date on which the first banks completed the process on obtaining GGB by the DSTA. It is interesting to note from the maximum value of € 50.388 billion that the initial budget of € 200 billion was considered more than enough by the banking sector as the total issued amount never reached more than 25% of the assigned budget.

Credit spreads for bonds can be obtained by deducting the respectively risk free bond yield of the closest maturity to each bond issue yield; $(y - r)$ on Equation (1). However the complexity of such calculation increases monotonically as banks also issue international destined MTN's. In the European Union is possible for a bank to trade its debt in several markets. For example Rabobank Debt can be traded on the Euronext Amsterdam exchange, on the Luxemburg Stock Exchange, on The Frankfurt Stock Exchange and on the Italian multilateral trading facility Euro TLX Platform. Such calculation requires knowledge on each bond yield and additionally on the yield of the risk free bond of the closest maturity. Fortunately Datastream provides a benchmark for each of the markets where the bond is traded and it is matched to each bond maturity such that it is possible to obtain the bond credit spread over such a benchmark. If the issued bond is a domestic issue only, then Dutch treasuries are used, if is an international issue then international benchmarks are used. There are some caveats by using each benchmark; to be precise that the spread would not always be over that of the Dutch government debt. Regardless the changes in spreads can still be determined by using the theoretical variables. If we consider bond investors and the way of choosing fixed income investments they most likely would weight a bond issue against a benchmark appropriate of that of their chosen market. For investors active on the Dutch market would make sense to consider a DSTA MTN's whereas an investor active on the Frankfurt exchange and/or Paris, a benchmark based on a basket of risk free French and German bonds would be more suitable. Fortunately the bond spreads over the Datastream calculated benchmark operate in the same fashion and are considered being valid estimators of the credit spreads for the bond issued.

When analyzing bonds the literature agrees in the necessity of using "plain vanilla" bond issues without extra attributes. With respect to the payment structure, those that are of the bullet form. Specifically the bond issues which are not callable, putable, convertible, belonging to structured debt, perpetuities, extendible or belonging to a sinking fund. That means that the payment of the principal depends only on the inherent characteristics of credit risk and not on any structural contract form. Furthermore the bond issues with zero coupon payments are also disqualified from sample since they are found to have an increasing credit spread. Having a constantly increasing credit spread could result as benchmark error. Zero coupon bonds should be matched against a zero coupon benchmark, but this matching is done in Datastream on maturity grounds not on coupon characteristics. Therefore such bonds are excluded.

Information on debt issues where obtained on 865 ISIN codes. The International Security Identification Number (ISIN) provides an easy way to track a security issue and obtain data on the security. Although is not widely used, many information providers include along the CUSIP, SEDOL and their own proprietary identifiers which makes matching the information of several data sources very challenging. For example a typical bond issue resulted from a query by ISIN code on Datastream, would not result on any information with respect to the structure or additional features on the bond issue; making necessary to match the relevant information with data on debt issued by the same entity by other providers that use their own proprietary codes: as in the case of Bloomberg which does gives information on the structure of the MTN's but not on historic spreads making necessary to match the information based on issued amount and issue and maturity date.

Initially 865 ISIN codes where obtained by retrieving the current and new debt issues from 2005 onwards of the top 30 banks in The Netherlands according to Bankscope. That first screening resulted in 11 Dutch banks that issued MTN's and that where eligible to the Credit Guarantee Scheme by holding a Dutch bank permit. Appendix B shows the institutions included in the sample. Additionally information on the credit rating of the 865 ISIN codes (bank bonds) were obtained from Moody's Investors Service, information on the Bank Financial Strength rating on each of the 11 banks was also obtained from Moody's Investors Service website. Of the 865 initial ISIN codes, bond credit spreads were obtained on roughly 230 bond issues; of those bonds screening with respect to the structure (bullet issues), on maturity (debt with a maturity higher than 3 years) and on observations higher than 6 month-data-points where selected, leaving a total of 139 bond issues on 11 bank institutions. This constitutes an unbalanced panel since institutions are represented by a different number of bond issues. Furthermore, for a given bank, bond issues do not match in the time series representing credit spreads. Appendix C provides graphs of the credit spreads and their corresponding ISIN codes.

CDS spreads where found for 5 of the banks included in the sample. Spreads on CDS where obtained from CMA which is a source of independent data on OTC markets. Spreads can be quoted on bid, mid or offer rates. Whereas the bid rate is the quote on which a protection buyer stands ready to buy protection, offer quote is the rate at which a protection seller is willing to sell protection. Differences on offer rates across protection sellers arise from information asymmetries on the entities willing to trade that could arise from selling agency policies, restructuring terms or more complex contract terms [10]. As this paper aims at testing the influence of GGB choosing either is irrelevant for the discussion, therefore the midpoint is retrieved. As explained on Figure 6, CDS quotes can be obtained for senior debt or for subordinated debt; at several maturities aiming to match the maturity of the MNT bought by investors. For this study 5 year senior CDS

[10] Following the conventions of the ISDA, CDS contracts can be enforced upon agreed terms of restructuring by a defaulting company, sometimes include failure to service debt as a restructuring event.

spreads are chosen as they are the most forthcoming in the market ensuring that there exists a higher liquidity for these types of CDS which in turn makes pricing information more accurate and available.

From the statistics on bond and CDS credit spreads it is easy to see great differences on maximum and minimum values, whereas the means and standard deviations of both spreads are very close to each other (means of 92.28 and 79.57 and std. dev. of 155.98 and 132.91 for bond credit spreads and CDS spreads respectively). Maybe the lack of a big gap on credit spreads means and standard deviations contribute to the similarities on credit spreads given by Equation (1) on section 3.2 above. Perhaps in another sample without the volatility resulting from the crisis of credit, those values would be even closer to each other and would follow more closely the theorized relationship resulting from arbitrage. The careful reader will notice on the negative credit spreads of certain bank bonds. Negative credit spreads are the way of the bond market to say that it's safer to lend to banks than to governments. They represent the credit risk of the treasuries where the bonds is traded. Considering the fact that no Italian Banks issued GGB adds validity to this argument. Furthermore the recent instability on governments following the demise of Greece and fears of contagion as Spain, Ireland and Portugal faced pressure on their budget deficits. These economies entered the crisis while being highly leveraged, causing unseen changes in the yields of their securities. At the same time banks are busy decreasing their leverage which in turns decreases default probabilities causing market participant to influence bonds yields accordingly. The fact that government's treasuries are considered "risk free" does not set in stone that their yields have to be lower than those for corporate debt. It would rather mean another feature of an irrational market[11].

Bond Rating Squared is the main credit proxy for bond level. It represents the bond's credit risk by using Moody's bond ratings. Such variable is transformed from their qualitative values to an ordinal quantitative value based on a scale of 1 to 21 matching each of the Moody's ratings. Here 1 equals Aaa, 2 equals Aa1 and so forth. To capture the nonlinear increase in credit risk between consecutive rating groups the squared vales are taken. A similar methodology is used to proxy for the bank credit risk. Moody's Bank Financial Strength Ratings are a measure of the likelihood that a bank will require assistance from third parties such as its owners, its industry group, or official institutions[12]. The ratings represent Moody's opinion of a bank's intrinsic safety and soundness and are given from the categories A till E, with additional "+" or "–" modifiers for ratings below A and above E. By matching numerical values is possible to obtain a scale from 1 to 11 that are also squared following above. The resulting variable is labeled Bank Financial Strength Squared. Such methodology was introduced by Hoven Stohs & Mauer (1996) and is used widely on investigating corporate bond credit spreads; see for example Güntay & Hackbarth (2010). In the sample the minimum value of 1 equals the highest possible rating for bonds and banks; similarly the maximum

[11] http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aYUeBnitz7nU Accessed on 18 February 2011.
[12] Moody's Investors Service. Rating Symbols and Definitions Manual. December 2010

value of 81 reflects a lower boundary on Bond Rating of Baa2 and for the Bank Financial Strength a rating of D by Moody's.

Continuing with the bank level variables, Bank Size represents bank's size measured by total assets at the end of the fiscal year). This variable is given in billions of Euros and continues with this value until there is new information on the bank's annual report. That means that the bank size increase at the end of 2006 will be valid throughout 2007, at this point new information is retrieved from the annual report (which is usually available around March of the next year 2008) and will be used for the next year's first month-data point (January 2008). For the panel regression this variable is normalized by taking the natural logarithms. To measure Bank Leverage, the debt to equity ratio is computed according to the following formula:

$$Bank\ Leverage = \frac{\begin{array}{c} Senior\ \ debt\ maturing\ after\ 1\ yr. + Subordinated\ Borr. + Other\ Funding \\ + Total\ Deposits, Money\ Market\ and\ Shor\ term\ Funding \\ + Derivatives\ and\ Trading\ Liabilities \end{array}}{Total\ Equity}$$

The construction of this ratio is another way to look at the equity funding of the bank balance sheet and its capital adequacy. Here debt represents the total long and short term funding of banks divided by total equity. Such variable measures bank leverage on an increased scale, the higher this value, the more leveraged an institution is and therefore a worst position on capital adequacy: the value of equity is then not enough to catch any increase in debt; implying by this a higher credit spread. Another bank level variable is Bank Liquidity ratio. This ratio looks at what percentage of customer deposits and short term funds could be met if they were to be withdrawn suddenly, the higher this percentage is, the more liquid the bank is and the less vulnerable to a classic bank run the institution would be. The ratio is given by:

$$Bank\ Liquidity = \frac{Liquid\ Assets}{Customer\ Deposits\ \&\ Short\ Term\ Funding} \times 100$$

The relevant data was extracted from the balance sheet items from the Universal Banking Model stated on the database of Bureau van Dijk Bankscope. The above mentioned variables are bank specific variables, in nature different across institutions on the sample, furthermore there is some data missing for institutions that have experienced change in the last times. Specifically ABN AMRO BANK NV which during the sample period went from an independently owned institution, to a subsidiary of a foreign institution, to a bailed out and subsequent nationalized institution absorbing yet another institution in the process (the Dutch assets and operations of Fortis Bank). Such changes bring additional volatility to the asset value of both institutions. Currently all the outstanding debt issued by Fortis is being secured by the new ABN AMRO as well as some of its previous debt issued under the umbrella of THE ROYAL BANK OF

SCOTLAND. A judicious selection of those bond issues have been conducted to ensure that the corresponding outstanding and matured debt are assigned to the rightful institution.

To continue with the macro level variables the values are obtained at quarterly frequency and are subsequently transformed to monthly values by using a cubic spline method of interpolation. They are Monthly GDP and Monthly Bank Lending. GDP represents the Dutch Gross Domestic Product given in billions of Euros at constant prices of the year 2000, seasonally adjusted. Monthly Bank Lending stands for the Dutch Bank lending to the Private sector also in billions of Euros. To illustrate the method of interpolation, Appendix D plots the trend of Dutch GDP. The blue line represents the quarterly values of GDP vs. the red line representing the cubic spline of GDP into monthly values GDPSPLI. While a formal discussion of the techniques employed to the derivation of the cubic spline and the econometric advantages over other methods of interpolation are beyond the scope of this paper, it suffices to say that the cubic spline interpolation method is frequently used in the academy. By using a cubit spline we obtain a smoother version of GDP that adds value on the monthly observations of the credit spreads and we can more precisely account for macro conditions at those month-data points.

