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Are all Credit Default Swap Databases Equal?*

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Abstract

The presence of different prices in different databases for the same securities can impair the comparability of research efforts and seriously damage the management decisions based upon such research. In this study we compare the six major sources of corporate Credit Default Swap prices: GFI, Fenics, Reuters EOD, CMA, Markit and JP Morgan, using the most liquid single name 5-year CDS of the components of the leading market indexes, iTraxx (European firms) and CDX (US firms) for the period from 2004 to 2010. We find systematic differences between the data sets implying that deviations from the common trend among prices in the different databases are not purely random but are explained by idiosyncratic factors as well as liquidity, global risk and other trading factors. The lower is the amount of transaction prices available the higher is the deviation among databases. Our results suggest that the CMA database quotes lead the price discovery process in comparison with the quotes provided by other databases. Several robustness tests confirm these results.

***Keywords**:* Credit Default Swap prices; Databases; Liquidity
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1. Introduction

Over the last decade, the Credit Default Swap (CDS) market has grown rapidly.[2] Given the growth and the size of this market, quoted and transaction prices of CDS contracts are widely thought to be a gauge of financial markets' overall situation, as suggested by the GM/Ford credit episode in 2005, the US subprime fiasco in 2007-2009 or the Europe's debt crisis in 2010. Academic and policymakers alike have voiced concerns with respect to the CDS market's role in the above mentioned episodes and its possible influence in other financial markets, credit-oriented or otherwise. However, to properly address current concerns, careful empirical research is needed and therefore dependable CDS price data is a key requirement. The CDS market is an Over The Counter (OTC) market almost entirely populated by institutional investors and therefore, in contrast with an organized exchange like the NYSE, there are no formally established clearing and settlement mechanisms providing reliable information on prices. The information on prices must be gathered from market participants on the basis of their voluntary participation on periodic surveys, with all the potential shortcomings such a situation may bring about. For instance, Leland (2009) reports that Bloomberg's CDS data is frequently revised weeks after and often disagrees substantially with other data sources such as Datastream. Given that price data deserve special attention, as the validity and power of the empirical results must be based on a dependable data source, in this study we investigate the differences in the main data sources employed by researchers and policymakers in this area. Specifically, we compare the six data sources for CDS prices

2 The global notional value of CDSs outstanding at the end of 2004, 2005 and 2006 was $8.42, $17.1 and $34.4 trillion, respectively. The CDS market exploded over the past decade to more than $45 trillion in mid-2007 and more than $62 trillion in the second half of the same year, according to the ISDA. The size of the (notional) CDS market in mid-2007 is roughly twice the size of the U.S. stock market (which is valued at about $22 trillion) and far exceeds the $7.1 trillion mortgage market and $4.4 trillion U.S. treasuries market. However, the notional amount outstanding decreased significantly during 2008 to $54.6 trillion in mid-2008 and $38.6 trillion at the end of 2008. This declining trend followed in 2009 (31.2 in mid-2009 and 30.4 at the end of 2009).

commonly used in almost all the extant research: GFI, Fenics, Reuters EOD, Credit Market Analytics (CMA) DataVision (CMA hereafter), Markit and JP Morgan. The first five databases are analyzed jointly for American and European firms while the JP Morgan data is employed additionally as a robustness test for a subset of European firms.

In this paper we describe the databases' main features and point out the deviations between them both in the cross section and in the time series dimension. We also study the extent to which there is an advantage, in terms of data quality, in choosing one from the six data sources.

Two price time series for the same single name CDS reported by different data sources should, in principle, be very close in the sense that both share a common trend, the underlying true value of the asset. More specifically, their distributional characteristics (mean, volatility, asymmetry, and kurtosis) as well as their time series behavior (autocorrelations, degree of integration) should be very tightly related. Even if there are deviations from the common trend between the price series reported by the different datasets, one should expect that these deviations are non-systematic (pure measurement errors) and therefore unrelated both to idiosyncratic factors (firm size, industrial sector) and to systematic market liquidity or trading activity factors. If all the data sources are consistent among them, the use of a given data source should not affect the research results and their financial and policy implications. But if there are significant deviations among them, the research implications can be sensitive to the specific data base employed and therefore open to challenge on these grounds. Moreover, any economic implication gathered by investors or regulators from the academic research could be unduly influenced by the data source employed.

Therefore, there are compelling reasons to test whether the different data sources, on which almost all the extant empirical studies are based, are consistent among them. If they are not, and the divergences among them are not purely random, hitherto published empirical research on this matter should be viewed with considerable caution. This inconsistency derived from the private price's providers would also imply a damaging lack of market transparency affecting all financial agents such as investors, risk managers, and regulators.

We study the consistency of six different CDS data sources in several dimensions using the most liquid single name 5-year CDS of the components of the leading market indexes, iTraxx (European firms) and CDX (US firms). First we look at their basic statistical properties. Then we address two specific issues: (i) the factors explaining the divergences from the common trend among different CDS quoted spreads, and (ii) the relative informational advantage of the prices coming from different CDS databases.

A summary of our results follows. As one can expect, the overall average trend is usually similar among databases but we find, somewhat unexpectedly, that there are systematic departures across databases from the common trend. In fact, if we restrict the comparison to the days in which we have observations in all the data sources simultaneously (both trades and quotes), we find that for European firms before the crisis, there is price information on trades in 35% of the days and, perhaps not coincidentally, there is, on average, a considerable degree of agreement among the prices provided by the different databases, although some differences can still be found at the individual (reference entity) level. During the crisis, there is price information on trades in 15% of the days, the average prices are relatively alike among databases but some striking differences appear at individual level and in specific time periods.

For US firms before the crisis, when there are recorded transactions prices from GFI on 15% of the days, average spreads are roughly similar across databases but again some differences persist at firm level. However during the crisis, the percentage of days with information from GFI on transaction prices is only 2%, and we find that average spreads widen across databases, and also there is a remarkable lack of agreement at the individual level. In summary, as was also the case with European firms, when there is enough information on transaction prices databases tend to agree among them. However during the crisis, US firms' CDS spreads from different databases diverge to a larger extent than before the crisis. This fact implies that as the information on transaction prices become scarcer, prices from different sources tend to diverge from the common trend. The most extreme disagreements are in the case of American firms during the crisis, when there is a drastic reduction in the availability of transaction prices from GFI. This lack of recorded transaction prices could be due to the fact that the CDS market in the US is based to some extent on voice transactions and to a lower extent in inter-dealer broker platforms such as GFI or perhaps, to the use of other platforms instead of GFI.

If we restrict the comparison to the days in which we have no trades and simultaneous quotes in the corresponding data sources, we find that for European firms before the crisis, there is, again, a fairly large degree of agreement among the prices provided by the different databases. During the crisis, the average prices are similar among databases with some individual exceptions for specific entities and time periods. For US entities before the crisis, average spreads are similar across databases but again some differences persist at individual level. However during the crisis, we find that average

spreads are less alike, volatility increases, and also there is surprisingly high variation in average quotes for the same reference entities coming from different databases.

In summary the preliminary analysis shows that, although the different CDS quotes moved broadly in the same direction, there are very noticeable divergences for some entities in some days. Also, the discrepancies among databases appear to be more marked in specific time periods, probably reflecting market turbulences but it is important to remark that no single database provides quotes that are consistently above or below the quotes from other databases. We also find evidence suggesting that on average the days without trade information have higher quote dispersion than the days with trade price information.

Most importantly, deviations (in absolute value) from the common trend among the different CDS quoted spreads are not purely random, but are related to idiosyncratic factors like firm size and also to liquidity, global risk and trading factors. We also find that the different data sources do not reflect credit risk information equally efficiently. Our results suggest that the CMA quoted CDS spreads led the credit risk price discovery process with respect to the quotes provided by other databases. All these results are robust to potential endogeneity or multicollinearity problems and to different econometric methodologies.

Our results have a number of important implications for empirical research using CDS prices. First, for US names with low trade frequency, our results cast doubts on the reliability of the existing price information because there are very few recorded trade prices in GFI. Thus, conclusions obtained in papers that have used these data are open, to some extent, to criticism on these grounds. Second, in studies of price discovery of

the CDS market in relation to other markets such as bonds or futures, empirical results may change depending on the database employed. In particular since there is a data source (CMA) which seems to lead the others. For instance, Zhu (2006) using Markit data found that the CDS market and the bond market appear to be equally important in the incorporation of new information. Would this result hold if CMA data is used instead of Markit data? Third, the smaller the firm, the lower the market's liquidity and, the highest the VIX volatility index, the larger are the deviations from the common trend in prices across the different databases, and therefore, the less reliable and comparable research results might be.

This paper is structured as follows. Section 2 presents a literature review. Section 3 describes the data employed in the analysis. Section 4 motivates the research hypotheses and introduces the methodology. Section 5 shows the empirical results while Section 6 confirms the robustness of the results and presents some extensions. Section 7 concludes.

