Credit Default Swaps: does the traded volume influence research interest?

Karin Martín-Bujack (karin.martinb@gmail.com) , M. Teresa Corzo (mcorzo@icade.comillas.edu) and Isabel Figuerola-Ferretti (ifiguerola@icade.comillas.edu).
Universidad Pontificia Comillas. C/Alberto Aguilera 23, 28015 Madrid. Spain

Abstract

The 21st century witnessed an extraordinary boom in the CDS market. The increased popularity of CDS instruments as investment and hedging vehicles has seen a parallel development in the CDS research literature. This paper exploits the results of *a search on title textual analysis* to explore interactions between CDS aggregate trading volumes and the number of CDS research articles. We find significant evidence of co-movement over the 2001-2010 period which is illustrated by means of a cointegration and informational leadership analysis. We additionally document the effects of the 2010 Dodd Frank Act reforms in the level of trading activity. While there is a decreasing trend in volumes traded over the second sample period, the level of research interest remains significant. We contend that the academic literature aims to contribute to the regulation policy debate involving position limits in the CDS market.

Keywords: Credit Default Swaps (CDS), Textual Analysis, Dodd-Frank Act.

JEL Classification Codes: G12, G15, G18

1. Introduction

The market of credit derivatives came into existence in 1992 and grew exponentially during the first years of the 21st century, reaching $58 trillion notional amount outstanding by the end of 2007. This amount was reduced in the post-crises period to $29 trillion in 2011, and to $12 trillion by 2016, partly in response to restrictions imposed by US regulators.

Over the same period, academics responded to the significant growth seen in the Credit Default Swaps (CDS hereafter) market, by shifting their focus to these derivatives as reliable measures of credit conditions. Researches exploited the liquidity and tax benefits underlying CDS markets by increasingly using CDS (as opposed to bond) spread data to measure credit risk (see Hricko et al, 2003; Das and Hanouna, 2006). The CDS derivative market is not subject to funding and short-sale restrictions and provides a relatively pure pricing of the underlying entity's default risk (see Blanco, Brennan y Marsh, 2005, Zhang, Zhou and Zhu (2009) and Longstaff et al. 2011). The relevance of the CDS in the financial system is evidenced by the vast amount of CDS literature published in the new century (see Agustin et al 2016 for a recent literature review). In this paper we quantify the influence of the surge in CDS trading activity on academic research productivity by means of a textual analysis. This is a word base classification scheme that captures the number of CDS published papers using a CDS tittle-abstract search methodology that converts qualitative information into quantitative measures. Our textual analysis reveals that, while trading activity decreased substantially over the post-crises period, CDS publishing activity did not decrease concurrently. The results reported in this paper therefore address the implications of the post crises financial regulation on the relevance of the CDS market. This is analysed using two measures: the CDS trading and publication processes.

We contribute to the literature by conducting a novel approach to discover the importance of the CDS market from two different perspectives using a textual analysis. This has been applied in the finance literature by, e.g., Loughran and McDonald (2011). In their paper they study the impact of text based information on stock returns. Their results demonstrate that their methodology represents an efficient alternative way for analysts to capture relevant sources of information (other example is Tetlock et al. 2008). In this spirit, we present the use of textual analysis for a different purpose: the assessment of an underlying factor, i.e.,the relevance of the CDS market.

We search for the number of papers that include the term "Credit Default Swap" (or „CDS") in their title or/and abstract to capture the total number of CDS publications with semiannual frequency. We analyse this variable jointly with the notional amount of aggregate data provided by ISDA (International Swaps and Derivatives Association). We show that both variables are closely linked over the 2001-2010 period by means of a cointegration and informational leadership analysis. In this context both volumes and published papers measure a common underlying factor, the value or reliability of the CDS market. Because there is no potential structural model, we follow a reduced form approach in this analysis. Reduced form models are useful precisely when there are questions over the specification of a structural framework. In our exploratory analysis we measure the contribution of each of the two variables to the revelation of the common fundamental by means of a VECM analysis.

We also report evidence of a structural break in the second half of 2010 that changes the relationship between CDS trading and publishing activity. We associate this break to the effects of the post crises global financial regulation. We show that while over the 2011-2015 period the trading volume in credit derivative markets and the notional amount of CDS has notably decreased, the amount of papers using CDS remains stable, showing evidence of divergence between both variables.

CDS spreads remain key indicators of credit quality available for a large number of firms and sovereigns. Moreover, the end of 2016 may determine the threshold of a new market revival with the Trump era, as the US president-elect plans to repeal the financial regulations imposed under 2010 Dodd-Frank law.[1] The results in this paper can therefore be extended to address the impact of looser regulation under the Trump era on future academic publishing activity.