Other macro level variables included are the Investor Sentiment, and the Dutch Inflation Rate; these variables are given at monthly frequencies and are obtained from Statistics Netherlands[13]. Investor sentiment is proxied by the monthly Dutch CBS consumer confidence survey index seasonally adjusted. The Inflation Rate is the annual rate deduced form the Dutch Consumer Price Index.

For market level variables the market returns are proxied by taking the differences in natural logarithms on the price index of the Dutch equity market AEX, the price index of the MSCI EMU commercial banks equity benchmark which takes the commercial banks in the European Monetary Union compiled by MSCI Barra. Finally the market return on fixed income is captured by the iBoxx bond index on senior debt of European banks compiled by Markit. These variables are also obtained at monthly frequencies and their graphs can be found on Appendix E.

[13] Statistics Netherlands is the English name of the Centraal Bureau voor de Statistiek (CBS) which is the entity in charge of collecting, administering and publishing Dutch Statistics.

CHAPTER 5 Statistical Tests and Discussion

5.1 Panel Regression Results

This section describes the empirical results from the mentioned hypothesis in section 3.2; Table 3 explores the effect of the Credit Guarantee Scheme on the similar MTN's of banks. Table 4 focuses on the second hypothesis, it center the study on CDS credit spreads.

Table 3 Results on Bond Implied Credit Spreads

Structural determinants of Bond implied credit spreads. Using panel data from 2005 to 2010, we regress monthly Bond implied credit spreads of 124 non Government Guaranteed Bond issues against the variables listed below. All regressions are panel OLS models with fixed effects at the cross sections. A redundant fixed effect test is performed below each regression. Models (1) and (2) correspond to equations 3 and 4 respectively.

Variable	(1)			(2)		
	Coefficient		Std. Error	Coefficient		Std. Error
Constant	-269.89	***	93.01	-416.76	***	94.49
	-2.90			-4.41		
Bond Rating Squared	5.48	***	0.43	5.71	***	0.44
	12.77			13.11		
Ln Bank Size	60.15	***	18.69	103.41	***	18.93
	3.22			5.46		
Bank Leverage	-0.37	**	0.15	-0.68	***	0.15
	-2.51			-4.46		
Bank Liquidity	-0.62	***	0.11	-0.84	***	0.12
	-5.52			-7.30		
Bank Financial Strength Sq.	-1.19	***	0.28	-0.78	***	0.28
	-4.31			-2.79		
Monthly NL GDP Growth	-91.22	***	7.26	-119.11	***	6.75
	-12.56			-17.64		
Monthly NL Bank Lending Growth	-3.83	**	1.66	-6.42	***	1.66
	-2.30			-3.87		
Investor Sentiment	-0.27		0.20	-0.66	***	0.20
	-1.38			-3.38		
Annual Inflation Rate	19.12	***	4.08	1.62		3.84
	4.69			0.42		
AEX Equity Index Return	-2.40	***	0.44	-1.80	***	0.44
	-5.50			-4.10		
MSCI EMU Banks Equity Index Return	0.91	***	0.26	0.35		0.26
	3.47			1.36		
iBoxx European Banks Bond Index Return	3.86	**	1.74	6.24	***	1.77
	2.22			3.53		
GGB Time Dummy	70.07	***	7.58			
	9.24					
Cum. Guarantees DSTA				0.47	***	0.15
				3.21		
R-Squared	0.64			0.63		
Redundant Fixed Effects Tests						
Effects Test	**Statistic**	**Prob.**	**d.f.**	**Statistic**	**Prob.**	**d.f.**
Cross-section F	19.99	0	(123,3817)	20.17	0	(123,3817)
Cross-section Chi-square	1966.31	0	123	1979.87	0	123

Notes: t-statistics below the coefficients; *, ** and *** denote significance at the 10%, 5% and 1% levels respectively. Empty cells occur when a particular variable is not included in a regression.

In Table 3 is easy to see how both measures of the Credit Guarantee Scheme influenced positively Bond implied credit spreads. These regressions use a fixed effect at the cross sections. As mentioned earlier, the literature uses consistently the fixed effect model to encapsulate all the variables that affect the credit spreads cross-sectionally but that do not vary over time. To recognize whether or not the fixed effects are necessary or not, we run a redundant fixed effect test. Such a test evaluates the joint significance of the fixed effects by restricting the cross-section fixed effects to zero both in the *Chi-square* and in the *F-test* version, a value of zero for the p-value would indicate that the effects are significant and a value of 1 would indicate that a normal pooled regression could be employed. From the results of such a test for both models (1) and (2) we conclude that the fixed effect is significant and that pooled regressions do not apply.

Here the regressions correspond to all MTN's in sample with the only exception of GGB; all covered, senior and subordinated, with fixed and floating coupons and all maturities bonds are included. In both models our measures of the Credit Guarantee Scheme are statistically significant, the time dummy at better than 1% and the cumulative issuance also at 1% (t-ratios of 9.24 and 23.21 respectively). This means that by solely using a time dummy for the credit guaranteed issuance (which encapsulates the information content of the announcement of the DSTA), credit spreads increased by 70.07 basis points per month. But when accounting for the monthly cumulative GGB issued (which represents the actual issuance pattern per month) this increase is barely 0.47 basis points per month; this means that by each cumulative billion of GGB issued, credit spreads on all the other instruments traded increased by 0.47 per month which translates into an annualized increase of 5.78 basis points per year.[14] To put this result in perspective, a cumulative issued amount on GGB of € 10 billion reached by the end of the second month of the Credit Guarantee Scheme increased credit spreads of other MTNS by 4.7 basis points. This is consistent with the first hypothesis: by issuing GGB other bonds are considered more risky by the market according to their credit spreads and certainly in times of high uncertainty; this is reflected in the increase of the credit spreads measured by the Cumulative Guarantees DSTA variable. Several factors influence this result: as mentioned earlier and as is visible from the Cumulative Guarantees DSTA graph on Appendix E, guaranteed issuance stabilized at the end of 2009 which shows in the data sample by a decreased influence with respect to the time dummy, that is the reason why both coefficients are of different value. Furthermore by having positive significant coefficients on both relevant variables we can reject the null for the first hypothesis; credit spreads on bank bonds on the same markets that issued GGB increased the more GGB were issued, GGB increased credit spreads after accounting for bond, bank, macro and market conditions. Below we discuss their separate effect.

Bond Rating is positive and significant for both models; this means that as this value increases (the lower the rating) the higher the credit spread becomes as much as 5.71 basis points for the second model. This is

[14] Starting from the monthly value that is considered equal per year, the annual value is then given by:

$$5.78\ bp = ((1 + 0.0047)^{12} - 1)$$

consistent with the literature. Since bond ratings are considered a proxy for the bond credit risk, it should hold for all MTN's that obtain a rating from the mainstream agencies. Such rating measures the counterparty risk embedded in the bond issue: a lower rating means a higher default probability, hence a higher credit spread observed in the sample. As a result of the crisis of credit, concerns regarding banks solvency impacted market participants pricing banks bond accordingly. Furthermore as concerns regarding financial positions of banks, liquidity was affected: valuations became scarce for some markets or stopped altogether; as a consequence for rating agencies it became very difficult to evaluate this risk. As anecdotal evidence in the data sample is clear to see how Moody's on February 2007 upgraded the ratings from virtually all bank bonds only to downgrade them all 2 months later even by two full categories for some banks. This adds evidence to the questionable added value of the rating agencies and their role in the past crisis, at least for the bonds in sample their effect is shown as predicted by their definition, negative changes in the bond rating have had an increasing effect on bond implied credit spreads.

At the bank level, Bank Size is also positive and significant for both models, with coefficients of 60.15 and 103.41 for (1) and (2) respectively. This variable takes the Natural Logarithm of bank size to normalize the differences across banks size-wise. The positive coefficients provide evidence that bank size was also a contributing factor of bond implied credit spreads during the crisis. The larger the bank is the higher the risk of default as measured by bond implied credit spreads. Certainly this also speaks of fear of systemic risk in the banking industry in The Netherlands. The larger the bank is, the more likely to be connected to other institutions. The case of ING Group NV illustrates this point.[15] In 2009 ING Group had to make a deal with the European Commission on Banking Supervision to be allowed participation in the measures taken to counter the crisis of credit. ING BANK NV is part of ING Group NV which until December 2010 included banking and insuring operations. ING Group NV had to divest its insurance business units in order to gain approval of the European Commission for bailout including the DSTA Guarantees and the transfer of € 21.6 billion of U.S. mortgage assets.[16] The decision to limit the size of the group is inherent to the characteristics of linkages in the banking industry which is directly related to systemic risk. Bank size could then be seen as a proxy for systemic risk, which affects credit risk positively. Other proxies for credit risk include bank's leverage and liquidity ratios. Economic intuition dictates that higher leverage ratios influence credit spreads positively, the more leverage the more likely that the bank defaults on its debt obligations, creating bigger gap in the difference between bank's MTN's yields and the risk free yield. However this reasoning is not supported in the sample. Bank leverage has a negative coefficient, significant at the 5% level of -0.37 for model (1) and -0.68 significant at the 1% level for model (2). Nevertheless if higher leverage comes at the expense of government's guarantees then this effect very well might shift in the opposite direction. From Figure 3 is possible to see that some entities issued considerable amounts on GGB: LeasePlan Corp. NV almost its totality of 2009 funding and ING and NIBC by close to

[15] http://www.ing.com/group/showdoc.jsp?docid=417610_EN Accessed 16 March 2011.
[16] http://www.bloomberg.com/news/2010-12-01/ing-says-banking-insurance-separation-on-schedule-update1-.html Accessed 16 March 2011.

30%. Bank Liquidity is economically and statically significant negative for both models confirming the fact that liquidity is a valid determinant of credit spreads. Higher liquidity ratios mean better positions to meet short run demands (as a run on the institution) that can avoid solvency concerns, thus decreasing credit spreads. This arguments is also valid on the CDS case in which according to the regulations of the ISDA, failure to comply with due payments could trigger a CDS settlement. Bank Financial Strength has a negative significant coefficients in both models (-1,19 and -0.78 at the 1% level). A negative coefficient on this variable means that a decrease in Bank's financial strength given by Moody's affects bond credit spreads negatively, higher values on this variable indicate a lower rating, hence a negative value induces credit spreads to decrease. This effect should be of the same sign as the bond rating given that lower rating is considered a bad signal that affects defaults probabilities; again this effect is not supported in the sample for bond implied credit spreads.