2. Literature Review

The importance of comparing alternative financial databases is stressed in the classical papers by Rosenberg and Houglet (1974) and Bennin (1980) on the differences between CRSP and COMPUSTAT stock price data. However, in more recent times there are very few papers comparing databases. Schoar (2002) and Villalonga (2004) compare COMPUSTAT with the Longitudinal Research Database and the Business Information Tracking Series from the U.S Bureau of the Census, respectively, and show that different data sources have large impact on the answers to research questions. Despite the widespread use of CDS databases and the high relevance of their accuracy, to the

best of our knowledge there exists no study that examines or compares data as well as databases. Our paper is a first attempt to fill this gap in the literature.

The first papers that compare, at least to some extent, different CDS data sources are Nashikkar and Subrahmanyam (2007) and Nashikkar, Subrahmanyam, and Mahanti (2009). However, this comparison is not the main focus of their paper and these authors do not present a detailed analysis. They simply conduct a test to ensure consistency between the CMA and GFI CDS spreads series over a short period when there was an overlap between the two series. They develop this test just to match GFI and CMA series and create a longer dataset given that they have the two data sources for different periods. Moreover, they do not report any results of the tests and simply state that they find consistency.

Mayordomo, Peña and Romo (2009) employ four different data sources (GFI, CMA, Reuters EOD and JP Morgan) to study the existence of arbitrage opportunities in credit derivatives markets focusing their attention to the single names CDSs and asset swaps. Although they find similar results employing any of the four previous data sources at the aggregate level, some differences appear at the individual reference entity level. They report their base results using the GFI's traded CDSs but when they use the other data sources they do not find exactly the same number of arbitrage opportunities. That is, for some individual firms they find arbitrage opportunities using GFI but they do not find them using some of the other data sources. In some other cases they also find the opposite.

The Mayordomo et al. (2009) study above suggests that the differences in CDS prices from different databases can have a material influence on research results and therefore a careful analysis of the publicly accessible databases is called for. In fact, the problem

could be potentially even more serious when researchers work with "unique" databases coming from a single dealer's quotes (contributor) and without crosschecking. It is important to emphasize that we use a broad array of CDS data sources where, for most of them, prices are put together based on information provided by several market traders and dealers. Using aggregate prices we focus on the market factors or characteristics that could affect the consistency among quoted prices. Thus, instead of using individual dealer's prices we use aggregated (composite/consensus) prices which allow us to have a more comprehensive perspective on the market.

The only previous paper that employs different CDS prices (trades and quotes) is Arora, Gandhi and Longstaff (2010). They examine how counterparty credit risk affects the pricing of CDS contracts using a proprietary data set. Specifically, their data set spans from March 2008 to January 2009 and includes contemporaneous CDS transaction prices and quotations provided by 14 large CDS dealers for selling protection on the same set of underlying reference firms. The authors find that there are differences across dealers in how counterparty credit risk is priced. That is, counterparty credit risk is not priced symmetrically across dealers and they consider that these asymmetries could be due to differences in the microstructure and legal framework of the CDS market. They argue that dealers may behave strategically in terms of their offers to sell credit protection.

We use aggregate data, which are formed after grouping the information of the market traders and dealers instead of individual dealer prices, to study the potential divergence among the composite CDS spreads. By concentrating on the aggregate prices we focus on the market factors or characteristics that could affect the consistency among quoted prices but we do not try to explain the effect of potential differences among the individual dealers. As Arora, et al. (2010) sustain, the decentralized nature of the CDS

markets makes the transaction prices somewhat difficult to observe. This is why most empirical research analyses based on the CDS markets use price quotes instead of transaction prices.

Longstaff, Mithal, and Neis (2005) argue that the composite prices include quotations from a variety of credit derivatives dealers and therefore, these quotations should be representative of the entire credit derivatives market. We complement our analysis using also GFI transaction prices and Fenics prices (elaborated by GFI) which are based on a combination of transaction and judgmental prices, the latter computed using the Hull and White methodology and therefore not dependent on contributors.[3]

3. Data

The six publicly available data sources that we employ in this paper are GFI, Fenics, Reuters EOD, CMA, Markit and JP Morgan. As was mentioned above, the first five databases are analyzed jointly and JP Morgan data is employed additionally as a robustness test for the European firms given that we do not have JP Morgan data for the American firms.

- GFI, which provides traded CDS spreads, is a major inter-dealer broker (IDB) specializing in the trading of credit derivatives. GFI data contain single name CDS transaction prices for 1, 2, 3, 4, and 5 years maturities. They are not consensus or indicative prices.[4] Thus, these prices are an accurate indication of where the CDS markets traded and closed for a given day. GFI data have been

[3] As explained in Section 3, we also use an additional single sources data (JP Morgan). JP Morgan data refer to individual dealer's prices and we use them in the robustness analysis.
[4] Consensus and indicative data are trusted less nowadays given the increased market's volatility. There exist differences of up to 100% between consensus prices from leading providers compared to actual trades on GFI systems. The reason is that consensus process is inherently slow and the prices originate from back office staff which can be swayed by the positions they already hold in their books, and also perhaps because they do not have a front office's market view.

used by Hull, Predescu, and White (2004), Predescu (2006), Saita (2006), Nashikkar and Subrahmanyam (2007), Fulop and Lescourret (2007), or Nashikkar, Subrahmanyam, and Mahanti (2009) among others.

- Fenics (elaborated by GFI) data are a mixture of traded, quoted and estimated CDS spreads. Fenics' data are credit curves for the whole term structure of maturities, generated hourly (all trading days) for more than 1900 reference entities. Data points in a given name's credit curve can be actual trades or mid prices calculated from the bid/offer quotes. If there are no market references, the Fenics CDS spread is computed using the Hull and White methodology to ensure that a credit curve always exists for each reference entity.[5] Fenics data have been used in Mayordomo et al. (2009) among others[6].
- Reuters EOD provides CDS composite prices. Reuters takes CDS quotes each day from over 30 contributors around the world and offers end of day data for single names CDSs. Before computing a daily composite spread, it applies a rigorous screening procedure to eliminate outliers or doubtful data. Mayordomo et al. (2009), among others, employ CDSs data from Reuters.
- Credit Market Analytics (CMA) DataVision reports consensus data (bid, ask and mid) sourced from 30 buy-side firms, including major global Investment Banks, Hedge Funds, and Asset Managers. Among the papers that employ CMA data are Nashikkar and Subrahmanyam (2007) and Nashikkar, Subrahmanyam, and Mahanti (2009).

[5] Although Fenics is computed using the approximations mentioned above, it is a reasonably accurate data source. For instance, the median of the absolute difference in basis points between five years CDS premiums as defined by Fenics and the actual quotes or transaction prices registered in other databases for the period between April 2001 and May 2002, is equal to 1.16, 2.01 and 3.82 bps for AAA/AA, A and BBB ratings for a total of 2,659, 9,585 and 8,170 companies respectively.

[6] GFI is a broker which also reports the Fenics prices. The data reported by GFI are transactions prices or bid/quotes in which capital is actually committed. This data is only available when there is a trade. When there is not, GFI constructs the Fenics curve which is available daily with no gaps. To compute the Fenics curve, GFI uses its own information on transactions or quotes. If for a given day neither prices nor quotes are available, Fenics data is computed by means of Hull and White's methodology.

- Markit provides composite prices. The Markit Group collects more than a million CDS quotes contributed by more than 30 major market participants on a daily basis. The quotes are subject to filtering that removes outliers and stale observations. Markit then computes a daily composite spread only if it has two or more contributors. Once Markit starts pricing a CDS contract, data will be available on a continuous basis, although there may be missing observations in the data. Markit is one of the most widely employed dataset. Papers that employ this dataset include: Acharya and Johnson (2007), Zhang, Zhou and Zhu (2009), Jorion and Zhang (2007), Jorian and Zhang (200), Zhu (2006), Micu et al. (2004), and Cao, Yu, and Zhong (2010).
- Our last database is J.P. Morgan quotes. It contains mid-market data provided by J. P. Morgan which is one of the leading players and most active traders in the CDS market. The data from J.P. Morgan is employed for a subgroup of European firms as part of the robustness tests (data is not available for US firms). This dataset is employed in Aunon-Nerin, Cossin, Hricko, and Huang (2002), Blanco, Brennan, and Marsh (2005), and Chen, Cheng, and Liu (2008) among others.

To summarize, three of the data sources (Reuters EOD, CMA and Markit) employ data from a variety of contributors (over 30 potential dealers/traders) to report composite prices. GFI reports traded CDS spreads. Fenics is a mixture of traded, quoted and calculated CDS spreads all of them based on the same data source and without depending on contributors. Finally, the last data source is obtained from one of the most active traders in the CDS market (JP Morgan) and reports mid-quoted prices obtained

from their own traders. Thus, the information reported by Reuters EOD, CMA and Markit could also include the information of JP Morgan's quoted CDS spreads[7].

For our analysis we use US firms included in the CDX index, as well as European firms included in the iTraxx index. At any point in time, both the CDX and iTraxx indexes contain 125 names each but the composition of the indexes changes every six months. We do not use all the single names CDSs in these indexes but concentrate on the most liquid single names CDSs. As in Christoffersen, Ericsson, Jacobs, and Xisong (2009) we use only the single name CDSs which constitute the iTraxx and CDX indexes over the whole sample period which spans from January 2004 to March 2010. We end up with 47 (43) firms which stay in the iTraxx (CDX) index during the whole sample period and for which we are able to obtain equity price information[8]. We guarantee a minimum consistency between the single name CDS spread obtained from the different data sources by requiring that all of them have the same maturity (5-year), currency denomination (Euros for the European and US Dollars for the American CDSs), seniority (senior CDS spreads), and restructuring clause (Modified-Modified Restructuring for the European and Modified Restructuring for the American CDSs).