The rest of the article is structured as follows: in section 2 we provide a brief review of the CDS trading, publishing and regulation processes. The data used in our study are summarized in section 3, while the empirical application regarding the relationship between notional amounts and published papers are reported in section 4. We conclude in section 5. References can be found at the end of the paper.

2. Evolution of the CDS trading, regulation and publishing processes.

[1] http://www.wsj.com/articles/donald-trump-took-aim-at-dodd-frank-on-the-stump-1478691726

2.1. The trading process.

CDSs are over the counter contracts that protect the buyer against the risk of a credit event by a particular company or country, in exchange of the payment of an annual premium. They were introduced in the mid-1990s but total notional amounts outstanding are not available until 2001. Since then, first ISDA and then Bank for International Settlements (BIS)[2] have surveyed CDS semiannual outstanding amounts, which we use to study the evolution of the trading volume. Figure I depicts the evolution of CDS trading activity recorded by ISDA (International Swaps and Derivatives Association).

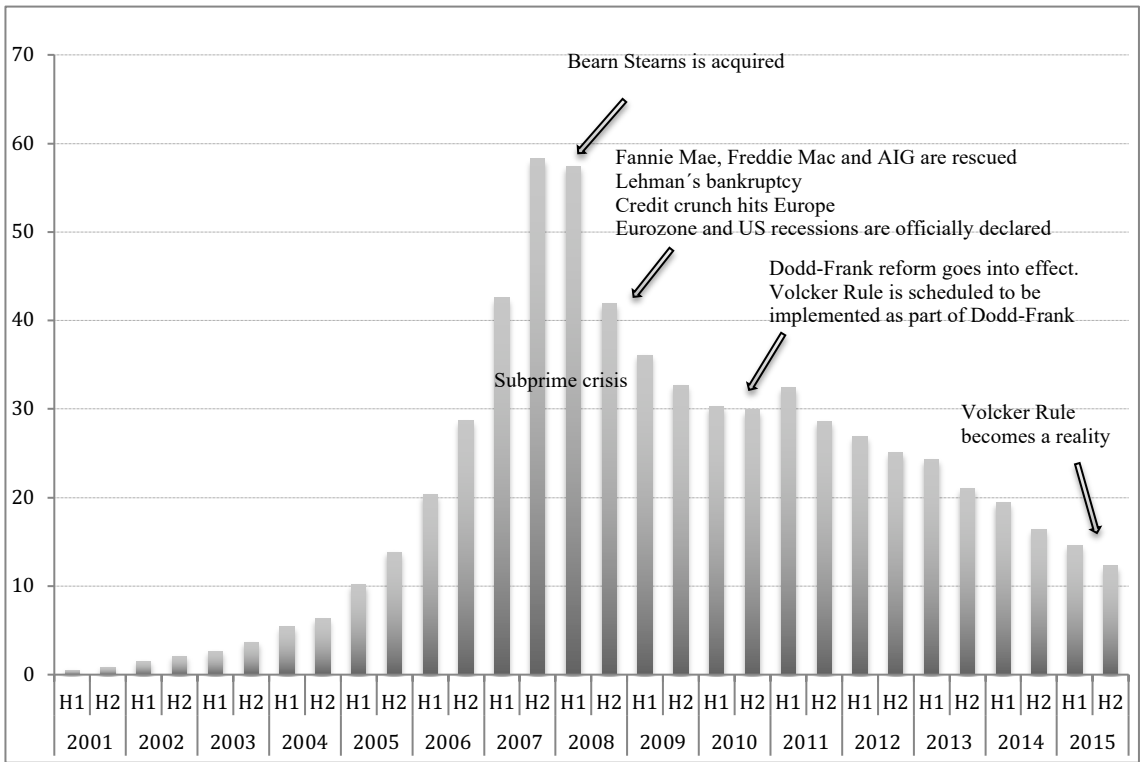

Figure I: CDS outstanding notional amount (trillion of US$). In this figure, we graph the volume outstanding in the CDS market between 2001 and 2015. First data were surveyed by ISDA regarding 2001 volumes. From then on, surveys were published in a semiannual frequency mixing CDS and credit derivatives numbers, reason for which, as soon as BIS data regarding CDS amounts were available (2003) those surveys replace ISDA´s figures in our data base. The graph also shows main events regarding financial markets and financial regulation since the subprime crisis.