Macro variables are consistent with the literature, for the Dutch case the crisis slowed economic growth and the lending to private sector by banks. Furthermore as both measures are an indicator of economic conditions an increase in welfare decreases the credit risk of the senior unsecured debt traded in the market. Both variables are negative significant in both models. A one percent increase in Monthly GDP Growth lowers credit spreads by 119.11 basis points for the second model, it is important to note that Monthly GDP Growth of 1% is highly unlikely; the maximum reported rate is of 0.61%. This adds evidence to the rationale of credit spreads decrease during economic upturns. Investor Sentiment is a measure that targets consumers, is only significant in the second model, at better than 1% level (t-ratio of -3.38). It has a coefficient of -0.66; as investor confidence increases, it decreases credit spreads. Inflation Rate is also a measure of economic activity but it is found to be a not significant determinant for the second model, by using the Cumulative Guarantees by the DSTA. The excessively increase of prices is a negative signal for the economy; as such an increase in the inflation rates of 1% results in an increase of bond implied credit spreads of 19.12 basis points for the model when the information content of the DSTA announcement is used. From the descriptive statistics of the variables we can see that the maximum value for the inflation rate throughout the sample period was in the order of 3.22%, this means that in that month bond implied credit spreads increased by almost 61.56 basis points just for the increase in the price level. However this effect is not significant by quantifying the influence of the Credit Guarantee Scheme by the cumulative guarantees issued.

Market level variables show a small degree of variability across models. Given that the correlation between the equity indices returns is the highest of the sample (0.82), we would expect them to have the same effect on credit spreads across models; however this is not the case. Note that for the first model the MSCI EMU Banks Equity Index return is positive and significant meaning that when the market return for EMU Bank's equity is high, credit spreads of Dutch bank bonds increase. This has to do probably with competitions effects, if EMU bank's stock price is appreciating then the bank might seem in a favorable position to other investors. Market valuation of peer banks might make investor to prefer bond issues of

those banks, especially after an event of flight to quality which influences bond yields resulting in higher credit spreads. This effect has not been explored in the literature and dedicated research is needed to disentangle this effect. On the other hand the Market return proxied by the Dutch equity index AEX is an indirect measure of economic conditions, when market return is high Bond implied credit spreads decrease. In the sample this effect is significant for both models at the 1% level (coefficients of -2.40 and -1.80 for the (1) and (2) respectively). The coefficients for the return on the iBoxx index of senior debt of European commercial banks are positive significant in both models. This means that higher return on the bond index increases credit spreads of Dutch banks bond implied credit spreads. The effect of this variable has not been explored in the literature and provides grounds for further research on this topic. A possible interpretation could arise from the effect of the risk return relationship. A higher return is frequently related to a higher risk; by introducing a concept of risk that links this risk to default probability proxied by credit risk, then the positive significant result from the first model is to be expected, higher risk implies a higher credit spread of the bonds currently in the market.

Table 4 below provides the results of CDS credit spreads. 5 year senior CDS contracts are used as they are the most forthcoming in the literature. Similarly as the previous result, fixed effect at the cross-sections are implemented and tested for; the results from the p-value provides evidence that the effects are significant and that a normal pooled regression does not apply. With respect to the second hypothesis, the coefficients of both measures of the Credit Guarantee Scheme are of the predicted sign meaning that the measures by the DSTA did decrease CDS credit spreads, however these results are not conclusive since they are found to be not statistically significant. Nevertheless this still provides evidence of a probable reduction on the CDS spreads as a result of government measures against the crisis of credit. Perhaps in another country this effect is more evident.

For CDS spreads the effect of Bond rating is the opposite of on Bond implied credit spreads. Here the coefficients are negative and significant at the 5% level for both models. This entails that as bond ratings deteriorate, CDS spreads decrease by 13.61 basis points for (1) and 12.96 for (2). The theoretical relationship between credit spreads and ratings is difficult to determine, bond ratings is a proxy for credit risk, it captures both default risk and recovery risk; however it depends on the proprietary evaluation methods employed by each rating agency and are assigned at their discretion. It becomes then very difficult to evaluate the result on the regression, according to the literature a lowering of the credit rating would imply an increase of default probabilities and hence higher credit spreads; it is strange then that in the sample this effect is the opposite. This result could be influenced by the sample in itself, as previously mentioned the bond rating collected belongs to the publicly traded bonds and not to those bonds held to maturity by institutions and this could lead to selection bias. It very well might be that bonds with highest ratings are held and those with lower ratings are changing hands more often and hence those are the ones which ratings are considered at the bond level, furthermore the CDS spreads considered are those of the

contracts on senior 5 year debt while the bond ratings belong to all the MTN's in sample. The discussion section below elaborates on this issue.

Table 4 Results on CDS Credit Spreads

Structural determinants of Credit Default Swaps spread. Using panel data from 2005 to 2010, we regress monthly 5 year CDS spreads of 6 Dutch Banks (ABN AMRO BANK NV, AEGON BANK NV, ING BANK NV, NIBC BANK NV, RABOBANK and SNS BANK NV) against the variables listed below. All regressions are panel OLS models with fixed effects at the cross sections. A redundant fixed effect test is performed below each regression. Models (1) and (2) correspond to equations 5 and 6 respectively.

Variable	(1)			(2)		
	Coefficient		Std. Error	Coefficient		Std. Error
Constant	8781.81	***	2569.48	8412.06	***	2597.29
	3.42			3.24		
Bond Rating Squared	-13.61	**	6.15	-12.96	**	6.08
	-2.21			-2.13		
Ln Bank Size	-1853.05	***	541.47	-1773.73	***	549.08
	-3.42			-3.23		
Bank Leverage	4.01	**	2.03	3.29		2.26
	1.98			1.46		
Bank Liquidity	4.63	***	1.89	4.30	**	1.92
	2.46			2.24		
Bank Financial Strength Sq.	28.89	***	6.59	29.40	***	6.61
	4.38			4.45		
Monthly NL GDP Growth	-367.78	***	78.02	-328.00	***	67.99
	-4.71			-4.82		
Monthly NL Bank Lending Growth	45.95	***	15.80	45.37	***	15.57
	2.91			2.91		
Investor Sentiment	-11.77	***	2.90	-11.47	***	2.75
	-4.06			-4.18		
Annual Inflation Rate	-41.32		51.10	-39.35		40.90
	-0.81			-0.96		
AEX Equity Index Return	-3.66		4.11	-3.75		4.10
	-0.89			-0.92		
MSCI EMU Banks Equity Index Return	2.77		2.36	3.29		2.39
	1.17			1.38		
iBoxx European Banks Bond Index Return	25.02		18.61	19.85		17.18
	1.34			1.16		
GGB Time Dummy	-71.19		114.66			
	-0.62					
Cum. Guarantees DSTA				-1.95		2.06
				-0.95		
R-Squared	0.73			0.74		
Redundant Fixed Effects Tests						
Effects Test	**Statistic**	**Prob.**	**d.f.**	**Statistic**	**Prob.**	**d.f.**
Cross-section F	2.61	0.01	(8,153)	2.30	0.02	(8,153)
Cross-section Chi-square	22.39	0.00	8	19.88	0.01	8

Notes: t-statistics below the coefficients; *, ** and *** denote significance at the 10%, 5% and 1% levels respectively. Empty cells occur when a particular variable is not included in a regression.

When analyzing the bank level variables, Banks size stands out with its large negative coefficient, which is significant at the 1% level for both models. This means that in the sample, bank size affects negatively CDS spreads. This is in line with Völz and Wedow (2009), they explored the effect of bank size and CDS spreads under the light of the too-big-to-fail (TBTF) problem. This arises when bank creditors expect

government interventions of a large institution in times of financial instability, the expectations reduces the incentives to apply sound market discipline on the institutions and therefore allows managers to pursue riskier strategies which ultimately increase the overall risk in the financial system. The collapse of a larger institution can further trigger failures trough contagion and loss of investor confidence. Following Völz and Wedow (2009) TBTF is represented in the sample by the distortions in CDS price (the CDS spread) due to a size effect when investors expect a public bail out as a result of TBTF; hence the negative effect on CDS spreads. Bank Leverage is found be of the expected sign, a higher leverage is related to a higher default probability therefore A high leverage ratio influences positively the price of insurance against default. Unfortunately this is not totally supported on the second model due perhaps as explained above; more leverage influenced by GGB might render the significance of this variable useless. By looking at the liquidity variable we found a positive effect, this could be influenced by the sample period, by looking at the crisis and ongoing managing of it, CDS spreads have increased significantly and in ways that are far from the traditional spreads determinants. Liquidity is a variable that should decrease CDS spreads as more liquidity held equal a higher capacity to meet short term creditor demands, which traditionally would help the bank against a classic run on the institution. The increase on the CDS spread is then a puzzle in this context. To finish with bank level variables, Bank rating is of the excepted sign and significant at the 1% level for both models which is consistent with the empirical determinants of CDS spreads.

With respect to macro level variables; GDP growth rate and Investor sentiment are significant and consistent with the literature with respect to their negative sign, predicting a decrease on CDS spreads as economic conditions improve. Bank Lending to the private sector on the other hand is positive significant at the 1% level. The effect of Bank lending on CDS premiums has not been explored before in the literature but it adds value to the relevance of banks and the real economy. After the failure of Lehman Brothers in September 2008 there was a short term lack of liquidity for banks making a challenge for banks to roll over their short-term debt which led them to scale back their lending, spilling over the effect of the financial crisis on to Main Street. This also adds significance to systemic risk. As lines of credit for non financial companies dry-up, they face constrains in their normal operations and as a result struggle to find means to fund their short-term commitments. Ivashina and Scharfstein (2010) conclude that bank lending during the financial crisis of 2008 fell by 47% during the fourth quarter of 2008 relative to the prior quarter and that in the US this effect was exacerbated for banks that had their credit lines co-syndicated with Lehman Brothers, decreasing their bank lending even further. For CDS spreads this means that banks lost a source of interest income as credit lines and lending was scaled down, and as a result the valuation of the banks might experience a decrease influencing a higher default probability of default; for a given level of leverage there is now a lower level of future cash flows from interest income activities which translates in a high premium for insurance against default. This is represented in the positive coefficient for both models of 45.95 and 45.37 basis points respectively for both models. The fact that these coefficients are virtually identical adds validity to the influence of Bank Lending irrespective of government aid.

Market level variables are found not statistically significant in the sample but exhibit the similar sign of influence on Bond Implied credit spreads. This is important as it implies that equation (1) above could be used to treat both CDS spreads and Bond Implied credit spreads as equal proxies for credit risk. The following section elaborates on this issue.