[7] CMA and GFI span from January 1, 2004 to March 29, 2010 for all firms. Markit spans from January 1, 2004 to December 8, 2009 for all firms. Fenics spans from January 1, 2004 to June 3, 2009 for most of the firms and from January 1, 2004 to March 29, 2010 in the remaining seven firms. Reuters spans from December 3, 2007 to March 29, 2010. JP Morgan spans from January 1, 2005 to August 13, 2009. For this reason, in the robustness test in which we add JP Morgan data we limit the length of our sample from January 1, 2005 to August 13, 2009 to focus in the cases in which we have observations from JP Morgan.

[8] It could be argued that this selection procedure could introduce some survivorship bias in our sample. It should be noted that the components of the indexes are investment grade CDSs firms which are the most actively traded names in the six months prior to the index roll. If in a given period a single name CDS is excluded from the index it is not necessary due to the fact that the firm enters financial distress but simply because of liquidity reasons. On the other hand if a name is downgraded to non-investment it is, of course, excluded from the index. Notice however that one should expect that the agreement among databases on the CDS price for a given name should be higher for the most liquid names. Thus, this possible survivorship bias will tend to make the prices from different databases more in agreement than they are in fact. Consequently if we find significant disagreement among prices from different sources, the empirical evidence is even more compelling.

As we said before, two price time series for the same financial instrument reported by different data sources should, in principle, be very close. To provide a telling illustration that this is not necessarily the case for CDS contracts, Figure 1 depicts 5-year CDS quotes from Reuters, Fenics, Markit and CMA for two European entities (AXA and Hannover) and for two US entities (Baxter and Dominion Resources). The sample period is from September 1, 2008 to January 1, 2009. Four notable features emerge from the figures (which can be deemed as typical behavior for firms over this time period). First, although the different CDS quotes moved broadly in the same direction, there are very noticeable divergences in a given day. For instance on October 10, 2008 the following quotes for AXA were reported: CMA 247 b.p., Markit 229 b.p., Fenics 193 b.p. and Reuters 191 b.p., implying a difference around 30% between the highest and the lowest quote. Similar disagreements can be observed in the other three entities. Second, the discrepancies among databases appear to be more marked in specific time periods, probably reflecting market turbulences. The first week of October 2008 (Dominion, Hannover, AXA) or the first week of December 2009 (Baxter) is a case in point. Third, no single database provides quotes that are consistently above or below the quotes from other databases. Fourth, the speed of adjustment to market news is not the same across databases as the case of Dominion at the end of September 2008 or the case of Hannover at mid-October 2008 suggest. In both cases, the Fenics quotes reacted to market events in a different way than the other three databases.

Table 1 shows the main descriptive statistics for the single name CDS of the firms that we study, for the first five databases: GFI, Fenics, Reuters EOD, CMA, and Markit. We report statistics on Number of Trades or Quotes, Number of Trades or Quotes per day, Mean, Standard Deviation, Median, Skewness and Kurtosis of the CDS spreads as well

as the coefficient of the AR(1) based on the CDS spreads. In Panel A we report the names classified by index and sector for both the American and European firms.

Panels B, C, D, E, and F, provide the CDS descriptive statistics for the European single name CDSs. The information is divided for the periods before and during the financial crisis to make easier potential comparisons among data sources in these two periods. Each of the five previous panels corresponds to a different data source. Panel B reports the CDS traded spreads information obtain from GFI while Panels C, D, E, and F provide the information obtain from CMA, Markit, Fenics, and Reuters EOD, respectively. Before the crisis there is price information on trades in 35% of the days and there is, on average, a considerable degree of agreement among the prices provided by the different databases. The asymmetry is always positive and there is a high degree of persistence with first order autocorrelation coefficient near one in all cases. However there are a few cases where some noteworthy differences can be found.

During the crisis however there is information on transaction prices only in 15% of the days. The skewness is usually positive but there are some noticeable differences in persistence: GFI prices are clearly less persistent (0.83) than the quotes from the other databases. In fact, all the names which trade less than the 10% of the days have first-order autocorrelation coefficients around 0.6. One important implication of this is that unit root test based on an AR(1) specification will tend to give different results, rejecting non-stationarity for GFI data (especially in the cases of low trade frequency names) but not rejecting it for the other databases. The discrepancies, even in the cases in which a comparable number of observations across the different data sources are available, are much more frequent and more remarkable as the cases of PPR, Volvo,

Enel and some others suggest. Specifically, in the case of Volvo there is a difference of 33 b. p. between the highest average price (Reuters, 253b.p.) and the lowest (CMA, 220 b.p.). Other discrepancies are found even between the datasets (CMA and Markit) with more similar quotes, as in the cases of PPR (16 b.p.) and Enel (9 b.p.).

Panels G, H, I, J, and K, provide the CDS descriptive statistics for the American single name CDSs. As in the European case, the information is divided for the periods before and during the crisis. Panel G reports the information obtained from GFI while Panels H, I, J, and K provide the information obtain from CMA, Markit, Fenics, and Reuters EOD, respectively. Before the crisis there is price information on trades in 15% of the days and there is, on average, a fair amount of agreement among the prices provided by the different databases. The skewness is always positive but with a fair degree of variation from 0.72 for Fenics to 0.06 for GFI. In all cases there is a high degree of persistence with first order autocorrelation coefficient near one. However, as is the case with European firms, there are a few names with a relatively similar number of observations where some salient differences can be found. Before the crisis, Cigna's CDS quoted spreads obtained from Fenics are more than 30% higher than CMA and Markit quotes. On the other hand, General Electric's CDS spreads obtained from Fenics are 62% lower than the ones obtained from CMA and Markit.

Transaction prices are only available in 2% of the days during the crisis, and the discrepancies are both more frequent and more remarkable. For instance in the case of American International Group there is a difference of 111 b.p. between the Reuters quote (825 b.p.) and the CMA quote (714 b.p.) and 80 b.p. between the Reuters quote (815 b.p.) and the Markit quote (745 b.p.). Other notable disagreements between the highest and the lowest prices in names with a relatively similar number of observations

across the different data sources are found for Comcast (the average difference between Markit and Reuters CDS spreads is 61 b.p.), General Electric (the average difference between CMA and Reuters is 34 b.p.), and XL Capital (the average difference between CMA and Reuters is 57 b.p. and between CMA and Markit 34 b.p.), among others. The GFI transaction data is less persistent than the quoted prices from the other databases. Therefore, the implications for unit root test also apply to US entities. In summary, the preliminary analysis suggests that the crisis has had a strong effect on the degree of disagreement of the different databases in several individual reference entities, and especially so for US names

As the actual sample size of the different data sources differ (because of missing values and slightly different periods covered), we report aggregated summary statistics for all observations in Panel L, in Panel M for the cases in which we have common observations (trades and quotes) in all the data sources, and in Panel N for the cases in which there is no trade but there are quotes in all the data sources. The implications one may gather from these panels are relevant for assessing the degree of databases' overall agreement in the common average trend. As expected, for European firms before the crisis the common trend is readily apparent in the prices provided by the different databases in the three panels. During the crisis, there are some discrepancies in the average values and in the volatilities in Panel L. In Panels M and N there are few discrepancies but it is interesting to remark that averages and volatilities are lower in Panel M than in Panel N suggesting that average quotes tend to be higher and more volatile in the days where there are no transaction prices available.

For US firms before the crisis the common trend is also readily apparent. However during the crisis, there are many quite remarkable discrepancies in the average values

and in the volatilities in Panel L. In Panels M and N there are also discrepancies but it is worth noting that, as it was also the case with the European firms, averages and volatilities are lower in Panel M than in Panel N reinforcing the above suggestion that average quotes tend to be higher and more volatile in the days where there are no transaction prices available.

We should emphasize that the total aggregate descriptive statistics across all the firms, which are reported in Panels L, M and N, do not provide information about potential discrepancies at the individual reference entity level or in a given date. That is, although the total averages are in most cases fairly close, there could be some noteworthy discrepancies both at the entity (as the preliminary analysis above suggest) and also at the cross-sectional level that cannot be captured by these statistics.