After the savings and loan crisis in the 1990s, CDS gained popularity to diversify and mitigate financial risks, and specifically, credit risk. Trading activity increased significantly becoming a trillion dollar market and reaching its peak in 2007. Outstanding values grew from $631 billion in June 2001 to $58.244 billion by the end of 2007. As stated in the 2008 1Q Report on Bank Derivatives Activities of the OCC US department of the Treasury, the demand for credit derivatives boomed as dealers increasingly used them for better risk distribution and to structure securities to meet demand for higher yields. From 2003 to 2007, they grew at a 100% compounded annual growth rate. After the US subprime crisis (2007-2008), outstanding amounts decreased rapidly, as CDSs became controversial. Credit risk transfer activities were perceived as increasing the fragility of the financial system, rather than contributing to better risk diversification.

Due to the 2009-2011 European sovereign debt crisis, outstanding volumes briefly recovered to support the need for hedging the exposure of banks to Greece's default risk. Trading activity

[2] ISDA (International Swaps and Derivatives Association) has worked since 1985 to make the global derivatives markets safer and more efficient. Their research helps to increase the market transparency. Established on 17 May 1930, the Bank for International Settlements (BIS) serves central banks by carrying out research and policy analysis on issues of relevance for monetary and financial stability, among others.

continued its downward trend in the aftermath of the European credit risk crises due to the CDS market emerging opacity, non-uniformly distributed liquidity and the absence of a compensation system (Oldani, 2011).

2.2. The publishing process

Since the beginning of the century the academic literature gave a prominent role to CDS premia as reliable default risk proxies. A large amount of academic papers on financial risks used CDS data due to their high liquidity levels and dominant role in the price discovery process (see Blanco et al. 2005). As underlined in the literature review of Augustin et al. (2016) and the holistic account of Martín and Corzo (2016) work, the first studies on credit risk focused on pricing issues. Authors such as Blanco, Brennan and Marsh (2005) and Longstaff, Mithal and Neis (2005) suggested that CDS prices are useful indicators of credit risk. Empirical studies using CDS started then to analyse the influence of various factors on credit risk (e.g., Berndt, A. & Obreja, I., 2007; Chen et al, 2006; Das, S. R. & Hanouna, P., 2006). The cointegration literature quantified the price-discovery process between CDS spreads and bond spreads (e.g., Blanco et al, 2005; Arce et al, 2013) while other authors looked at correlations between different types of risks using CDS data (e.g., market and credit risk in Jarrow and Yildirim "2002", counterparty/reference entity correlations in Brigo and Chourdakis "2009", or correlation between currency and credit risk in Hui and Chung "2011"). The 2007-2009 market turmoil led to different studies about sovereign risk contagion (e.g., Caporin et al., 2013), risk transmission from peripheral to central EU economies (Groba et. Al., 2013), the "flight-to-quality" phenomenon (Berndt & Obreja, 2007), and risk spillovers between banks and sovereigns, as well as private-to-public and public-to-private risk contagion (Corzo et al., 2014, among others). CDS have also been useful to analyse systemic risk (Berndt and Obreja, 2007). This literature introduced the CDS paradox[3] (Nijskens and Wagner, 2011). Another line of CDS literature dealt with the "too big to fail/save" case as shown in the work of Chen et al. (2014) which addresses the relevance of a country´s membership in a monetary union in relation to spillover effects (Dieckmann and Plank, 2012) or the market interventions of public authorities (Ejsing and Lemke, 2011). Over the past years CDS were also applied as alternative measures of country risk (Remolona, Scatigna and Wu, 2008). Other important recent contributions include the work of Merton et al. (2013) which uses CDS prices to determine sovereigns' expected loss ratio in a Contingent Claims Analysis (CCA) framework.

2.3 The regulation process

In what follows we describe how the regulation process influenced the trading process. According to Augustin et al. (2016) the July 2010 Dodd-Frank Act[4] as well as the October 2011 European MIFID II[5] agreement impacted the negotiation in the CDS market. In this context, the Volcker Rule (Section 619 of the Dodd-Frank Wall Street Reform and Consumer Protection Act) represents the most significant constrain on banks activities since the Great Depression. It restricts banks from engaging in proprietary trading, including CDS trading, if it is not for market making or to facilitate client positions. It also regulates the central clearing of CDS indices which, according to Duffie et al. (2014), may increase collateral requirements making the market activity more difficult. While it was supposed to be implemented in July 2010, it was finally finished in December 2013 and repeatedly delayed until July 2015 as regulators had to ease the application of new restrictions. As a consequence, several banks partially or totally closed their CDS business as reflected in the decrease of the notional outstanding amount illustrated in Figure 1. Bank of America, Citigroup, Morgan Stanley and Goldman Sachs, among others, killed off their proprietary trading operations, pulled money from certain investment funds, and ceased other activities that would run afoul of the rule's restrictions during these last five years. The overall result is that while the rule finally arrived in July 2015, the consequences on trading activity were reflected in trading volume from the date of the Dodd-Frank financial law (July 2010). These events are illustrated in Figure III, which motivates the split of our sample into two sub-periods (2001-2010, 2011-2015).