5.2 Discussion

The most important implication of the results is that credit spreads for bonds and CDS are consistent with the literature. By assuming that equation (1) holds, the results for models (1) and (2) of the first hypothesis yield the effect of the Credit Guarantee Scheme on Dutch MTN's. This combined result provide evidence to support the first hypothesis, the issuance of government guaranteed debt did increase bond implied credit spreads, therefore crowding out this instruments from the Dutch market. As an immediate response from the crisis a flight to safety is reflected on an increased demand for government treasuries. In this case, for a given return paid by banks on their debt instruments, a new debt type arises featuring a risk similar to that of government bonds; this changes naturally the market perceptions of the debt markets and the mechanisms to hedge against default on the same markets. Such characteristic is already enough to make it more desirable for investors. Economically when agents realize that a new instrument exists that can be regarded as an alternative to governments bonds with respect to its credit risk, but that trades and pays coupons are on par with traditional bonds, substitutability arises. For a given bond issue of a bank, investors will now look at the new fixed income universe creating an additional demand for the new instrument (GGB); decreasing the attractiveness of traditional bonds and depressing the mechanisms involved in the trading and pricing of such instruments which ultimately results in an increase on credit spreads after controlling for other variables. This effect is especially severe when the crisis creates a lack of liquidity for such instruments. As it was the case of what is happening in the recovery after the crisis of credit, it highlights the fact that even when investors' appetite for risk is back; GGB still has a positive effect of other MTN's credit spreads.

To better understand the effect of GGB we proceed to break up the sample on bond types, first we look at bond seniority and later at coupon payments. We follow the analysis employing the same determinants to establish which instruments are the ones who felt crowding out the most. Table 5 below provides segmentation between senior debt and subordinated debt issues, from figure 6 we can appreciate that GGB felt under the senior debt asset class, it is therefore to be expected that their influence crowded out these instruments most than other debt issues.

Models (1) and (2) correspond to equations 3 and 4 on page 22, and represent the panel regressions on senior bond issues. Models (3) and (4) also correspond to equations 3 and 4 but for subordinated bond issues.

Table 5 Senior bond vs. Subordinated bond Issues

Structural determinants of Bond implied credit spreads. Using panel data from 2005 to 2010, we regress monthly bond implied credit spreads of 97 senior non Government Guaranteed Bond issues (1) and (2); 6 subordinated non Government Guaranteed Bond issues (3) and (4) against the variables listed below. All regressions are panel OLS models with fixed effects at the cross sections. Models (1) and (3) correspond to equation 3 and models (2) and (4) correspond to equation 4.

Variable	(1)		(2)		(3)		(4)	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Constant	-11.39	104.75	-147.40	106.15	-807.18 ***	265.25	-920.21 ***	339.95
	-0.11		-1.39		-3.04		-2.71	
Bond Rating Squared	6.50 ***	0.49	6.74 ***	0.50	-2.51 ***	0.94	-4.23 ***	1.20
	13.15		13.49		-2.67		-3.52	
Ln Bank Size	13.30	21.28	55.25 **	21.52	129.09 ***	48.01	182.69 ***	62.62
	0.63		2.57		2.69		2.92	
Bank Leverage	-0.64 ***	0.16	-0.94 ***	0.17	2.93 **	1.21	2.46	1.61
	-3.95		-5.65		2.41		1.53	
Bank Liquidity	-0.84 ***	0.13	-1.06 ***	0.13	4.15 *	2.20	1.12	2.91
	-6.50		-8.09		1.89		0.38	
Bank Financial Strength Sq.	-2.02 ***	0.31	-1.65 ***	0.32	-6.11 ***	1.50	-0.16	1.84
	-6.46		-5.23		-4.08		-0.09	
Monthly NL GDP Growth	-94.81 ***	8.31	-119.31 ***	7.63	-76.41 ***	16.15	-196.03 ***	20.18
	-11.41		-15.64		-4.73		-9.71	
Monthly NL Bank Lending Growth	-5.18 ***	1.93	-7.76 ***	1.92	2.38	3.89	-7.99 *	4.78
	-2.69		-4.05		0.61		-1.67	
Investor Sentiment	-0.06	0.22	-0.43 *	0.22	-1.22 ***	0.44	-2.28 ***	0.55
	-0.28		-1.94		-2.77		-4.17	
Annual Inflation Rate	19.58 ***	4.71	2.23	4.44	8.42	10.14	-42.65 ***	11.77
	4.16		0.50		0.83		-3.62	
AEX Equity Index Return	-2.44 ***	0.50	-1.86 ***	0.50	-3.17 ***	0.94	-1.65	1.18
	-4.90		-3.74		-3.37		-1.40	
MSCI EMU Banks Equity Index Return	0.87 ***	0.30	0.39	0.29	2.76 ***	0.61	-0.04	0.75
	2.91		1.35		4.53		-0.05	
iBoxx European Banks Bond Index Return	5.14 ***	1.99	6.96 ***	2.02	-15.74 ***	3.94	1.76	4.73
	2.58		3.45		-4.00		0.37	
GGB Time Dummy	59.74 ***	8.56			393.25 ***	28.31		
	6.98				13.89			
Cum. Guarantees DSTA			0.29 *	0.17			4.06 ***	0.79
			1.75				5.12	
R-Squared	0.62		0.62		0.91		0.86	

Notes: t-statistics below the coefficients; *, ** and *** denote significance at the 10%, 5% and 1% levels respectively. Empty cells occur when a particular variable is not included in a regression.

There are quite a few striking results, first and foremost there is evidence supporting the first hypothesis as for both types of assets in both models there are positive significant coefficients. Both types underwent an increase in their credit spreads as consequence of the introduction of the GGB. It seems that there was a crowding out of subordinated bonds as their implied credit spread increased the most with respect to senior bond issues, with significant coefficients at the 1% level. This increase in the bond implied credit spreads is of larger magnitude than as established in table 3, in the order of 4.06 basis points for the second model, if we assume this level to keep constant during the year would yield an increase of 61.21 basis points per year for each billion of the cumulative guarantees issued. This result is notably higher than for senior bonds which is only significant at the 10% level, and yields an increase per year of 3.56 basis points. In table 3 the value for this variable was of 0.47 basis points which correspond to an annualized form of 5.78 basis points. Thus senior bonds experienced an increase in credit spreads of less severity than subordinated bonds after accounting for the established control variables. We proceed now to discuss them separately.

Bond Rating is significant at the 1% level across the board; however this influence is positive for senior bonds and negative for subordinated bonds issues. This leads us to believe that the information content of bond ratings holds for senior bonds; a bond downgrade is quantified by an increase in this variable, hence as this variable increases (a decrease in bond ratings) it makes senior bond implied credit spreads increase,

capturing in this manner the decrease in credit-worthiness of the bond issue. This effect of ratings should also hold on influencing credit spreads of all traded MTN's, it is then strange that for subordinated bonds it is the opposite; as ratings decrease, credit spreads for subordinated bonds decrease.

Bank size is positive significant for all models expect for model (1), which represents the information content of the Credit Guarantee Scheme of senior bond issues. This adds evidence that bank size increase bond implied credit spreads as established in Table 3. Bank size is particularly important for subordinated bond issues, note that in models (3) and (4) the coefficients are larger than for models (1) and (2) meaning that size increase credit spreads more for subordinated bond than for senior bond issues. Assuming that an increase in size comes in the short run by an increase in borrowing to fund banks operations (an assumption not too far from reality) is to be expected that credit spreads of subordinated bond issues increase more than for senior bonds of the same institution. In the event of default senior bond holders have a claim above that of subordinated bond holders and that characteristic makes credit spreads of subordinated debt increase by decreasing the expected recovery rates on subordinated bond issues. This characteristic is present in the analysis on the next bank level variables. Bank Leverage is negative and significant for senior bonds, as in Table 3 the causal relationship is attributed to the increase in leverage by GGB of banks using the DSTA Credit Guarantee Scheme, more GGB leverage decreases senior bond implied credit spreads. Bank Liquidity is negative and also significant at the 1% level for senior bonds, a result in line with the traditional determinants of credit spreads. There is no statistical evidence in the sample data to conclude on these variables for subordinated bond issues, but the positive signs suggest a possible positive leverage effect and liquidity effect. More research is needed to conclude on this asset class. Finally Bank Rating is significant negative across the board except for model (4). The negative sign leads us to conclude that this effect is unclear, again economic intuition suggest that as bank ratings decrease, bond implied credit spreads should increase in a similar fashion as Bond Ratings especially when both variables behave in similar ways. Finally two of the variables that are supported by the literature on credit spreads are also supported in the sample data; GDP growth and the Market equity return (AEX return) are of the expected sign and are all significant with the exception of the Dutch equity return for model (4).

We now turn to Table 6 below which shows the breakup of the sample in coupon rates. Coupon rates are interesting because they influence yields differently. A fixed coupon rate indicates that the bond trades with a known specified coupon payment beforehand in all states of the economy -ceteris paribus-, whereas floating coupons depend on an additional percentage (spread) over a benchmark. Changes in this benchmark could affect floating bonds and influence changes with respect to an otherwise similarly fixed coupon bond issue. This characteristic adds an additional external factor compared to fixed coupon bonds that make yields and therefore credit spreads different from each other.

Table 6 Fixed coupons vs. Floating coupons bond Issues

Structural determinants of Bond implied credit spreads. Using panel data from 2005 to 2010, we regress monthly bond implied credit spreads of 74 fixed coupon non Government Guaranteed Bond issues (1) and (2); 29 floating coupon non Government Guaranteed Bond issues (3) and (4) against the variables listed below. All regressions are panel OLS models with fixed effects at the cross sections. Models (1) and (3) correspond to equation 3 and models (2) and (4) correspond to equation 4.

Variable	(1)		(2)		(3)		(4)	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Constant	-617.93 ***	73.88	-673.74 ***	75.92	-77.81	224.46	-411.04 *	228.64
	-8.36		-8.87		-0.35		-1.80	
Bond Rating Squared	-1.97 ***	0.43	-2.02 ***	0.45	5.51 ***	0.96	6.03 ***	0.97
	-4.60		-4.53		5.73		6.19	
Ln Bank Size	105.73 ***	14.37	125.59 ***	14.75	43.71	48.68	134.90 ***	49.13
	7.36		8.51		0.90		2.75	
Bank Leverage	1.06 ***	0.11	0.99 ***	0.12	-0.47	0.51	-1.07 **	0.51
	9.56		8.38		-0.92		-2.09	
Bank Liquidity	1.00 ***	0.09	0.93 ***	0.10	-3.77 ***	0.36	-4.00 ***	0.36
	10.78		9.47		-10.39		-10.99	
Bank Financial Strength Sq.	3.20 ***	0.25	3.39 ***	0.26	-3.00 ***	0.63	-1.99 ***	0.64
	12.69		13.16		-4.79		-3.13	
Monthly NL GDP Growth	-45.56 ***	5.25	-88.26 ***	4.88	-175.03 ***	23.09	-208.53 ***	21.08
	-8.68		-18.10		-7.58		-9.89	
Monthly NL Bank Lending Growth	0.16	1.22	-2.07 *	1.23	-12.61 **	5.20	-16.84 ***	5.18
	0.13		-1.68		-2.43		-3.25	
Investor Sentiment	-1.02 ***	0.14	-1.28 ***	0.14	0.08	0.61	-0.96	0.61
	-7.25		-9.03		0.13		-1.58	
Annual Inflation Rate	4.19	2.93	-7.97 ***	2.81	74.33 ***	13.31	36.31 ***	12.50
	1.43		-2.84		5.58		2.90	
AEX Equity Index Return	-1.50 ***	0.31	-1.09 ***	0.32	-4.29 ***	1.36	-2.93 **	1.36
	-4.79		-3.40		-3.14		-2.15	
MSCI EMU Banks Equity Index Return	1.15 ***	0.19	0.39 **	0.19	0.38	0.82	-0.31	0.80
	6.10		2.09		0.46		-0.39	
iBoxx European Banks Bond Index Return	-1.00	1.26	3.90 ***	1.29	12.43 **	5.45	13.50 **	5.53
	-0.79		3.02		2.28		2.44	
GGB Time Dummy	101.18 ***	5.52			84.28 ***	24.11		
	18.33				3.50			
Cum. Guarantees DSTA			1.53 ***	0.11			-0.38	0.46
			13.88				-0.81	
R-Squared	0.79		0.78		0.67		0.67	

Notes: t-statistics below the coefficients; *, ** and *** denote significance at the 10%, 5% and 1% levels respectively. Empty cells occur when a particular variable is not included in a regression.