To clarify this point, we first compute the absolute value of the average difference across pairs of data sources[9] (CMA - Markit, CMA - Fenics, CMA - Reuters, Markit - Fenics, Markit - Reuters, Fenics – Reuters) and then divide it by the average CDS spread across the four previous data sources (CMA, Markit, Fenics, and Reuters) for each firm every day. Then, we calculate the average of the previous series every day across the total number of firms. This is the Data Sources' Average Absolute Discrepancies (AAD) time series. The AAD time series is shown in Figure 2 for days with trades (Trade) and for days without trades (No Trade). The average value of Trade is 0.031 and its volatility is 0.021. The average value of No Trade is 0.053 and its volatility is 0.017. The two sample unpooled t-test with unequal variances has a t-statistic of 33.68 under the null of equal means, suggesting that on average the days without trade information have higher quote dispersion. The AAD series show a very

[9] GFI data is not used due to the scarcity of transaction prices during the crisis.

dynamic behaviour, with some noticeably turbulent episodes, for instance in 2005 given the impact of the crisis experienced by General Motors (GM) and Ford in May 2005 on the credit default swap (CDS) market. Both firms' CDS premia increased sharply just before the downgrading of their credit ratings in May 2005. All other CDS premia also rose markedly during this period for US and European firms. The more salient episodes in the AAD series are in September 2008 in the days surrounding the Lehman Brothers collapse when the AAD took its highest value to date (10%). In summary the data suggest that discrepancies from the common trend among databases are persistent and related with market-wide significant episodes. We address the modelling of these discrepancies in Section 4.

Additionally, in Panels O and P of Table 1 we report the unit root test for all CDS names in our sample, computed using the quotes time series whenever we have quotes in the four data sources (CMA, Markit, Fenics, and Reuters EOD) at the same time.[10]

Table 2 reports summary statistics for the distribution of the quoted and the traded CDS spreads referencing the firms in Table 1. Panel A provides the distribution of the number of quoted spreads on a given day for a single name CDS through the four data sources (CMA, Markit, Reuters and Fenics). Panel B reports the distribution of the range of the mean absolute difference, in basis points, among all the possible pairs of quoted spreads from the previous data sources on a given day for a single CDS. Panel C provides the distribution of the range of the mean absolute difference, in basis points, between all the possible pairs formed by the GFI traded CDS spread and one of the

[10] We do not report the unit root test for GFI given the low number of observations available, which limits the comparison among the quoted CDS spreads which include more observations than the traded ones, and also due the consequent test's low power, see Shiller and Perron (1985). Actually, in the US sample we cannot test the existence of a unit root due to lack of trades.

different quoted CDS spreads. In almost 80% of the cases we observe the CDS spread on a given firm at least in three different data sources. The mean absolute difference among the different data sources is higher than one basis point in 55.3% of the cases and it is higher than five basis points in 13.3% of the cases. The mean absolute difference among the traded CDS spread on one hand and the quoted CDS on the other hand (Panel C of Table 2) is slightly higher than the mean differences observed in Panel B of Table 2. Actually the mean difference is smaller than one basis point in 40.9% of the cases.

4. Research Hypotheses and Methodology

The main analysis of the data is based on two testable hypotheses. These hypotheses and the methodology employed to perform the empirical tests are detailed in this section.

Hypothesis 1: The volatility of the deviations from the common trend of the quoted prices provided by the different CDS data sources is not related to systematic factors.

In other words, large deviations (in absolute value) from the common trend appear randomly among databases and are unrelated with risk and liquidity factors (global or idiosyncratic). The test of Hypothesis 1 is based on a regression in which the dependent variable is the logarithm of the standard deviation of the 5-year quoted CDS spreads reported by the different data sources which is denoted by $\log(sd(CDS))_{i,t}$ This variable is computed with the *j* available CDS quoted spreads *(j = 1,..,4* where *1*= CMA, *2* = Markit, *3* = Reuters and *4* = Fenics) for a given underlying firm *i (i = 1,..,90)* on every date *t* as follows: $\log(sd(CDS\ ))_{i,t} = \log((1/n\sum_{j=1}^{n}[CDS_{j,i,t} - (1/n\sum_{j=1}^{n}CDS_{j,i,t})]^2)^{0.5})$, where

n is the number of data sources from which we observe CDS spreads, with the maximum *n* equal four whenever CMA, Markit, Reuters and Fenics report the CDS spreads for firm *i* at time *t*.

By defining the dependent variable in this way[11] we get rid of the common trend (the average) and concentrate on the deviations from the common trend. The regression equation is as follows:

$$\log(sd(CDS))_{i,t} = \alpha + \beta' X_{k,i,t} + u_{i,t} \qquad (1)$$

where the vector $X_{k,i,t}$ includes k explanatory variables: the logarithm of the firm market capitalization, a trade dummy, the number of days without a trade, the interaction of the number of days without a trade one day ago and the trade dummy , the CDS bid-ask spread, the VIX Index and a number of databases dummy.[12] The vector β' includes the regression coefficients corresponding to these k variables while the parameter α is the intercept of the regression. The residual term is denoted by $u_{i,t}$. The trade dummy is equal to one if there is a trade in the GFI platform at the current date in the 5-year maturity contract, and zero otherwise. [13] The number of days without a trade variable measures the number of days without a trade up to the current date. The interaction variable is constructed as the interaction between the number of days without a transaction up to one day ago and the trade dummy. The last variable intends to give an indication about how many data points were used to compute the dependent variable and is a dummy which equals one when all, or all minus one, of the data sources report

[11] We take logs to induce the data to meet the assumptions of the regression method that is to be applied; because the distribution of the standard deviation variable is strongly right skewed (the skewness of the original series is 25.10 while the skewness of the log series is 0.21).

[12] Hausman's test rejects the random effects specification in favor of a fixed-effects specification, with a p-value of 0.05.

[13] We are considering trades for the 5-year maturity contract only given that the number of trades in the other maturity contracts is very low. The total number of trades according to GFI information during the sample period and for the firms that we consider is 26,126 while the number of trades which occurred in the other maturities (1 and 3 years contracts) is 1,100 confirming that the most liquid contract is the 5-year CDS contract.

a price.[14] If the null hypothesis is true no significant coefficients should be found in equation (1) because differences in price dispersion between databases should be purely random.

Hypothesis 2: The different data sources reflect credit risk information equally efficiently or, equivalently, all databases contribute equally to the price discovery process. Given that transaction prices are very scarce for some firms, only quoted prices are employed and therefore the comparison is among CMA, Markit, Fenics and Reuters.

To test Hypothesis 2 we employ the Gonzalo and Granger's (1995) model which is based on the following Vector Error Correction Model (VECM) specification and it is used to study the effectiveness of the different data sources in terms of price discovery:

$$\Delta X_t = \alpha\beta' X_{t-1} + \sum_{i=1}^{p} \Gamma_i \Delta X_{t-i} + u_t \qquad (3)$$

where equation (3) is formed by a vector autoregressive (VAR) system formed by two equations defined from the vector X_t which includes a pair of CDS quotes or prices of the same underlying firm from two different databases and an error correction term which is defined by the product $\beta' X_{t-1}$ where $\beta' = (1 - \beta_2 - \beta_3)$ are estimated in an auxiliary cointegration regression. The series for the pair of CDS prices included in X_{t-1} must be cointegrated to develop this analysis and the cointegrating relation is defined by $\beta' X_{t-1} = (CDS_{SOURCE\ \ A,t-1} - \beta_2 - \beta_3 CDS_{SOURCE\ \ B,t-1})$ which can be interpreted as the long-run equilibrium. The parameter vector $\alpha' = (\alpha_1 , \alpha_2)$ contains the error correction coefficients measuring each price's expected speed in eliminating the price difference and it is the base of the price discovery metrics. The parameter vector Γ_i for $i = 1,..p$,

[14] We do not employ values from zero to four given that we only have observations on Reuters EOD after December 2007 which is very close to the beginning of the crisis and may reflect something different to what we want to study in this paper.

with p indicating the total number of lags, contains the coefficients of the VAR system measuring the effect of the lagged first difference in the pair of CDS quotes on the first different of such quotes at time t.[15] Finally, u_t denotes a white noise vector. The percentages of price discovery of the CDS quote i (where $i = 1, 2$) can be defined from the following metrics GG_i, $i=1,2$ which are based on the elements of the vector α':

$$GG_1 = \frac{\alpha_2}{-\alpha_1 + \alpha_2}; \qquad GG_2 = \frac{-\alpha_1}{-\alpha_1 + \alpha_2} \tag{4}$$

The vector α' contains the coefficients that determine each market's contribution to price discovery. Thus, given that $GG_1+GG_2=1$ we conclude that market 1 leads the process of price discovery with respect to market 2 whenever market 1 price discovery metric GG_1 is higher than 0.5. If the null hypothesis is true (no dominant market) the percentage of price discovery will be the same for the names from all databases and equal to 0.5. We estimate the price discovery metric for each firm using pairs of CDS spreads and then test whether the average price discovery metric is significantly higher than 0.5 using the mean t-statistic: $Mean \quad t-stat \quad = \frac{(Mean\,(PDMetrics\,) - 0.5)}{Std\,.Dev\,(PDMetrics\,) / \sqrt{\#\,metrics}}$,

where # metrics denotes the number of firms for which it is estimated the price discovery metric from a given pair of CDS spreads.

5. Empirical Results

5.1 Regression Results: Hypothesis 1

Table 3 reports the average time-series correlations among dependent and explanatory variables in equation (1). The variables with a highest correlation with the dependent variable are the CDS bid-ask spread (0.414) and the VIX Index (0.456). The highest

[15] The optimal number of lags is determined by means of the Schwarz information criteria.

correlation among explanatory variables is also the one between the CDS bid-ask spread and the VIX Index (0.480). Our main objective, however, is to examine the joint effect of these explanatory variables on the dispersion among the CDS spreads obtained from the different data sources.