[3] Idea that states that CDS help transfer risk but concentrate systemic risk because of increased interconnections in the financial system.
[4] The Dodd-Frank Act is a compendium of federal regulations affecting financial institutions and their customers, in an attempt to prevent the recurrence of events that caused the 2008 financial crisis.
[5] MIFID is the Markets in Financial Instruments Directive which has been applicable across the European Union since November 2007. MIFID II was approved on April 2014.

Recent events could once again change the financial landscape under a new Trump era of looser regulation, higher interest rates and newly US capitalized banks. These conditions are likely to ease the re-engagement of big banks in previously banded trading activities.

3. The data.

We use a complete set of semiannual data of outstanding CDS amounts surveyed by ISDA and BIS, as well as a measure of publishing activity quantified by the number of papers.

ISDA surveyed for the first time total notional outstanding volumes for single name credit default swaps, default swaps on baskets of up to ten credits, and portfolio transactions of ten credits and more in June 2001. 83 ISDA member firms supplied data on these products. The results for the first half of 2001 showed that global notional outstanding volume of credit derivatives transactions was $631.497 billion.[6] Since then, the semiannual ISDA survey publishes outstanding amounts as "Credit Default Swaps" or "Credit derivatives" indistinctly. Given that the notional value of CDSs constitute 95%-99% of the traded volume in credit derivatives,[7] we take those surveyed by ISDA as CDS outstanding values until BIS initiated the publication of statistics on the market for CDS in the second half of 2004. From then on, data on notional amounts outstanding on CDS are taken from BIS[8].

In order to construct a variable measuring publishing activity we have used a textual analysis in which we limit the search to articles that include "CDS" or "Credit Default Swap" in the title or topic (Web of Science, WoS) or in the title, abstract or keywords (Scopus). We consider that these two databases gather the vast majority of the qualified and relevant scientific research on the target topic. Because we do not consider any other publication sources we will assume that those CDS publications that are not captured by these databases evolve under a similar process. In WoS, we have restricted the category to Management or Business Finance or Economics or Multidisciplinary Sciences, and the research area to Business Economics, obtaining 558 papers (including 48 in 2016). While using Scopus, we have limited the subject area to Economics, Econometrics and Finance, Social Sciences and Business, Management and Accounting and reduced the type of papers to articles, conference papers, reviews, articles in press and conference reviews obtaining 958 pieces (including 81 in 2016).