Again on this table is easy to see how the Credit Guarantee Scheme influenced positively bond implied credit spreads regardless of coupon payment structure. The coefficients are positive significant at the 1% level for both the Time Dummy and the Cumulative Guarantees DSTA variables for fixed coupon bond issues and for floating bonds only the Time dummy is positive significant at the 1% level. This adds up to the evidence of crowding out by GGB on other banks' MTN's. Here Bond Rating is significant at the 1% level for all models. For fixed coupon bonds it has a negative effect, being at odds with the literature, floating coupon bonds on the contrary show consistency in the positive sign. This means for the sample data that floating coupons experience an increase of bond implied credit spreads as ratings deteriorate and this effect is found to be opposite for fixed coupons, which experience a decrease of bond implied credit spreads as ratings decrease.

On Table 6 is easy to see that Bank Size has a similar effect as in table 5. It has a positive significant effect at the 1% level expect for model (3). This mean that regardless of coupon structure Bank Size positively influences bond implied credit spreads, the bigger the bank is the more credit risk their obligations entails. Following with bank level variables, Bank Leverage is found to have a positive effect on fixed coupon bond credit spreads at the 1% significance level. The effect is negative for floating coupon bond credit spreads which is only significant for the (4) model. Contrary to this, Bank Liquidity is of the expected sign

and significant for floating coupon bonds and of the wrong sign and significant for fixed coupon bond issues. This constitutes a puzzle since as in Table 5 leverage should affect positively bond implied credit spreads, but here the same argument applies: if higher leverage comes at the expense of GGB then the influence of high leverage becomes unclear. Bank Liquidity on the other hand should have a negative sign irrespective of the model employed and of the type of asset or even the type of interest payments. When proxying credit risk and expected default loss, a higher ratio of assets held to meet short term liquidity should lead to a decrease on short term credit risk, therefore reflecting a decrease in bond implied credit spreads. Similarly to this, is the effect of Bank Rating for fixed coupon bonds: it is found to be positive and significant at the 1% level whereas for floating coupon bonds the coefficient is negative significant. Currently the author is not aware of any study that targets this issue, undoubtedly more research is needed as to establish why this is the case.

GDP growth and Market equity return appear with the predicted signs and are both significant at the 1% level for all the models. Investor Sentiment is significant at the 1% level and of the predicted sign only for fixed coupon bond issues. This means that fixed coupon bonds credit spread changes are subject to the outlook of the economy as expressed by investor's views it seems a bit strange that this effect is not supported for floating coupon bonds, since their coupon payments are subject to interest rates that change with the economy. This ability is said to shield floating bond holders against changes in interest rates which might explain why Investor Sentiment is not significant for floating coupon bonds.

One type of MTN's similar to the GGB that has the same level in ratings is the Covered Bond. By the high quality of the pool of assets backing this type of security, Covered Bonds frequently gain the highest rating, making them similar to GGB in terms of riskiness. Credit spreads of covered bonds are considered to be determined by the characteristics of the cover pool of assets, rather than by the usual determinants of bonds implied credit spreads. This characteristic makes them suitable for the next discussion. Table 7 shows the effect of the Credit Guarantee Scheme on Dutch Covered Bond issues. For once it is refreshing to see how the determinants of credit spreads hold with their corresponding predicted sign and are economically and statistically significant. The only exception is again Bank Leverage; indeed seems that the Credit Guarantee Scheme influenced more than the credit spreads on banks' MTN's. The coefficient is negative significant at the 1% level for both models. If assuming that bank leverage increased at the expense of GGB then more leverage could decrease credit spreads, even the spread of Covered Bonds. Other than this coefficient, bank level variables are consistent with the literature; credit spreads of Covered Bond Issues decrease as high Liquidity ratios are held by banks, keeping in mind that covered bonds have a dedicated pool of assets this result underlines the importance of banks' liquidity. If bank's hold enough liquidity to prevent a run on the institution, the less likely it is that banks would default on their obligations including Covered Bonds. It makes sense that Covered Bond investors do not want to be included in the hassle of claiming the pool of assets, incurring the costs of converting these instruments in marketable

securities in order to recover their investment. Therefore the lower probability of default given by holding enough capital to meet short term constrains also decreases credit spreads of Covered Bonds.

Table 7 Covered Bond Implied Credit Spreads

Structural determinants of Covered Bond implied credit spreads. Using panel data from 2005 to 2010, we regress monthly Covered Bond implied credit spreads of 21 Covered Bond against the variables listed below. All regressions are panel OLS models with fixed effects at the cross sections. Models (1) and (2) correspond to equations 3 and 4 respectively.

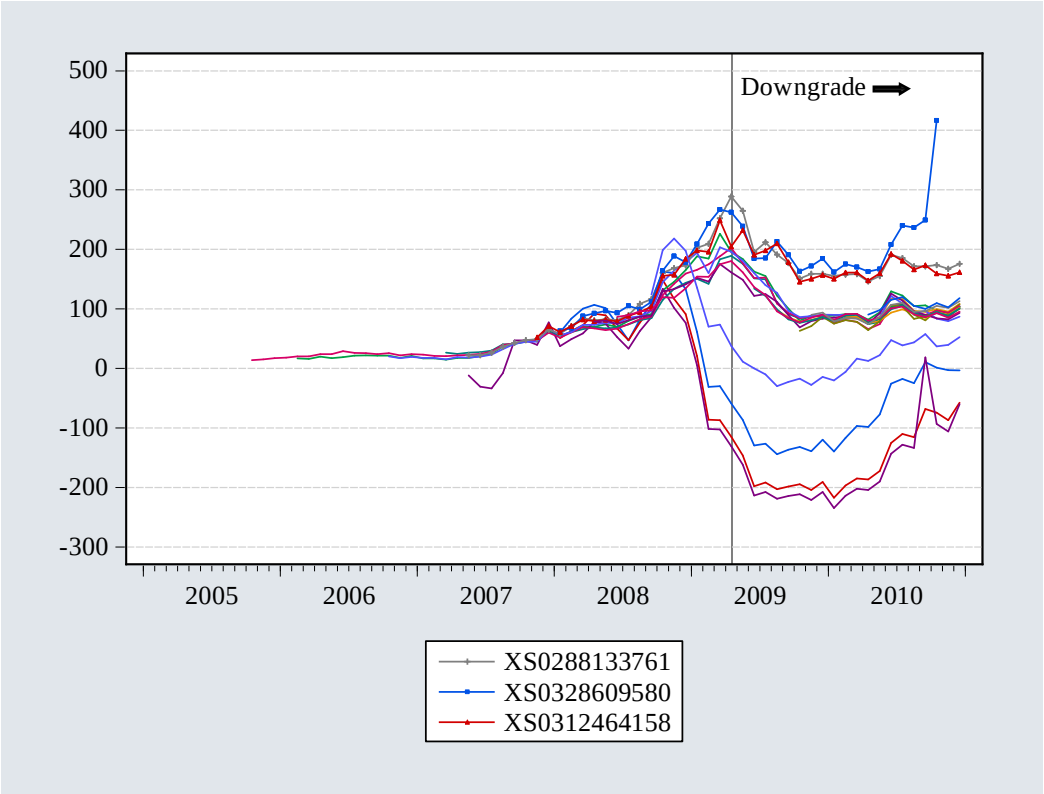
Variable	(1)		(2)	
	Coefficient	Std. Error	Coefficient	Std. Error
Constant	-1104.98 ***	312.12	-1321.97 ***	314.95
	-3.54		-4.20	
Bond Rating Squared	4.28 ***	1.45	5.91 ***	1.49
	2.95		3.97	
Ln Bank Size	237.73 ***	66.48	297.58 ***	67.27
	3.58		4.42	
Bank Leverage	-2.15 ***	0.64	-3.50 ***	0.68
	-3.39		-5.18	
Bank Liquidity	-0.59 ***	0.12	-0.72 ***	0.12
	-4.91		-5.96	
Bank Financial Strength Sq.	1.07 **	0.44	2.16 ***	0.46
	2.42		4.73	
Monthly NL GDP Growth	-37.85 ***	8.83	-44.49 ***	8.21
	-4.29		-5.42	
Monthly NL Bank Lending Growth	-4.53 ***	1.56	-4.80 ***	1.56
	-2.91		-3.08	
Investor Sentiment	-0.73 **	0.32	-0.62 *	0.33
	-2.26		-1.88	
Annual Inflation Rate	15.01 ***	4.45	3.79	4.34
	3.37		0.87	
AEX Equity Index Return	-1.10 **	0.44	-0.81 *	0.44
	-2.47		-1.84	
MSCI EMU Banks Equity Index Retur	0.04	0.25	-0.17	0.24
	0.14		-0.70	
iBoxx European Banks Bond Index Ret	-2.74	1.82	-1.61	1.75
	-1.51		-0.92	
GGB Time Dummy	28.57 ***	10.80		
	2.65			
Cum. Guarantees DSTA			-0.53 **	0.24
			-2.15	
R-Squared	0.90		0.90	

Notes: t-statistics below the coefficients; *, ** and *** denote significance at the 10%, 5% and 1% levels respectively. Empty cells occur when a particular variable is not included in a regression.

Bond and Bank Rating should influence credit spreads positively as they reflect a lowering of the ratings. It is implied by the literature (Ngow and Hassan 2009) that a lowering of credit rating increases default probabilities as entailed from credit risk, this is indeed the case for both types of ratings. In the sample covered bonds from Achmea Hypotheekank NV experienced a downgrade in the rating and also an increase on the credit spreads of their covered bonds with respect to the other covered bonds in sample, which retained their Aaa rating throughout the sample period. This effect is shown in Figure 7; the only

labeled Covered Bond issues correspond to the 3 Achmea Covered Bond Issues in sample. Note how after the downgrade (indicated by the vertical line on April 2009), their implied credit spreads remain at a noticeable high level with respect to other covered bond issues.