Table 4 shows the regression results obtained from fitting equation (1) to data from the five databases. Column 1 reports the results for the whole sample whereas Column 2 reports the results for European firms and Column 3 for US firms. Negative and significant coefficients for the explanatory variable measuring size (log (market cap)) are found suggesting that the CDS prices for large firms tend to be more in agreement among databases than the prices for small firms. Or in other words, the volatility of the deviations from the common trend is lower for large firms. This effect is also noticeably stronger for US firms. The coefficients for the explanatory dummy variable "trade" are negative and significant suggesting that when there are transaction prices available for a given day, the quotes from different contributors tend to agree more closely. This is in agreement with the results on basic statistical properties summarized in the Section 5.1 above. Consequently, the positive (but only significant for US firms) effect found for the variable days w/o trade implies that the longer the period without transaction price information, the greater the disagreement among quotes because, the weaker is the referential value of the previous price. The interaction between the trade dummy and the number of days without a trade one day ago has a negative sign (but non-significant for European firms) indicating that the effect of the trade is more influential when the number of days without price trade information is larger.[16]

[16] One possible explanation is that traders will pay more attention to the new information reported by GFI when there has been no recorded trading activity for some time.

Regarding the liquidity variable, the bid-ask spread, has, as expected, positive and significant coefficients implying that the more illiquid is the market, the more difficult is to infer appropriate prices and the higher are the deviations from the common trend among the different data sources. The effect of the VIX index is positive and significant. The higher the global risk, the higher the dispersion from the common trend among individual CDS spreads. [17, 18]

The dummy variable Max Quotes is equal to one when at least three data sources report a price and zero otherwise. The intuition is that the higher the number of quotes employed to calculate the cross-sectional standard deviation, the higher should this standard deviation be. This variable is significant and has a positive sign as expected.

To summarize, the empirical evidence strongly rejects Hypothesis 1. The volatility of the deviations from the common trend of the quoted prices provided by the different CDS data sources is not random but related to systematic factors. In other words, large deviations (in absolute value) from the common trend among databases do not appear randomly but are significantly related with risk and liquidity factors. The economic implication of this result is that, in specific market circumstances, the deviations of the prices from the common trend will tend to grow on average. Some prices will be closer to the trend and some prices will be far away from it but the average distance between them will increase, making the prices less homogeneous and making it more difficult for agents to asses the CDS fair value and for researcher using the data to decide what database gives the market prices' most reliable account. Also, model (1) does a pretty

[17] These variables should not cause any collinearity problem given that the correlation is 0.480. However, we further investigate this aspect and others regarding potential endogeneity problems derived from the use of the VIX and CDS liquidity variables in the robustness test section.

[18] Our results do not change materially when we proxy the global risk measure by means of the VDAX Index, the difference between LIBOR and Treasury Bill, the CDS indexes (iTraxx and CDX) or the square of the MSCI Index returns instead of the VIX index.

good job in explaining the dispersion among prices for the overall sample as measured by the R^2 (48%), and also for the European (37%) and US (46%) samples.[19]

As the bulk of the CDS spreads that we employ in our analysis are based on the information revealed by the traders or dealers, it is possible that the degree of divergence among the different data sources may be influenced by the number of contributors which are reporting quoted or traded CDS spreads. In an extreme case in which all the composite prices are constructed using the same group of contributors, the prices should be very similar and the volatility of the deviations from the common trend should be close to zero. The problem is that we do not have access to the identity of the contributors that are reporting prices to the different data sources. However, we have access to the number of contributors that are reporting prices to Markit for the 5-year CDS spread. The different data sources may have different contributors but there should be some common group of contributors which presumably are the most influential traders and for that reason the most active agents in terms of contributed prices. Moreover, there could be other contributors whose participation is less significant in the sense that they report prices less frequently, or they could report prices to a few data sources but not to the others. This could imply that when the number of contributors is small the prices might be provided by the most influential and active traders which, on the other hand, could be common to all the data sources. Therefore, we conjecture that the lower the number of contributors, the higher should be the importance of the common contributors and the lower the divergence from the common trend among the different data sources. To test this conjecture we include the variable "number of

[19] We also performed separate analysis before and during the crisis. We find that the explanatory variables referred to the trades are not significant before the crisis but they are significant and with the same signs as reported in Table 4 for the crisis period. We also considered the use of a crisis dummy but since the liquidity is much lower during the crisis and the number of trades in US is much lower during that period the use of the crisis dummy may cloud the effect of some of the potential explanatory variables that we use. Moreover, we use the VIX as a potential proxy for times of financial distress

contributors" as an additional explanatory variable in equation (1) and run the corresponding regression. The results are shown in Column (2) of Table 5; Column (1) repeats the benchmark results from Table 4 for comparison purposes. The coefficient on the number of contributors is positive and significant which is consistent with our conjecture on the effect of the number of contributors. The coefficients for the remaining variables do not change materially in sign or in magnitude with respect to the ones obtained in the baseline regression (Column (1) of Table 5).

To test if these results are affected by possible collinearity due to the relatively high correlation between both the CDS bid-ask spread and the VIX Index with the number of contributors (-0.212 and -0.361, respectively) we repeat the previous regression but using as explanatory variable the residual of the regression of the number of contributors onto the VIX Index and the CDS bid-ask spread. The residual proxies the number of contributors net of the global risk and the illiquidity effect in the CDS market. These results are shown in Column (3) of Table 5.[20] The results are almost identical to the ones observed in Column (2) and consistent with our conjecture on the effect of the most relevant contributors, and also that collinearity between the three previous variables is not a serious issue in our case.

It should be mentioned that transactions are not necessarily made through the GFI platform, but they could occur in any other platform. The advantage of GFI data is not that it includes all the CDS contracts traded but that it is a transparent source in which the market participants can observe real transaction prices and not just quotes. Although there is no available data for all the transaction prices since the beginning of our whole sample, we can employ an additional information source for a shorter time period;

[20] In order to estimate the coefficients presented in Column (3) of Table 5 we use the bootstrap methodology to correct any potential bias in the standard errors due to the use of a generated regressor.

namely, a "trade information warehouse" that captures the majority of information on CDS trades covering corporate and sovereign borrowers. This warehouse is established by the Depository Trust & Clearing Corporation (DTCC) which keeps a record of outstanding CDSs involving major dealers as counterparties. According to the DTCC calculations around 90-95% of the CDS trades are settled and confirmed through them. The DTCC does not provide all the trade details, which are private information, but it reports weekly data on the gross and net exposures and the number of CDS outstanding contracts on 1,000 corporate and sovereign borrowers. We have this weekly information for the 90 firms that constitute our sample from the 7th of November, 2008 to the last sample date (the 29th of March, 2010).

To test for the importance of trades in the deviations of the CDS prices, we substitute the trading controls employed in equation (1) by a weekly variable which reports the total number of outstanding CDS contracts traded on a given reference firm. This allows us to control for both the cumulative information on a given firm attending to the total number of contracts and the trend in trading activity. The hypothesis to test is if a higher number of CDS contacts traded on a given reference firm lowers the volatility of the deviations from the common trend across data sources. We find that the total number of CDS contracts traded on a reference firm has a significant and negative effect on the dispersion between data sources while the sings and levels of significance of the other variables remain unchanged with respect to the ones observed in the baseline regression results (Column (1) of Table 4). The implication of this is that the higher the market activity, the lower is the volatility of the deviations from the common trend of the quoted prices provided by the different CDS data sources. This fact is obviously at odds with Hypothesis 1 being true. Additionally, given that we are employing daily information but this variable is constructed on a weekly frequency, we lagged the

variable one week and obtain a significant negative coefficient on that variable while the signs and the significance of the other variables remain unchanged. We also use the number of weekly traded contracts, lagged one week, instead of the total number of outstanding traded contracts and obtain similar results.[21]

5.3 Regression Results: Hypothesis 2

Table 6 reports the results of testing Hypothesis 2 on price discovery analysis using quoted prices (transaction prices are too scarce to be included in the analysis). A statistical significance test for the null hypothesis that the estimated price discovery proportions GG_i are equal to 0.5, is also included. The test rejects the null in all cases with the exception of CMA vs Markit in Europe and Fenics vs Reuters also in Europe. Therefore in these two cases both databases contribute equally to the price discovery process. However, in all other cases the results indicate that there is a leader database and a follower database. CMA is the data source that contributes to a higher extent to the "formation of prices" with newer and more influential information, especially for the total sample and for the US sample, followed by Markit. As mentioned above, for European firms CMA and Markit are almost equally informative in terms of price discovery. The less informative database in this realm seems to be Fenics. The results strongly reject the hypothesis that the price discovery process is evenly spread among data bases, and therefore Hypothesis 2 is not supported by the data.