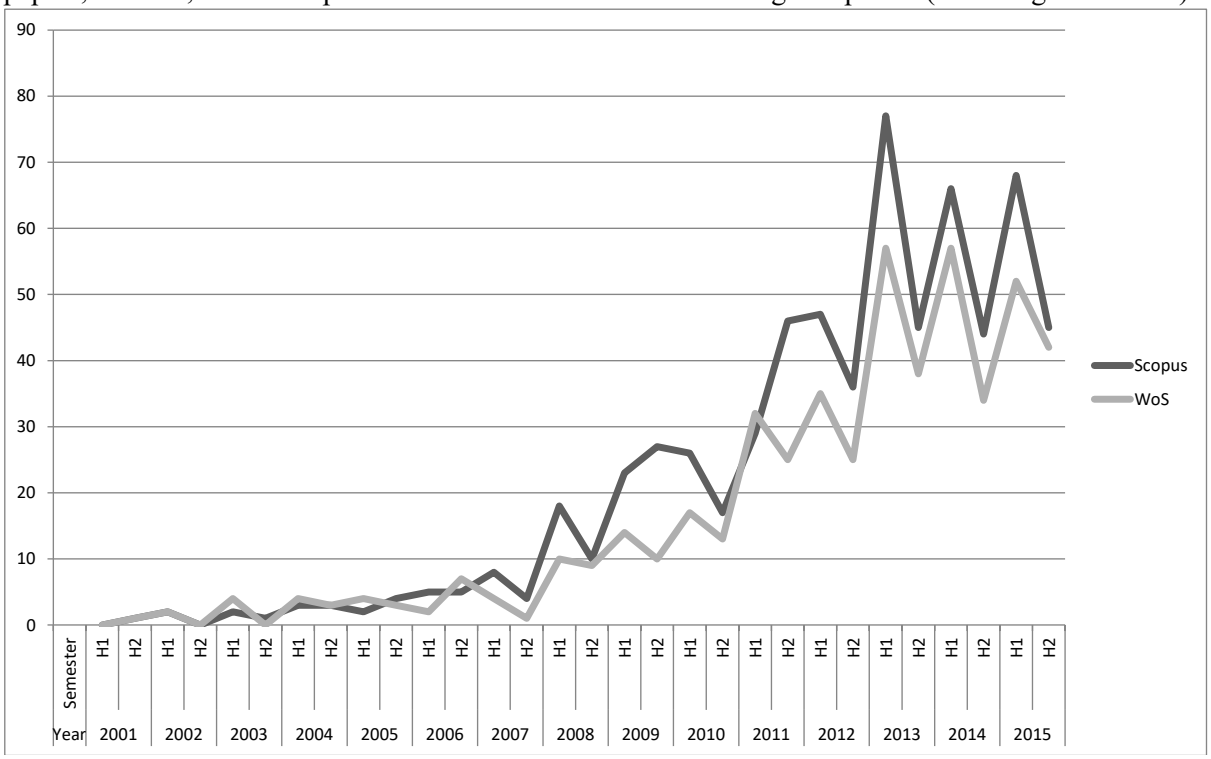

Figure II: CDS publications in WoS and Scopus (in units). This figure depicts the evolution of the academic productivity dealing with CDS between 2001 and 2015. We searched through WoS and

[6] http://www.isda.org/statistics/recent.html#2004mid.
[7] Expressly mentioned in OCC's Quarterly Reports on Bank Trading and Derivatives Activities since 2006 1Q.
[8] http://www.bis.org/statistics/derstats.htm.

Scopus for papers that include the terms “CDS” or “Credit Default Swap” in their title or abstract in an effort to measure academia´s activity regarding this financial instrument.

After conducting the two parallel searches, we combined results from our textual analysis to identify the relevant papers published related to CDSs, taking into account those which appeared in both databases and excluding other which didn´t have anything to do with Credit Default Swaps (e.g. those regarding Compact Discs). We look at the papers published between 2001 and 2015, resulting in an amount of 769 articles.[9]

Table I: Total CDS papers
This table shows the number of papers dealing with CDS published between 2001 and 2005 found through our textual analysis using WoS and Scopus. The result of combining the publications found in both databases concludes in 769 relevant papers, 53% (405 papers) of which were published in the last 20% (3 years) of the time frame.

Year	2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015	
Quarter	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2
Papers (units)	3	4	0	2	3	1	3	5	1	7	5	6	7	5	18	14	23	35	26	28	28	53	39	48	78	71	62	64	62	68

Figure III depicts the evolution of the two analysed variables over the 2001-2015 period.