Figure 7 Covered Bond Credit Spreads; the case of Achmea Hypotheekbank N.V.



Furthermore, the variables that influence Covered Bonds implied credit spreads negatively at the macro level are all significant: GDP growth and Bank lending growth at the 1% level, Investor Sentiment at the 5% and 10% level for model (1) and (2) respectively. This confirms that credit spreads increase during economic downturns and decrease during the upturns. An increase on such variables proxy for a booming economy and hence decrease implied credit spreads. Similarly, Inflation triggers an brake on economic activity therefore it is expected that it increases credit spreads, this effect is supported for Covered Bonds as it has a positive coefficient for both model, which is only significant for the first model at the 1% level. The Dutch Market Index return is also consistent with this line of reasoning, economics conditions are improved when market return is high.

The impact of the Credit Guarantee Scheme of the DSTA is of different signs for each model. When proxying the Scheme with the information content of the announcement of the DSTA, credit spreads of Covered Bonds increase; suggesting crowding out of these instruments. But this measures does not account for the actual development of the implementation of the scheme as in model (2), the negative sign found suggest that as GGB where issued, Covered Bond implied credit spreads decreased. This decrease is found

significant at the 5% level; perhaps investors did not shy away after all from Covered Bonds, we can see that their spreads stabilized at the last quarter of 2009 which might entail that as conditions improved, their spread reacted accordingly.

From the study of the credit spread of CDS, we find that the Credit Guarantee Scheme suggest a decrease in CDS premiums, however this result is not statistically significant. This finding provides evidence to reject the second hypothesis of a narrowing of the credit spreads as banks issued GGB. Panetta et all (2009) found evidence of a narrowing of CDS premiums trough an event study and with a time frame up to 25 days. This narrowing is also visible from figure 4 in which the CDS spread of ING decreased constantly in the 2 subsequent months after the announcement of the Credit Guarantee Scheme by the DSTA on October 2008 before following economic conditions. In contrast this paper introduces a longer time frame and looks at the cross section fixed effects of such credit spreads, addressing not only the GGB but also any theorized parameter that could affect credit spreads. With respect to the determinants of Credit Spreads they are consistent with what the previous research has shown, even after introducing a new instrument in the market as is the case with the GGB. New to the analysis is the negative relationship between GGB issuance measured by a time dummy and also by the cumulative amount of the guarantees as shown by Table 4. This effect together with the control variables shows the unforeseen consequences of the effect of government support to the Dutch Banking system. Maybe it is better to recognize the systemic relationship between bond credit spreads and CDS spreads given above in Equation (1) by rewriting it as:

$$s = y - r \tag{7}$$

In such a fashion we can distinguish that there might exist some market imperfections preventing both spreads to be equal. That can be seen after a careful inspection of the models illustrated in the tables above since some of the determinants change their values when comparing models (1) and (2) in both hypothesis. Table 8 below looks at bond implied credit spreads of 5 year senior bonds aiming to recreate the systemic relationship between 5 year senior CDS spreads and 5 year senior bonds credit spreads. If the relationship in Equation (7) holds then the results from Table 8 would not be too different from those found in Table 4. In other words the coefficients for the GGB effect would experience the same signs.

By looking first at the effect of the Time Dummy this proposition is rejected since the coefficient is positive however not statistically significant. The Cumulative Guarantees is of the same sign indicating a decrease in the credit spreads, similar as for the CDS spread; unfortunately similar as in Table 4 this effect is not statistically significant. Looking at the variables that are similar in both tables we can add validity to Equation (7) and establish that in the discussion of credit spreads, CDS spread determinants can also be employed to explain bond implied credit spreads. Credit risk is the same whether it is measured by CDS spreads or by bond spreads. Deviations in one instrument must be met by deviations of the other

instrument; this adds to the need to hedge for debt buyers, an increase of bond credit spreads as a result of GGB must be met by an increase on the price of protection against default given by the CDS.

Table 8 Results on 5 year Senior bonds

Structural determinants of Bond implied credit spreads. Using panel data from 2005 to 2010, we regress monthly Bond implied credit spreads of 14 senior Bond of 5 year maturity against the variables listed below. All regressions are panel OLS models with fixed effects at the cross sections. Models (1) and (2) correspond to equations 3 and 4 respectively.

Variable	(1)			(2)		
	Coefficient		Std. Error	Coefficient		Std. Error
Constant	2285.74	***	557.60	2210.86	***	558.04
	4.10			3.96		
Bond Rating Squared	3.61	*	2.18	4.26	*	2.18
	1.66			1.96		
Ln Bank Size	-445.24	***	105.37	-413.04	***	105.86
	-4.23			-3.90		
Bank Leverage	0.40		0.88	-0.24		0.90
	0.46			-0.26		
Bank Liquidity	0.07		0.61	-0.25		0.63
	0.11			-0.40		
Bank Financial Strength Sq.	0.59		1.19	0.85		1.19
	0.50			0.72		
Monthly NL GDP Growth	-146.43	***	37.09	-145.58	***	33.81
	-3.95			-4.31		
Monthly NL Bank Lending Growth	-5.22		7.77	-8.14		7.68
	-0.67			-1.06		
Investor Sentiment	-4.48	***	1.15	-4.90	***	1.13
	-3.91			-4.34		
Annual Inflation Rate	-4.59		20.95	-24.63		18.86
	-0.22			-1.31		
AEX Equity Index Return	-1.70		2.04	-1.01		2.02
	-0.83			-0.50		
MSCI EMU Banks Equity Index Retur	1.03		1.17	0.92		1.13
	0.87			0.81		
iBoxx European Banks Bond Index Ret	10.43		8.13	8.27		8.28
	1.28			1.00		
GGB Time Dummy	10.60		39.53			
	0.27					
Cum. Guarantees DSTA				-0.99		0.75
				-1.32		
R-Squared	0.72			0.72		

Notes: t-statistics below the coefficients; *, ** and *** denote significance at the 10%, 5% and 1% levels respectively. Empty cells occur when a particular variable is not included in a regression.

Variables that affect both instruments negatively are Bank Size, GDP growth, and Investor Sentiment; which are statistically significant at the 1% level for both CDS spreads (Table 4) and for 5 year senior bonds. The only surprise is that Banks Size affects 5 year senior bonds negatively for both models, having established in the previous discussion that size was a consistent positive determinant of bond implied credit spreads. Perhaps there are further determinants not explored in this study that affect 5 year senior bond particularly more than other MTN's. As opposed to Table 4, Bond Rating is of the expected sign meaning that 5 year senior bond implied credit spreads follow the information content of ratings downgrades.

Unfortunately the rest of the control variables show no statistical significance in our sample, making further comparisons inconclusive. Nevertheless it is sufficient to show that the Credit Guarantee Scheme might have indeed decreased the CDS spreads of Dutch banks.

CHAPTER 6 Conclusion

This paper measures the effect of the Dutch Credit Guaranteed Scheme of the DSTA on market related instruments. Such relationship is measured trough movements in the levels of Dutch bank's Credit Spread. We target movements on bond implied credit spreads and movements of Dutch banks' 5 year CDS premiums as to establish the influence of the DSTA aid after controlling for the traditional determinants of credit spreads. We use a 6 year monthly sample on 11 Dutch banks, and are able to retrieve data on 139 MTN's bond issues; furthermore we include the mid-rate on 5 year CDS premium for all the banks for which there is known information on CDS contract trades. The chosen measure for DSTA aid is designed to show first the information content on the market and the commitment of the DSTA and second to show the evolution of the issued guarantees as using this facility might emit signals to the market that the receiving institution is in need, adding additional pressure to the credit risk of such institution.

This paper has found evidence on the positive effect that the issuance of GGB has had on the credit spreads of Dutch bonds. This effect is found significantly positive for senior unsecured debt issues and subordinated debt issues irrespective of the effect of coupon structures. Furthermore the effect on Covered Bonds has also been explored; we find evidence of the same positive influence on their credit spreads. By using a time dummy the paper addresses the information content of the announcement and commitment behind the Credit Guarantee Scheme by the DSTA. Moreover, by using the cumulative amount of guarantees issued, we proxy for the development in the implementation of the scheme and focus the analysis on the effect on bond implied credit spreads as the guarantee scheme was used. Likewise, the paper also studies the effect on 5 year senior CDS spreads of Dutch banks and the effect of the mentioned Credit Guarantee Scheme as a response of the Dutch government to the financial crisis. The findings suggest a narrowing of CDS spreads supported by the apparent narrowing of 5 year bond credit spreads in line to aligned movements of credit spreads of both instruments. Furthermore the established determinants for CDS spreads have been found to be valid for Dutch banks.

Within the context of credit spreads as a proxy for default probability, the results suggest that default probabilities increased throughout the crisis. Crowding out is then given by an additional increase in such credit spreads for bonds without GGB guarantees. This would then be reflected on the investor's attitude against different alternatives of the investable bond universe. This ultimately depends of the investor demand and investor risk appetite, alternative to the preferred market in which the bond issues are traded. When measuring default probabilities as market implied ratings (given by CDS spreads) there is a negative relationship In this context government guarantees did help in decreasing the price of CDS contracts; the market could have perceived the actions of the DSTA as safeguarding the Dutch banking system, calming investors and decreasing the prize of protection against default. At the time of writing there is added concern due to the fact that sovereign CDS spreads are increasing, following market conditions. A

possibility could be that by providing guarantees, governments are incurring in a risk substitution from banks to the sovereigns backing such guarantees. This entails an additional unforeseen issue with respect to the aftermath of the crisis. If that is the case further research is required to separate causality between government guarantees, proxies for default loss of institutions and proxies for default losses of sovereigns. It may be that for countries in which weak banks obtained guarantees, CDS spreads for those banks and the sovereign CDS might be aligned. After all as Mark Twain said:

"It ain't what you don't know that gets you into trouble.
It's what you know for sure that just ain't so."

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APPENDIX A Correlations Table

Correlation Matrix. Using panel data from 2005 to 2010, this table reports the correlation matrix for Bond implied credit spreads, CDS Spreads and control variables for the sample.