6. Robustness Tests and Extensions

In this section, we report the results of several checks of the test of Hypothesis 1 presented in Table 4. First, we deal with potential problems of endogeneity and

[21] Detailed results are available upon request.

multicollinearity. Second, we repeat the previous analysis for a sub sample of European firms and adding a new data source: JP Morgan. Third, we consider alternative econometric techniques: pooled regressions and Prais-Winsten regressions after filling the missing observations. Finally, we analyze the sensitivity of the results to different data transformations: (i) using as the dependent variable the ratio between the logarithm of the standard deviation of the CDS quotes and the logarithm of mean CDS spread; (ii) excluding first the Reuters EOD quotes and second the Fenics quotes; (iii) limiting the sample period up to December 2009, June 2009 and December 2007;[22] (iv) using single source datasets constructed without aggregating data (Fenics/GFI and JPMorgan); and (v) grouping the firms by sector.[23]

6.1. Multicollinearity and Endogeneity Tests

In order to deal with potential problems of multicollinearity and endogeneity derived from the use of both the VIX and CDS bid-ask variables, we run a series of panel regressions based on different variations of the baseline regression (1) whose results are reported in Table 4. First, we run an identical panel regression but omitting the VIX Index, the CDS bid-ask spread and both. The results, not presented to save space, are qualitatively very similar to those in Column (1) of Table 4 confirming the significance of the other explanatory variables and suggesting that endogeneity and collinearity are not a serious issue in our case. As expected, the explanatory power of the panel regressions is lower given that we are omitting two powerful explanatory variables: the VIX Index and the CDS bid-ask spread.

[22] These alternative sampling periods are used to test whether the results may contain some bias due to the lack of observations in some data sources or due to the effect of the different rules for dealing with the collateral in the CDS contracts. We limit the sample up to December 2009 and June 2009 because the data obtained from Fenics and Markit are available up to such periods, respectively. We limit the sample up to December 2007 to take into account potential differences in terms of the standard underlying collateral which is used for the different data sources.

[23] All the results of this section are available upon request.

As an additional test for potential endogeneity between the standard deviation between the different data sources and the VIX and CDS bid-ask spread variables, we run a regression in which we use a one period (day) lag in both variables. This is a standard procedure to deal with potential endogeneity and we find similar results to the ones reported in Column (1) of Table 4.

Finally, to test whether the results are biased by collinearity reasons due to the high correlation between the bid-ask spread and the VIX we run regression (1) but instead of the VIX Index using as explanatory variable the residual of the regression of the VIX Index onto the bid-ask spread. The residual proxies the VIX net of the illiquidity effect in the CDS market. We also run the regression but instead of the CDS bid-ask spread using as explanatory variable the residual of the regression of the CDS bid-ask spread onto the VIX Index. The residual proxies the illiquidity in the CDS market net of the global risk effect. These results are reported in Columns (2) and (3) of Table 7 and they are almost identical to those in Table 4, which are also reported in Column (1) of Table 7 for comparison. In order to estimate the coefficients presented in Columns (2) and (3) of Table 7 we use the bootstrap methodology to correct any potential bias in the standard errors due to the use of generated regressors. The results suggest that collinearity between the two previous variables is not a serious issue in our case.

6.2. Adding a new data source

Our previous analysis is based on five different data sources (GFI, Fenics, CMA, Markit and Reuters EOD). We did not employ the data from J.P. Morgan because data for US firms was not available. However, for the sake of robustness we repeat the previous analysis for the sub sample of European firms adding a new data source: JP Morgan. These data was employed by Mayordomo et al. (2009) in the analysis of arbitrage

opportunities in the credit derivatives markets. This new analysis is developed attending to the sample length of JP Morgan, that is, we use observations from January 1, 2005 to August 13, 2009 for the different data sources.

First we run regression (1) but including the data for JP Morgan and find similar results to those in Column (2) of Table 4 for the European firms. If we also include variable for the number of contributors, its effect on the dependent variable is also positive. The lower the number of contributors, the lower is the discrepancy among the different data sources. We also find that collinearity and endogeneity are not a serious issue in our case.

Finally, we repeat the price discovery analysis for the six data sources and find that the CMA database leads the price discovery process with respect all other databases, including JP Morgan. The second more efficient data source is Markit which reflects credit risk more efficiently than JP Morgan, Fenics and Reuters EOD. The latter are all equally efficient.

6.3. Using other econometric methodologies

As a robustness test we repeat the previous analysis using alternative econometric techniques: pooled OLS regressions and Prais-Winsten regressions after filling the missing observations. We compare the results against the ones in Table 4 and show the robustness test results in Table 8.

To test whether the assumption of firm fixed effects affect significantly the results, we pool all the data and run a pooled OLS regression. As can be seen in Column (2) of Table 8 the effects of all the potential determinants of the CDS quotes' divergence are

similar to those presented in Table 4 and repeated in Column (1) of Table 8 for comparison, with the exception of the coefficient of the interaction term which now turns positive.[24] Therefore, the assumption of firm fixed effects does not have a major effect on the results.

Our data form an unbalanced panel and so, we also run a Prais-Winsten regression with correlated panels, corrected standard errors (PCSEs) and robust to heteroskedasticity, contemporaneous correlation across panels and serial autocorrelation within panels. The correlation within panels is treated as a first-order autocorrelation AR(1) and the coefficient of this process common to all the panels.[25,26] The results are reported in Column (3) of Table 8. The only difference with respect to the baseline results (Column (1) of Table 8) is that the interaction variable is not significant.

6.4. Testing the robustness of the results to data transformations

The dependent variable that we employ in the previous analysis is defined in logs in order to limit the effect of potential outliers which could appear in the quoted spreads due to any mistake in the contributed prices. By using the logs we also limit potential problems derived from a skewed distribution given that the value of the mean is almost four times the value of the median. We repeat regression (1) using as the dependent variable the ratio between the logarithm of the standard deviation among the CDS

[24] Note that the correlation between the dependent variable and the interaction term is very low (-0.005).
[25] Each element in the covariance matrix of the disturbances is computed with all available observations that are common to the two panels contributing to the covariance.
[26] The panel is unbalanced because we do not have information on some variables from the beginning of the sample. However, there are no missing values once we include the first realization of the series. There were some missing observations in the VIX Index across the 90 firms due to the US holidays (i. e.: third Monday in January and February, Last Monday in May, July 4, First Monday of September, Fourth Thursday in November, etc.). However, we exclude these days from our analysis. There were some missing values in the market capitalization variable which are related with holidays in the corresponding country. Nevertheless, due to the low variability in this variable, we substitute the missing data with the first previous day's data available.

quotes and the logarithm of mean across the CDS quotes. The results are almost identical to the ones reported in Table 4.

The data obtained from Reuters EOD are available from December 2007 whereas the remaining data sources have information starting from January 2004. To avoid any potential bias due to the different length of the sample period covered by the different data sources we repeat the previous analysis without including the Reuters EOD quotes. We do not report these results to save space but they are almost identical to the ones reported in Table 4.

The data obtained from Fenics and Markit are available up to June 2009 and December 2009, respectively. To test if the results are biased by the lack of date in a given data source after a given date, we estimate equation (1) using data first up to June 2009, and after up to December 2009. The sign and magnitude of the coefficients are very similar to the ones reported in the first column of Table 4 and are available upon request.

All the data sources but Fenics are based on the traders or dealers prices. As was mentioned in Section 3, Fenics data can be actual trades or mid prices calculated from the bid/offer quotes. If none of these are available, GFI, which is the responsible of the Fenics quotes, calculates the CDS spread using the Hull and White methodology to ensure a credit curve always exists for each reference entity. Thus, we repeat regression (1) using as the dependent variable the logarithm of the standard deviation among the CMA, Markit, Reuters EOD and JPMorgan quotes (excluding Fenics) on the corresponding explanatory variables.[27] Results are consistent with the ones obtained when we include Fenics in our analysis.

[27] We restrict our analysis to the European subsample in which we have information on JPM given that the use of the whole sample imply that the standard deviations across quotes calculated in the period before the crisis is obtained with just two contributors (CMA and Markit).

Since the beginning of the financial crisis counterparty risk in the CDS contracts has been partially mitigated through the use of collateralization. Actually, full collateralization of CDS liabilities has become the market standard. The ISDA Margin Survey 2009 reports that 74 percent of CDS contracts executed during 2008 were subject to collateral agreements. In order to limit any potential difference in the use of this collateral by the CDS data source we repeat the same analysis using a sub sample which spans up to December 2007 given that the use of the collateral was more limited before 2008. The results do not materially differ from the ones reported in the first column of Table 4. The only significant difference is that the coefficient of interaction of the number of days without a trade one day ago and the trade dummy, although with a positive sign is not significant now (p-value = 0.23).

One problem of using composite and consensus prices is that we do not know the contributors who "contribute" to form these prices or how these prices are obtained. We only observe the final price which is obtained by averaging different dealers quoted and traded prices. However, for a sample of European firms we observe JPM quoted and traded prices and Fenics constructed, quoted and traded (by means of GFI) prices although in any of the two cases we cannot distinguish between traded and quoted/constructed spreads. Both JPM and Fenics CDS spreads are obtained from single sources and not by aggregating data. As an additional robustness analysis, we test if the previous results are maintained when we compare prices obtained from two single (not composite) sources: the most active inter-dealer broker (GFI/Fenics) and the most active broker (JP Morgan). We focus our analysis on the results reported in Table 4 and regress the difference between the 5-year JPM and Fenics CDS spreads both in absolute and relative terms on the same explanatory variables that are employed in equation (1).