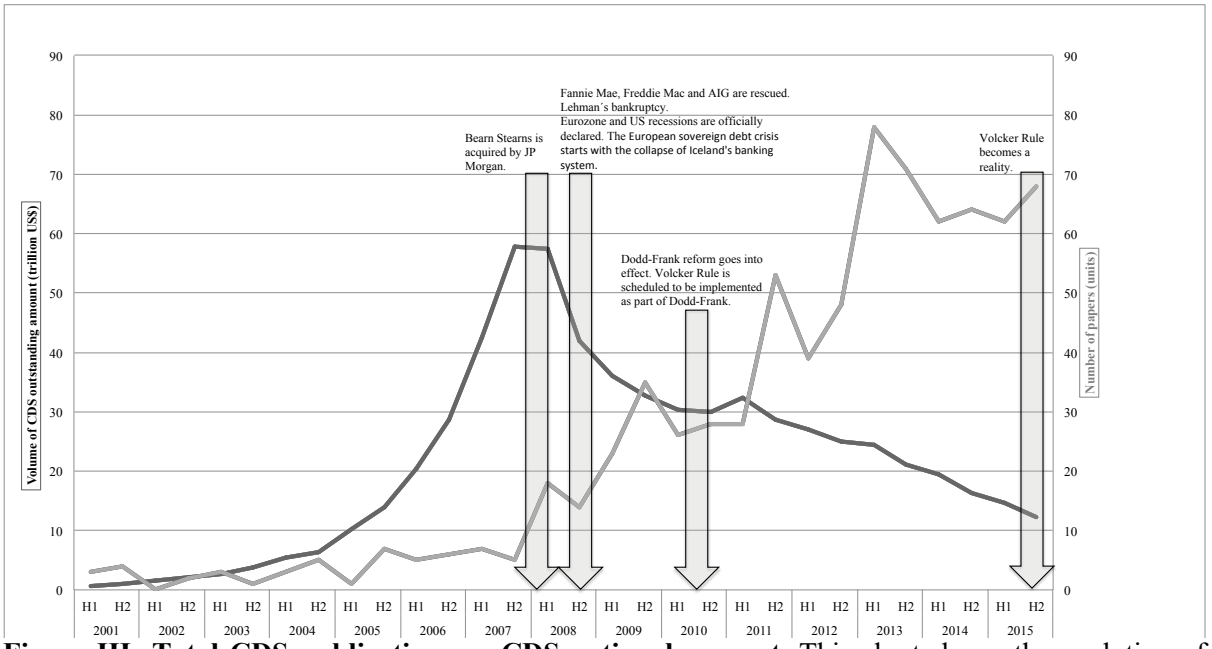

Figure III: Total CDS publications vs CDS notional amount. This chart shows the evolution of both CDS outstanding amounts (in trillion $ and based on ISDA´s and BIS´ surveys) and number of publications dealing with CDS (in units and summarizing the results obtained through WoS and Scopus) in the financial and regulatory context. The change in the volumes traded trend in late 2007 and early 2008, as well as the maintenance of the publication activity bullish trend until nowadays is therefore highlighted.

CDS outstanding amounts decreased significantly since its peak in 2007. According to OCC[10], credit derivative outstanding held by U.S. commercial banks declined by 12% in 2009. This collapse arises due to lower demand for structured products under industry efforts to eliminate offsetting trades. Total CDS outstanding amount fell by -49% from December 2007 ($58.244 billion) to the end of

[9] The complete list of papers is available to interested readers upon request
[10] Office of the Comptroller of the Currency´s Quarterly Report on Bank Trading and Derivatives Activities, Fourth Quarter 2009.

2010 ($29.898 billion), according to BIS data. The last reported figures show that notional amounts were $12.294 billion during 2015 H2.
Figure III also shows a pronounced decline in traded volumes after 2011. However the number of papers published grew until 2013 H1, it rose from an average of 4 papers semiannually over the 2001-2007 period to an average of 45 during the 2008-2015 time frame. Current research activity remains high, standing in 75 papers during 2016 H1.
The data illustrated in Figure III is consistent with the dual reality reported in Augustin et al (2016) . The authors underscore the role of CDS in the trading losses by the "London Whale" at JP Morgan Chase in 2012[11] and the anti-competitive practices in the CDS market by some banks willing to violate US antitrust laws. However they also point out that there is potential for future contribution of the CDS academic research, especially in the area of international finance.
It is important to note at this point, that the peer review process and time to publication in scholarly peer reviewed journals usually takes long time, commonly known as "turnaround time". There are a few stages underlying this process: several submissions[12], rejections, rounds of major revisions and numerous drafts before the work is finally published in a journal. According to Björk and Solomon (2013), who studied the average publishing delays in 2700 papers published in 135 journals sampled from the Scopus citation index, in the business and economics discipline, it takes almost 11 months for a paper to be accepted from the moment it is received, and another 7 months until it is published. The process lengthens by the failed submission attempts that take place before initiating the mechanism in the last journal. As underlined by Azar (2004) a paper is likely to be submitted to three to six different journals before it is accepted for publication.

4. Empirical estimation

We start our empirical approach by estimating the lead-lag relationship between CDS volumes and CDS number of published articles (Vol_t and Pub_t thereafter). From visual inspection it becomes apparent that the surge in volumes preceded the surge in papers up to a date, and that these clean relationship changed somewhere after the subprime crisis. Thus, we perform an OLS regression relating semiannual changes in papers published ΔPub_t to changes in volumes ΔVol_t. As was underlined in our earlier discussion, the data suggests that there is a structural break in the relationship between volumes and papers in 2010 in response to the new bank regulation proposed by the Volker Rule. To this effect, we test for the existence of a changing regime around the Dodd-Frank reform (2H 2010) and estimate the relationship between both variables introducing a dummy D_t variable taking value 0 before 2H2010, and 1 thereafter. We also account for the turnaround effect by including in the equation the fourth lag of the volumes' variable (the independent variable). Earlier lags of the volumes' variable are not significant so we exclude them from the analysis. The first lag of the dependent variable ΔPub_{t-1} is included to control for autoregressive effects. Estimated results are reported in Table II.

Table II: OLS estimation of model [1]

This table reports the Ordinary Least Squares estimation of the parameters in the linear regression model:

$$\Delta Pub_t = \alpha + \beta_1 \Delta Pub_{t-1} + \beta_2 \Delta Vol_{t-4} + \beta_3 D_t + \varepsilon_t. \quad [1]$$

The data frequency is semiannual. The significance refers to autocorrelation and heteroskedasticity robust standard errors (Newey West 1987), indicating *, ** and *** significance at the 10%, 5% and 1% level, respectively. The fourth lag of the variable Volumes is statistically significant at a 1% level and the Dummy variable is also significant at a 10% level. We introduce the first lag of Publications to control for the residuals autocorrelation.