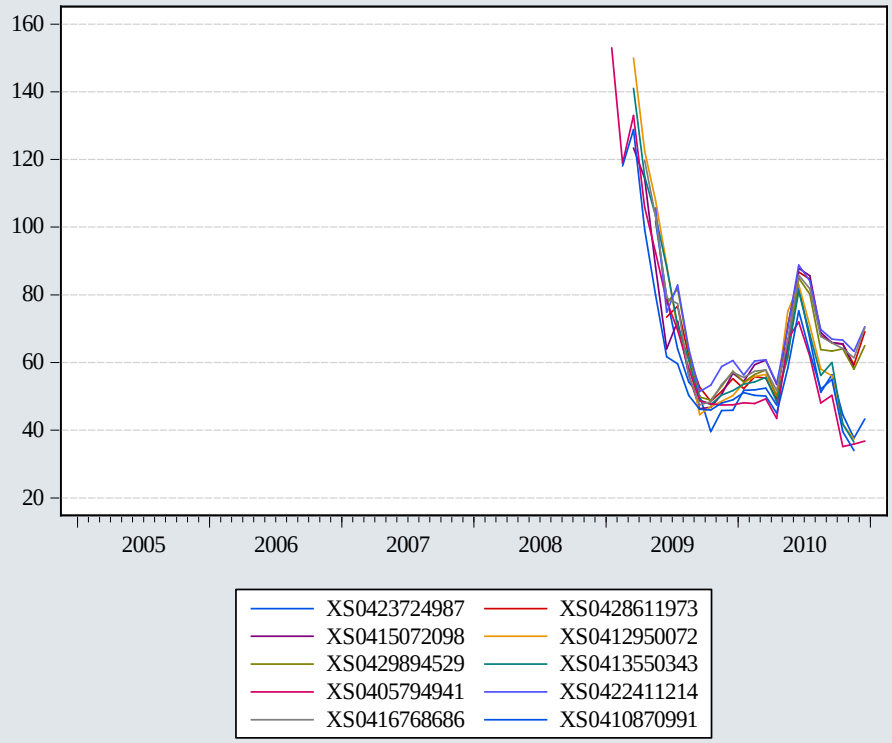
	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1)	Bond Credit Spreads	1															
(2)	CDS Spreads	0.73	1														
(3)	Bond Rating Squared	0.51	0.50	1													
(4)	Bank Size	-0.15	-0.29	-0.60	1												
(5)	Bank Leverage	-0.26	-0.29	-0.49	0.15	1											
(6)	Bank Liquidity	-0.04	0.01	-0.44	0.17	0.31	1										
(7)	Bank Financial Strength Sq.	0.41	0.50	0.70	-0.42	-0.45	-0.58	1									
(8)	Monthly NL GDP Growth	-0.37	-0.41	0.00	-0.09	0.07	0.00	-0.04	1								
(9)	Monthly NL Bank Lending Growth	-0.16	-0.11	0.01	-0.03	0.08	-0.01	-0.13	0.25	1							
(10)	Annual Inflation Rate	0.06	0.11	-0.09	0.04	0.09	0.06	-0.17	-0.42	-0.06	1						
(11)	Investor Sentiment	-0.34	-0.40	-0.06	-0.04	0.20	0.01	-0.15	0.59	0.12	-0.22	1					
(12)	AEX Equity Index Return	-0.10	-0.12	0.05	-0.03	0.00	-0.05	0.04	0.18	0.14	-0.33	0.23	1				
(13)	MSCI EMU Banks Equity Index Return	-0.05	-0.07	0.04	-0.02	0.03	-0.04	0.02	0.11	-0.08	-0.18	0.18	0.82	1			
(14)	iBoxx European Banks Bond Index Return	0.17	0.13	0.04	0.02	-0.07	-0.02	0.11	-0.18	-0.24	-0.22	-0.21	0.17	0.10	1		
(15)	GGB Time Dummy	0.29	0.31	0.08	0.04	-0.34	-0.02	0.37	-0.30	-0.27	-0.48	-0.47	0.08	0.00	0.44	1	
(16)	Cum. Guarantees DSTA	0.15	0.16	0.08	0.01	-0.36	-0.01	0.39	0.03	-0.19	-0.60	-0.27	0.23	0.16	0.28	0.90	1

APPENDIX B Banks in Sample

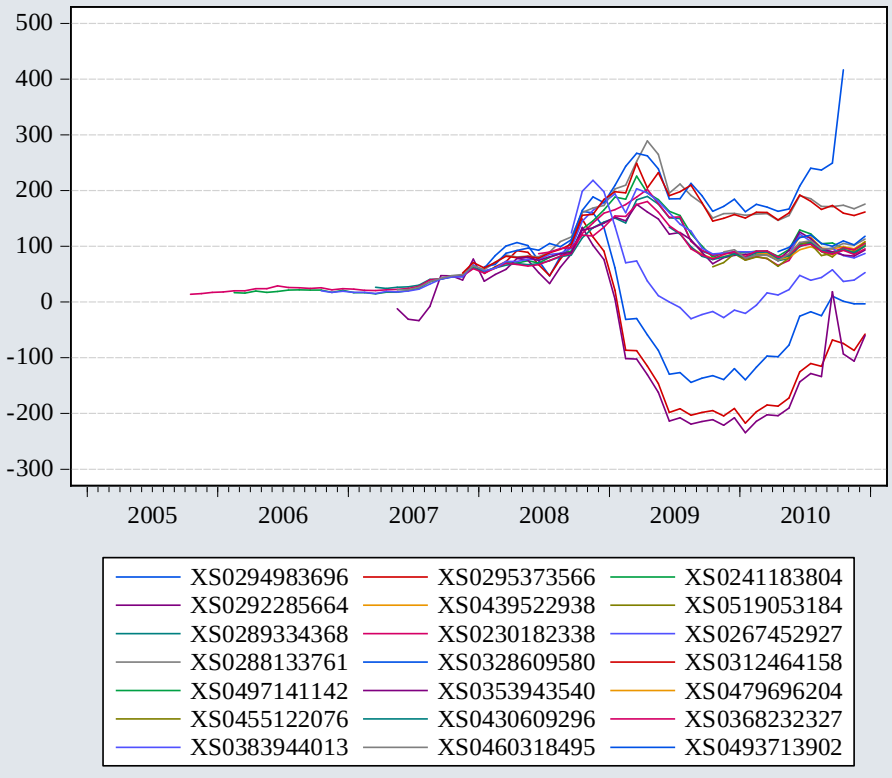
Bank Name	Bank History	Specialization	Contact Details	Dutch Bank Ranking
ABN AMRO Bank NV	ABN AMRO Bank NV was established as a bank on February 6, 2010, through the legal demerger of the former ABN AMRO Bank N.V. into businesses that the Dutch State acquired. On July 1,2010, ABN AMRO Bank NV absorbed Fortis Bank (Nederland) N.V..	Commercial Banking	Gustav Mahlerlaan 10 - PO Box 238 1082 AMSTERDAM Phone number 31 (20) 6289393 Web Site Address www.abnamro.com	5
Achmea Hypotheekbank NV	Established in November 1995.	Real Estate & Mortgage Bank	Lange Houtstraat, 8 2501 CH THE HAGUE Phone number 31 (70) 310 18 68 Web Site Address www.achmeamortgagebank.com	12
AEGON Bank NV	Formerly known as Spaarbeleg Bank NV. In February 1998, Spaarbeleg Bank NV changed its name to AEGON Bank NV.	Commercial Banking	Nevelgaarde, 60 - P.O. Box 2250 3430 DG NIEUWEGEIN Phone number 31 (30) 603 73 22 Web Site Address www.aegonbank.nl	
Bank Nederlandse Gemeenten NV, BNG	Established in 1914.	Commercial Banking	Koninginnegracht, 2 - P.O. Box 30305 2500 GH THE HAGUE Phone number 31 (70) 308 17 30 Web Site Address www.bng.com	6
Friesland Bank NV	Established in 1913 as Cooperatieve Zuivel-Bank. On January 1, 1970 its name changed to Friesland Bank. In 2007, absorbed Holding Bercoop Groep NV.	Commercial Banking	Beursplein 1 - P.O. Box 1 8G11 BN LEEUWARDEN Phone number 31 (58) 99 44 99 Web Site Address www.frieslandbank.nl	14
ING Bank NV	In 1992, NMP Postbank Groep N.V changed its name to Internationale Nederlanden Bank then, in 1995 to ING Bank NV. In September 2008, absorbed ING Bank Rt..	Commercial Banking	Amstelveenseweg 500 1081 KL AMSTERDAM Phone number 31 (20) 541 54 11 Web Site Address www.ingbank.nl	1
LeasePlan Corporation NV	Established in 1963. On February 3, 2003 ABN AMRO Lease Holding NV changed its name to LeasePlan Corporation NV.	Commercial Banking	P.J. Oudweg 41 1314 CJ ALMERE Phone number 31 (36) 539 39 00 Web Site Address www.leaseplan.nl	11
NIBC Bank NV	Established in 1945 as Herstelbank N.V. In 1971, its name changed to Nationale Investeringsbank NV. In 1997, absorbed DNI Inter Asset Bank NV. On April 13, 2000 was renamed NIB Capital Bank NV. In February 2006, changed its name to NIBC Bank NV.	Commercial Banking	Carnegieplein, 4 - P.O. Box 380 2501 BH THE HAGUE Phone number 31 (70) 342 54 25 Web Site Address www.nibcapital.com	8
Rabobank Nederland	Established on June 12, 1898. In June 2005, Rabobank Nederland absorbed Rabo Securities NV.	Commercial Banking	Croeselaan, 18 - P.O. Box 17100 3500 HG UTRECHT Phone number 31 (30) 216 57 77 Web Site Address www.rabobank.com	2
Royal Bank of Scotland NV (The)-RBS NV	On February 6, 2010, ABN Amro Bank NV changed its name to The Royal Bank of Scotland NV.	Commercial Banking	Gustav Mahlerlaan 10 - P.O. Box 12925 1100 AX AMSTERDAM Phone number 31 (20) 4649999 Web Site Address www.rbs.nl	3
SNS Bank NV	Established in 1971. In 1997, SNS Bank Nederland N.V. absorbed Banque de Suez Nederland NV. On December 29, 2001, SNS Bank Nederland N.V. changed its name to SNS Bank N.V.	Commercial Banking	Pettelaarpark, 120 - P.O. Box 70053 5201 DZ 'S-HERTOGENBOSCH Phone number 31 (73) 83 33 33 Web Site Address www.snsbank.nl	7