The difference between JPM and Fenics CDS spread in relative terms is obtained as the absolute difference between both data sources divided by the mean between JPM and Fenics spreads. Since there is a high correlation between the CDS bid-ask spread and the VIX Index (0.714) for the cases in which we have observations on both JPM and Fenics we include only one of these variable in the regression. Results are shown in Table 9. Even when we compare data sources which are formed individually without attending to a conglomerate of traders, the differences persist and can be explained by the same variables as the baseline case in Table 4, independently of whether the difference between the two quotes are reported in absolute (Columns (1) and (2)) or relative terms (Columns (3) and (4)).

7. Conclusions

We study the consistency of the six most widely used CDS data bases: GFI, Fenics, Reuters EOD, CMA, Markit and JP Morgan, for the period from 2004 to 2010 using the most liquid single name 5-year CDS of the components of the leading market indexes, iTraxx (European firms) and CDX (US firms). We find that there are significant differences among them in several dimensions.

Our main empirical findings are:

1) When timely information on traded prices is available, the different price sources largely agree among them in aggregate terms. However as the information on transaction prices become scarcer, prices from different sources tend to diverge from the common trend. The most extreme disagreements are in

the case of American reference entities during the crisis, where very few transaction prices are available in the GFI database.

2) Deviations (in absolute value) from the common trend among the different CDS quoted spreads are not purely random but related to idiosyncratic factors like firm size and also to liquidity, global risk and trading factors. Prices tend to diverge more from the common trend in the case of for smaller firms. Increases in market illiquidity, idiosyncratic stock market volatility and global volatility increase the divergence from the common trend among prices coming from different data bases.

3) CMA quoted CDS spreads led the credit risk price discovery process with respect to the quotes provided by the other databases.

Extensive robustness tests support these results. Since our analysis is based on the most liquid CDS prices, we would expect that the differences we find for these prices in the different databases would be even larger for less liquid CDSs not included in our study.

Our analysis has important implications for research studies and industry participants. First, for US names with low trade frequency, no reliable information exists because there are almost no recorded trade prices in the GFI platform. Second, in studies of price discovery of the CDS market with respect other markets and given that there is a data source (CMA) leading the others, empirical results may change depending on the database employed. Third, the smaller the firm, the higher volatility of the deviations from the common trend of the quoted prices provided by the different CDS data sources and therefore the less reliable and comparable research results might be. Fourth, in

times of high illiquidity or increased stock market volatility CDS prices from different databases will tend to substantially diverge from the common trend making it more difficult for agents to disentangle the CDS fair value from the different prices they receive from the databases and for researcher using the data to decide what database gives the market prices' most reliable account.

Looking forward, the analysis of how the discrepancy among the different CDS contributors may affect the relation between the CDS and corporate Bond spreads is a topic worth studying. Also the consequences of using different CDS sources on testing the degree of informational efficiency of the different markets where credit risk is traded is also an interesting avenue for future research.

References

Acharya, V. and Johnson, T. (2007), "Insider Trading in Credit Derivatives". *Journal of Financial Economics* 84, 110-141.

Arora, N., Gandhi, P., and Longstaff, F. (2009), "Counterparty Credit Risk and the Credit Default Swap Market". Working Paper, UCLA.

Aunon-Nerin, D., Cossin, D., Hricko, T. and Huang, Z. (2002), "Exploring for the Determinants of Credit Risk in Credit Default Swap Transaction Data: Is Fixed-Income Markets' Information Sufficient to Evaluate Credit Risk?". Working paper, HEC-University of Lausanne and FAME.

Bennin, R. (1980) "Error rates in CRSP and Compustat: a second look". *Journal of Finance*, 35, 1267-1271.

Blanco, R., Brennan, S. and Marsh, I. W. (2005), "An Empirical Analysis of the Dynamic Relationship between Investment Grade Bonds and Credit Default Swaps". *Journal of Finance* 60, 2255-2281.

Cao, C., Yu, F., and Zhong, Z. (2010), "The information content of option-implied volatility for credit default swap valuation". *Journal of Financial Markets*, Forthcoming.

Chen, L., Lesmond, D.A. and Wei, J. (2007), "Corporate Yield Spreads and Bond Liquidity". *Journal of Finance* 62, 119-149.

Chen, R.-R., Cheng, X., Liu, B. (2008), "Estimation and evaluation of the term structure of credit default swaps: An empirical study". *Insurance: Mathematics and Economics*, 43, 339-349.

Christoffersen, P. F., Ericsson, J., Jacobs, K., and Xisong, J. (2009), "Exploring Dynamic Default Dependence". Available at SSRN: http://ssrn.com/abstract=1400427.

Collin-Dufresne, P., Goldstein, R. and Martin, S. (2001), "The Determinants of Credit Spread Changes". *Journal of Finance*, 56, 2177-2207.

Delianedis, G. and Geske, R. (2001), "The Components of Corporate Credit Spreads: Default, Recovery, Tax, Jumps, Liquidity, and Market Factors". University of California, Working Paper.

Elton, E., Gruber, D., Agrawal, D. and Mann, C. (2001), "Explaining the Rate Spread on Corporate Bonds". *Journal of Finance*, 56, 247-277.

Fulop, A. and Lescourret, L. (2007), "An Analysis of Intra-Daily Patterns on the CDS Market". Working Paper, ESSEC Business School.

Gonzalo, J. and Granger, C.W.J. (1995), "Estimation of Common Long-Memory Components in Cointegrated Systems". *Journal of Business and Economics Statistics* 13, 27-35.

Hull, J., Predescu, M. and White, A. (2004), "The Relationship between Credit Default Swap Spreads, Bond Yields, and Credit Rating Announcements". *Journal of Banking and Finance* 28, 2789-2811.

Jorion, P., and Zhang, G. (2007), "Good and bad credit contagion: Evidence from credit default swaps". *Journal of Financial Economics*, Volume 84, Issue 3, June 2007, Pages 860-883.

Jorion, P., and Zhang, G. (2009), "Credit Contagion from Counterparty Risk". *Journal of Finance*, Volume 64, Number 5, pp. 2053-2087(35).

Leland , H. (2009), "Structural Models and the Credit Crisis". Presented at the China International Conference of Finance. July 8, 2009.
http://haas.berkeley.edu/groups/finance/CHINA7.pdf

Longstaff, F. A, Mithal, S. and Neis, E. (2005), "Corporate Yield Spreads: Default Risk or Liquidity? New Evidence from the Credit Default Swap Market". *Journal of Finance* 60, 2213-2253.

Mayordomo, S., Peña, J.I., and Romo, J. (2009): "Are There Arbitrage Opportunities in Credit Derivatives Markets: A New Test and an Application to the case of CDS and ASPs". Working Paper Universidad Carlos III de Madrid.

Micu, M., Remolona, E., and Wooldridge, P. D. (2004) "The Pricing Impact of Rating Announcements: Evidence from the Credit Default Swap Market". *BIS Quarterly Review.*

Nashikkar, A. J., Subrahmanyam, M. G. and Mahanti, S. (2009), "Limited Arbitrage and Liquidity in the Market for Credit Risk". NYU Working Paper No. FIN-08-011.

Nashikkar, A. J. and Subrahmanyam, M. G. (2007), "Latent Liquidity and Corporate Bond Yield Spreads". NYU Working Paper No. FIN-07-013.

Perraudin, W. and Taylor, A. (2003), "Liquidity and Bond Market Spreads". Bank of England, Working Paper.

Predescu, M. (2006), "The Performance of Structural Models of Default for Firms with Liquid CDS Spreads". Working Paper, Rothman School of Management, University of Toronto.

Rosenberg, B. and Houglet, M. (1974), "Error Rates in CRSP and COMPUSTAT Data Bases and Their Implications", *Journal of Finance*, 29, 1303-1310.

Schoar, A. S. (2002), "Effects of corporate diversification on productivity", *Journal of Finance*, 57, pp. 2379-2403.

Saita, L., (2006), "The Puzzling Price of Corporate Default Risk". Working paper, Standford Graduate School of Business.

Villalonga, B. (2004), "Diversification discount or premium? New evidence from BITS establishment-level data", *Journal of Finance*, 59, pp. 479-506.

Yu, F. (2006), "How Profitable is Capital Structure Arbitrage?". *Financial Analysts Journal* 62, 47-62.

Zhang, B. Y., Zhou, H., and Zhu, H. (2009) "Explaining Credit Default Swap Spreads with the Equity Volatility and Jump Risks of Individual Firms". *Review of Financial Studies* 2009 22(12):5099-5131.

Zhu, H. (2006), "An Empirical Comparison of Credit Spreads Between the Bond Market and the Credit Default Swap Market". *Journal of Financial Services Research* 29, 211-235.