[11] In April and May 2012, a series of derivative transactions involving credit default swaps were entered, reportedly as part of the bank's "hedging" strategy accumulating outsized CDS positions in the market and a several billions dollar loss.

[12] According to Björk and Solomon (2013) when the author submits the manuscript to a particular journal, most journals require that it is not under consideration for publishing by another journal, causing publishing delays for authors whose work is rejected in the first and even second journal to which they submit.

Dependent variable	ΔPub_t
Explanatory variables	
c	-0.970
	(-0.770)
ΔPub_{t-1}	-0.361 **
	(-2.086)
ΔVol_{t-4}	0.855 ***
	(3.297)
Dummy	8.503 *
	(1.828)
# Observations	25
R^2	0.27

Estimated results confirm the impact of the volumes fourth lag on the number of publications, supporting the two years turnaround time already documented in the literature. It also suggests that there is a change in degree of co-movement between both variables around the introduction of the Dodd-Franck Act, as the dummy variable is reported to be significant at the 10% level with Newey West (1987) standard errors. This motivates the split of our analysis into two subsamples, a first sample covering the 2001-2010 period and a second sample covering the post Dodd Frank era ranging from 2011 to 2015.

We start analysing the 2001-2010 time period, to determine the dynamics between the two measures by pursuing a cointegration test under the presumption that both of them assess a common fundamental, the relevance and reliability of the CDS market. To address this goal we first perform a unit root test on the level series. Augmented Dickey Fuller test results are reported in Table III. We can see that both series exhibit unit roots over the 2001-2010 sample period. Following the Engle and Granger (1987) two-step procedure we now test for unit roots in the OLS regression error. Because the volumes variable is expected to lead the price discovery process it is modelled as the independent variable. Dickey Fuller test results show that the error is stationary indicating that volumes and publishing processes are cointegrated over the 2001-2010 period.

Table III: Dickey-Fuller test

This table shows Augmented Dickey Fuller test statistics for the null hypothesis of unit roots on the level series (Vol_t and Pub_t) and the residual

$$z_t = Vol_t - 3.459 - 0.298 Pub_t \quad [2]$$

for semiannual data covering the 2001-2010 period. Mackinnon (1991) one-sided critical values are used. The SIC criteria is applied to calculate the optimal lag length. *** indicates significance at the 1% level.

ADF test	t-stat	p-value
Vol_t	-1.816	0.361
Pub_t	-1.043	0.711
z_t	-4.829	0.002 ***

Given that there is cointegration, we model the dynamics between the two measures by performing a VAR analysis extended by the cointegration error term (z_t). In this way we follow the Granger Representation Theorem which establishes that if two variables are cointegrated the best representation is specified under a VECM.

Under the VECM framework the cointegrating error is expected to be useful in forecasting future movements in CDS publications and/or volumes. We therefore assume that the CDS volumes and papers variables have the following VECM representation:

$$\begin{pmatrix}\Delta Pub_t\\ \Delta Vol_t\end{pmatrix} = \begin{pmatrix}\alpha_1\\ \alpha_2\end{pmatrix}[\widehat{z_{t-1}}] + klags\begin{pmatrix}\Delta Pub_{t-1}\\ \Delta Vol_{t-1}\end{pmatrix} + \begin{pmatrix}u_t{}^{Pub}\\ u_t{}^{Vol}\end{pmatrix} \quad [3]$$

$$\widehat{z_t} = Vol_t - \beta_0 - \beta_1 Pub_t, \qquad u_t \text{ is a vector white noise.}$$

Where the error correction coefficients α_1 and α_2 reflect the adjustment of volumes and publications each period based on deviations from the long term equilibrium relationship.
Table IV, reports results from estimating the two dimensional VECM model with ΔPub_t and ΔVol_t. as dependent variables (t statistics are given in parenthesis). Note that the constant is included in the cointegrating vector. An optimal lag length of 2 is determined by the SIC criteria. The turnaround effect is in this framework captured by the long run relationship measured by the cointegrating error.