APPENDIX C Credit Spreads Graphs

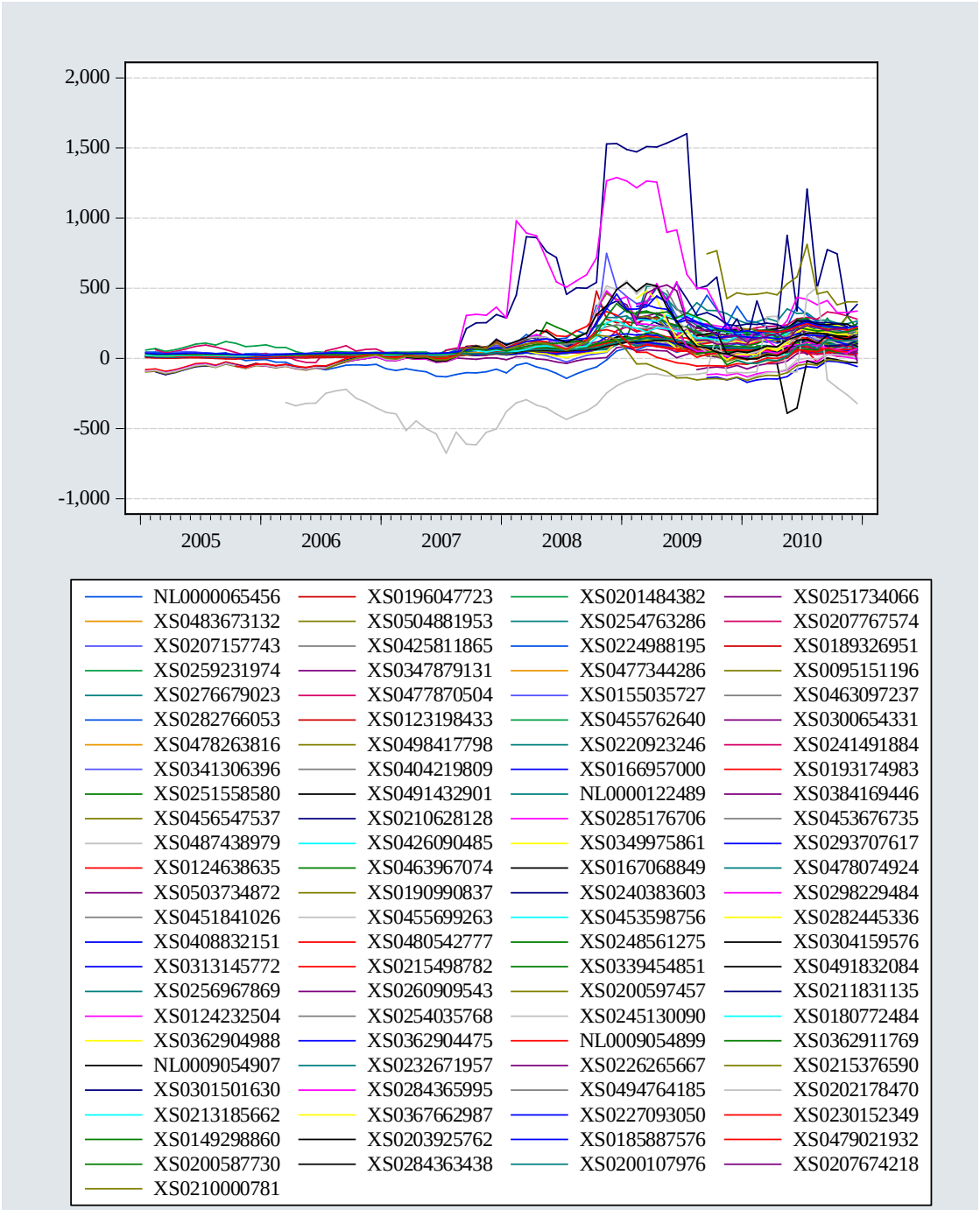
1. GGB bond issues in Sample.



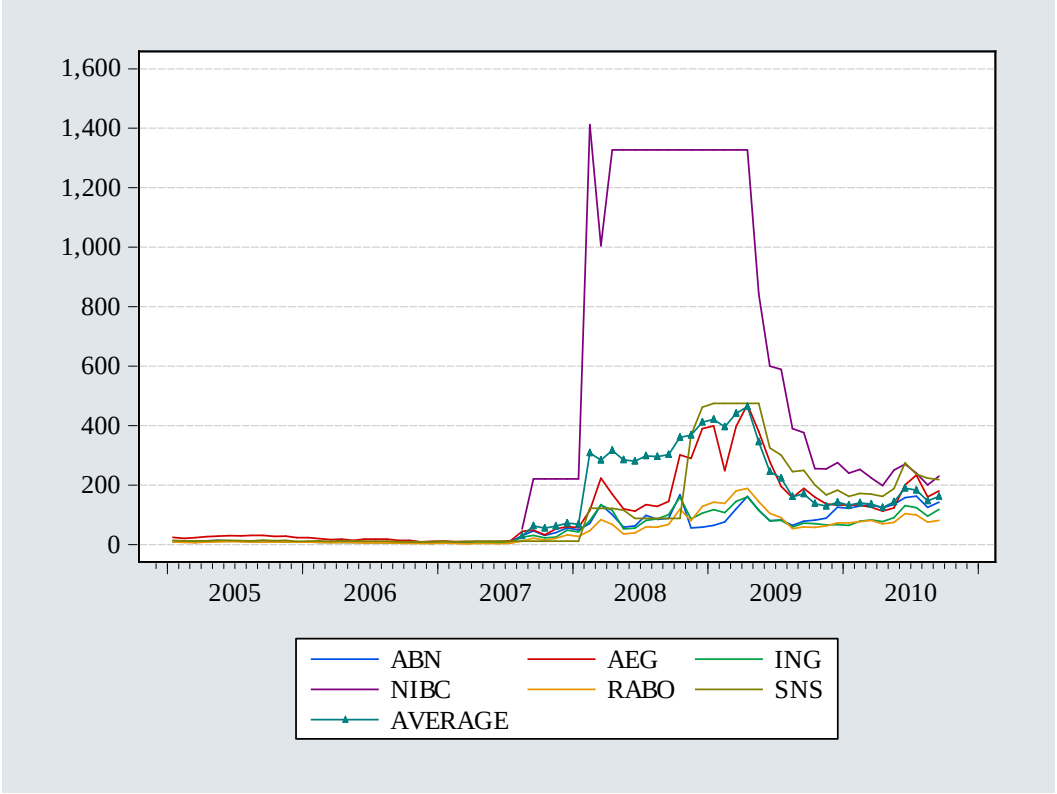
2. Covered bonds in Sample.



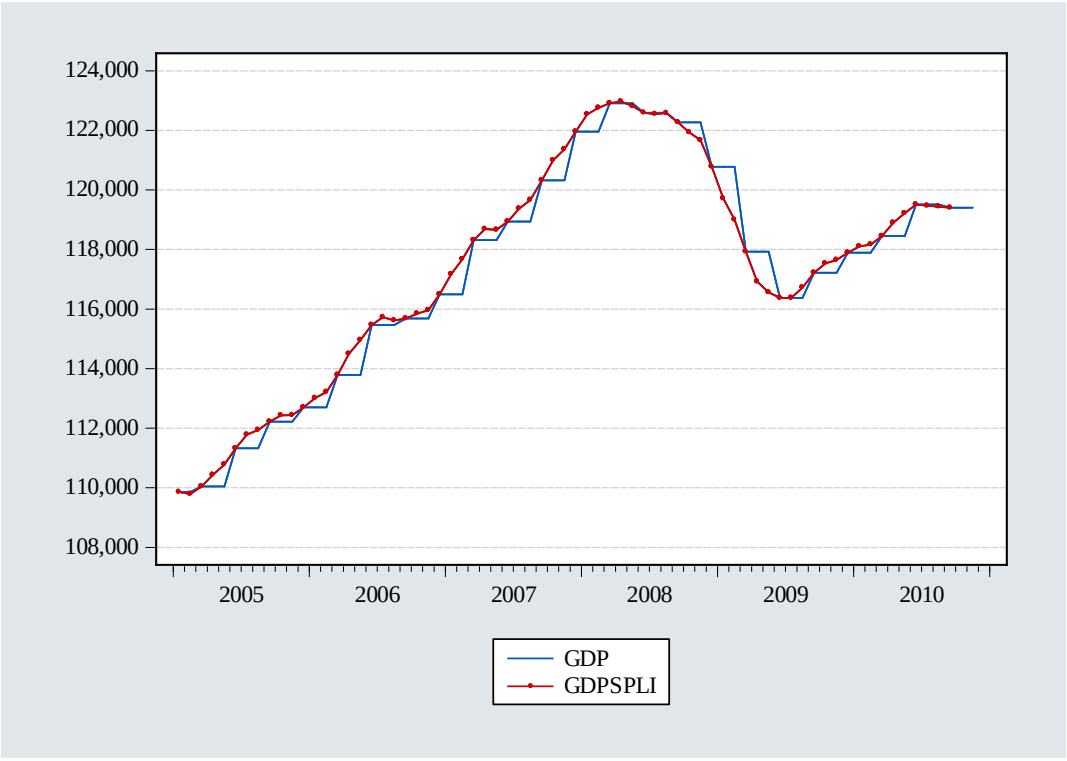
3. Senior unsecured MTN's.



4. CDS Spreads

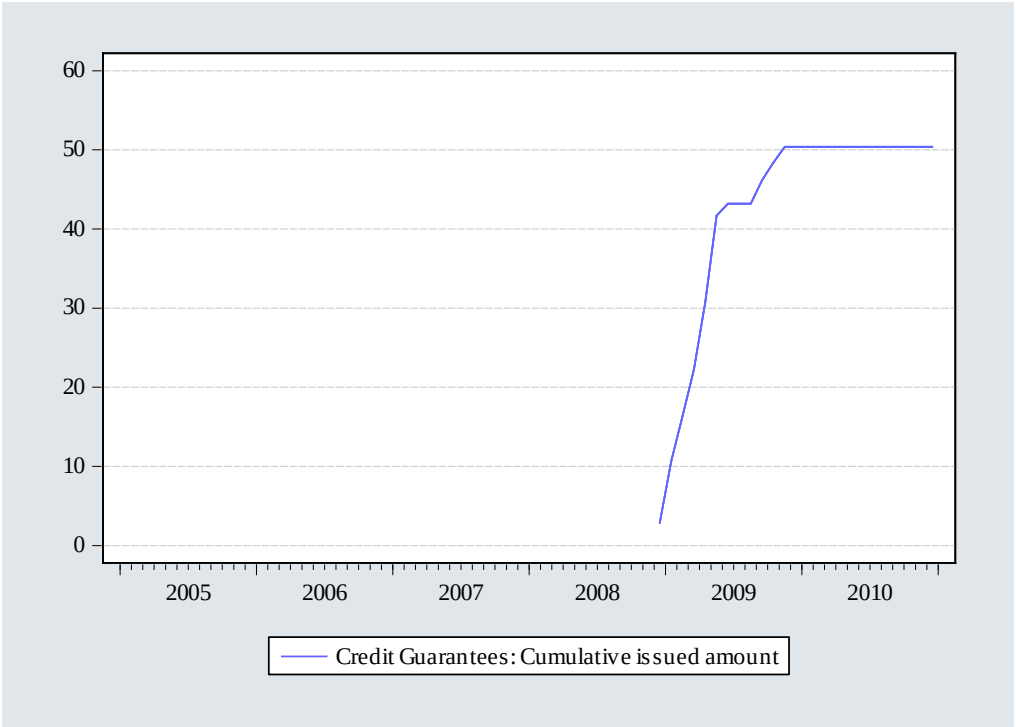


APPENDIX D Interpolation



APPENDIX E Graphs of macro and market level variables

1. Cumulative Guarantees DSTA



2. Macroeconomic Variables

3. Market Variables