Table IV: **Lead-lag analysis with two dimensional VECM model Semiannual data 2001-2010**
This table reports VECM estimates of the lead lag relationship between changes in Pub_t and changes in Vol_t for semi annual data over the 2001-2010 period. Optimal lag length is chosen according to the SIC criteria and t statistics are given in parenthesis. No constant is included in the VECM as it is estimated within the cointegrating error. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

$$\begin{pmatrix}\Delta Pub_t\\ \Delta Vol_t\end{pmatrix} = \begin{pmatrix}-0.841\\ (-2.911)\ **\\ -0.2385\\ (-0.763)\end{pmatrix}[\widehat{z_{t-1}}] + klags\begin{pmatrix}\Delta Pub_{t-1}\\ \Delta Vol_{t-1}\end{pmatrix} + \begin{pmatrix}u_t{}^{Pub}\\ u_t{}^{Vol}\end{pmatrix};\ R^2 = \begin{pmatrix}0.578\\ 0.244\end{pmatrix}$$

$$\text{With } \widehat{z_t} = Vol_t - 3.459 - 0.298 Pub_t, \text{ k(SIC)=2}$$

Results reported in table IV show that α_1 is statistically significant while α_2 is not significantly different from zero. This implies that the publication variable does all the adjustment in terms of restoring the cointegrating equilibrium while the volumes variable does not react to shocks in the long term relationship. As demonstrated in Figuerola-Ferretti and Gonzalo (2010) this is consistent with the finding of informational leadership in the volumes variable. In this context both volumes and publications measure a common underlying factor, the relevance and reliability of the CDS market and volumes are the sole contributors to the revelation of the common fundamental. The improved forecasting ability of the cointegrating error in the publications equation is reflected in the R^2 (0.578) which is significantly higher than that reported in the volumes equation (0.244).
Although this study is limited by the small number of observations in the sample, we provide reliable results for exploratory empirical assessment of the interaction between trading and academic activity during more than 10 years.[13] As it is noted in the previous cointegration literature (see Otero and Smith, 2000) the power of cointegration tests is dependent to a greater extent on the data span than on data frequency.
Finally, we explore the lead lag relationship between both variables for the second period (2011-2015) representing the post Dodd Frank era. The results should be interpreted as preliminary and with caution due to the severe observations scarcity. As suggested in Figure III, while both volumes and publications variables exhibit unit roots there is no evidence of cointegration.[14] We therefore proceed to estimate an OLS regression to model the lead lag relationship. Table V reports estimated results.

Table V: **OLS estimation. Semiannual data 2011-2015 [4].**
This table reports the Ordinary Least Squares estimation of the parameters in the linear regression model:

$$\Delta Pub_t = \alpha + \beta_1 \Delta Pub_{t-1} + \beta_2 \Delta Vol_{t-1} + \varepsilon_t. \quad [4]$$

[13] As a robustness check we have tested the stationarity of the VECM equation residuals ($u_{1,t}$,u_{2t}). We reject the null hypothesis of unit roots for the two errors implying that the assumptions underlying the VECM framework hold. Results can be provided upon request.

[14] Results are available upon request.

The data have a semiannual frequency and consist of 11 observations between 2011 and 2015. The significance refers to autocorrelation and heteroskedasticity robust standard errors (Newey West 1987), indicating *, ** and *** significance at the 10%, 5% and 1% level, respectively. The first lag of the variable Volumes is statistically significant at a 1% level.

Dependent variable	ΔPub_t	
Explanatory variables		
c	11.777	***
	(4.290)	
ΔPub_{t-1}	-0.239	**
	(-2.868)	
ΔVol_{t-1}	4.480	***
	(7.401)	
# Observations	11	
R^2	0.40	

Results reported in Table V show that while over the second sample period the strength of the relationship is lower, there remains some predictability in the publications variable as reflected by the value of the estimated R^2 (0.401). The volumes variable is significant in explaining variations in the publications variable at 1% significance level. As expected, the publications variable is not significant in explaining the changes in the volumes variable. We therefore present weak evidence of informational dominance in the volumes variable over the second sample period.

5. Conclusions

The importance of the CDS contract both for academia and for financial markets is undeniable. Over the last two decades, many researchers have taken advantage of its versatility and informational content in several studies. This motivates us to explore, through a reduced form approach, the relationship between the CDSs notional amounts and the level of research activity over the 2001 - 2015 time frame.

By doing so we contribute to the revelation of the CDS market as a variable of scientific interest by means of an informational leadership analysis, where the level of publication activity is proxied applying textual analysis. To our knowledge, this is the first study to relate these two variables and to use textual analysis beyond the framework of event studies.

Our findings show significant evidence of relationship between CDS volumes and academia's interest. During the 2001-2010 period both variables are found to measure a common underlying factor, the relevance of the CDS market, being volumes the leading variable. We also document a structural break in this relationship around the Dodd-Frank reform, which changed the activity standards in the CDS market, while research activity remained stable and high. During the 2011-2015 period, we only find weak evidence of informational dominance from volumes to papers.

By addressing the relevance of the CDS market in the academic productivity this finding sheds light to the ongoing debate regarding trading position limits. This debate gains importance under what seems to be the new Trump deregulation era.

6. References

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