Table 1: Firm Names by Sector and CDS Index (iTraxx and CDX)

This table shows the descriptive statistics for the single name 5-year CDS. Panel A shows the names classified by index and sector. We use European and American firms included in the iTraxx and the CDX indexes, respectively, over the whole sample period. Panels B, C, D, E, and F, provide the CDS descriptive statistics for the European single name CDSs. The information is divided before and during the crisis. Each of the five previous panels corresponds to different data sources. Panel B reports the CDS traded spreads information for GFI (Number of Trades or Quotes, Trades per day, Mean, Std Dev., Median, Skewness, and Kurtosis of the CDS spreads as well as the coefficient of the AR(1) based on the CDS spreads) while Panels C, D, E, and F reports the information for CMA, Markit, Fenics, and Reuters EOD, respectively. Panels G, H, I, J, and K, provide the CDS descriptive statistics for the American single name CDSs. The information is divided before and during the crisis. Panel G reports the information obtained from GFI while Panels H, I, J, and K provide the information obtained from CMA, Markit, Fenics, and Reuters EOD, respectively. As the actual sample size of the different data sources differ (because of missing values and slightly different periods covered), we report the summary statistics for the cases in which we have common observations (trades and quotes) in all the data sources in Panel L. Finally, Panels M and N report the unit root tests for all the European and American single name CDSs. In the last two panels, I(1) is used to indicate that the series have a unit root and are integrated of order one and I(0) to indicate that the series are stationary.

Panel A

iTraxx Firm Name	Ticker	Sector	CDX Firm Name	Ticker	Sector
AKZO Nobel NV	AKZO	Auto/Indust.	Alcoa Inc.	AA	Auto/Indust.
Bayer Aktiengesellschaft	BAYG	Auto/Indust.	Carnival Corporation	CCL	Auto/Indust.
Bayerische Motoren Werke AG	BMWG	Auto/Indust.	CSX Corporation	CSX	Auto/Indust.
Compagnie de Saint-Gobain	SGOB	Auto/Indust.	The Dow Chemical Company	DOW	Auto/Indust.
EADS NV	AERM	Auto/Indust.	Eastman Chemical Company	EMN	Auto/Indust.
Siemens Aktiengesellschaft	SIEG	Auto/Indust.	Honeywell International Inc	HON	Auto/Indust.
Volkswagen Aktiengesellschaft	VOWG	Auto/Indust.	Union Pacific Corporation	UNP	Auto/Indust.
Aktiebolaget Volvo	VOLV	Auto/Indust.			
Accor	ACCP	Consumers	Altria Group, Inc.	MO	Consumers
British American Tobacco PLC	BATS	Consumers	AutoZone, Inc.	AZO	Consumers
Carrefour	CARR	Consumers	Baxter International Inc.	BAX	Consumers
Marks and Spencer PLC	MKSA	Consumers	Bristol-Myers Squibb Company	BMY	Consumers
LVMH Moet Hennessy Louis Vuitton	LVMH	Consumers	Campbell Soup Company	CPB	Consumers
Metro AG	METB	Consumers	Cardinal Health, Inc.	CAH	Consumers
Koninklijke Philips Electronics NV	PHG	Consumers	Loews Corporation	LTR	Consumers
PPR	PRTP	Consumers	Safeway Inc.	SWY	Consumers
Sodexho Alliance	SODE	Consumers	Southwest Airlines Co.	LUV	Consumers
Unilever NV	UN	Consumers	The Walt Disney Company	DIS	Consumers
			Whirlpool Corporation	WHR	Consumers
Edison SPA	EDN	Energy	Anadarko Petroleum Corporation	APC	Energy
Electricite de France	EDF	Energy	Arrow Electronics, Inc.	ARW	Energy
EnBW Energie Baden-Wuerttemberg	EBKG	Energy	ConocoPhillips	COP	Energy
Enel SPA	ENEI	Energy	Constellation Energy Group, Inc.	CEG	Energy
EDP - Energias de Portugal SA	EDP	Energy	Devon Energy Corporation	DVN	Energy
E.ON AG	EONG	Energy	Dominion Resources, Inc.	D	Energy
Fortum Oyj	FUMC	Energy	Progress Energy, Inc.	PGN	Energy
Iberdrola SA	IBE	Energy	Sempra Energy	SRE	Energy
Repsol YPF SA	REP	Energy	Transocean Inc.	RIG	Energy
RWE Aktiengesellschaft	RWEG	Energy	Valero Energy Corporation	VLO	Energy
GDF Suez	GDF	Energy			
Veolia Environnement	VIE	Energy			
Aegon NV	AEGN	Financials	Ace Limited	ACE	Financials
AXA	AXAF	Financials	American Express Company	AXP	Financials
Barclays Bank PLC	BCSB	Financials	American International Group, Inc.	AIG	Financials
Commerzbank Aktiengesellschaft	CBKG	Financials	Boeing Capital Corporation	BA	Financials
Deutsche Bank Aktiengesellschaft	DB	Financials	Cigna Corporation	CI	Financials
Hannover Rueckversicherung AG	HNRG	Financials	General Electric Capital Corporation	GE	Financials
Banca Monte Dei Paschi Di Siena Spa	BMPS	Financials	Marsh & McLennan, Inc.	MMC	Financials
Muenchener Rueckversicherung	MUVG	Financials	Simon Property Group, L.P.	SPG	Financials
Swiss Reinsurance Company	RUKN	Financials	Wells Fargo & Company	WFC	Financials
			XL Capital Ltd.	XL	Financials
Bertelsmann AG	BTGG	TMT	AT&T Inc.	T	TMT
Deutsche Telekom AG	DTA	TMT	CenturyTel, Inc.	CTL	TMT
France Telecom	FTE	TMT	Comcast Cable Communications, LLC	CMCC	TMT
Hellenic Telecommunications	OTE	TMT	Omnicom Group Inc.	OMC	TMT
Koninklijke KPN NV	KPN	TMT	Time Warner Inc.	TWX	TMT
Telecom Italia SPA	TLIT	TMT			
Telefonica SA	TEF	TMT			
Vodafone Group PLC	VOD	TMT			

Panel B: GFI

	Before 9th August 2007								After 9th August 2007							
	Trades	Trad/Days	Mean	Std Dev	Median	Skew	Kurt	AR(1)	Trades	Trad/Days	Mean	Std Dev	Median	Skew	Kurt	AR(1)
Accor	318	0.351	68	19	67	0.34	-0.23	0.97	99	0.149	121	59	112	0.51	-0.73	0.96
Aegon NV	348	0.385	27	5	28	-0.38	2.43	0.95	28	0.042	137	88	130	1.69	4.25	0.56
AKZO Nobel NV	318	0.351	34	8	33	0.29	-0.96	0.97	59	0.089	56	19	58	0.14	-0.31	0.85
AXA	322	0.356	29	6	29	-0.09	-0.12	0.98	20	0.030	97	37	96	0.15	-0.11	0.67
Barclays Bank PLC	270	0.298	11	3	11	4.39	29.45	0.97	104	0.157	98	46	94	0.57	-0.14	0.93
Bayer Aktiengesellschaft	320	0.354	36	9	37	0.01	-1.37	0.97	33	0.050	52	18	49	0.81	0.80	0.78
Bertelsmann AG	213	0.235	42	10	45	-0.75	-0.63	0.96	111	0.167	137	75	135	0.62	-0.18	0.95
Bayerische Motoren Werke AG	279	0.308	26	7	26	-0.30	-0.91	0.98	110	0.166	107	85	90	2.37	6.80	0.94
British American Tobacco PLC	352	0.389	56	17	56	0.22	0.44	0.99	72	0.108	77	31	74	0.53	-0.33	0.90
Carrefour	413	0.456	24	5	22	0.30	0.13	0.96	143	0.215	57	24	55	0.53	0.08	0.94
Commerzbank Aktiengesellschaft	340	0.376	23	8	20	2.54	11.71	0.90	75	0.113	83	28	75	0.56	-0.73	0.81
Deutsche Bank Aktiengesellschaft	352	0.389	17	5	16	2.95	13.79	0.97	99	0.149	85	36	85	0.23	-1.03	0.91
Deutsche Telekom AG	407	0.450	38	7	39	0.09	2.11	0.90	291	0.438	87	37	84	2.13	15.47	0.79
EADS NV	98	0.108	23	4	23	1.34	2.87	0.80	110	0.166	93	62	82	2.39	6.29	0.89
Edison SPA	211	0.233	42	19	35	1.29	1.35	0.97	32	0.048	76	28	74	0.47	-0.44	0.70
Electricite de France	304	0.336	22	6	23	-0.37	-0.82	0.96	91	0.137	66	31	56	1.11	0.67	0.94
EnBW Energie Baden-Wuerttemberg	241	0.266	29	10	28	0.14	-1.18	1.00	34	0.051	56	13	55	0.54	1.60	0.33
Enel SPA	317	0.350	25	7	27	-0.07	0.27	1.00	114	0.172	133	108	100	2.78	7.59	0.93
EDP - Energias de Portugal SA	292	0.323	28	7	26	-0.25	-0.38	0.98	67	0.101	96	30	98	-0.41	-0.34	0.81
E.ON AG	334	0.369	21	5	20	0.72	0.37	0.96	72	0.108	66	23	62	0.12	-0.31	0.86
Fortum Oyj	235	0.260	32	8	33	-0.67	0.79	0.95	25	0.038	67	25	68	1.18	1.44	0.54
France Telecom	650	0.718	43	12	42	0.21	-0.59	0.99	239	0.360	73	29	79	0.13	-1.00	0.98
Hannover Rueckversicherung AG	276	0.305	29	7	28	0.38	1.48	0.96	23	0.035	61	15	60	1.40	3.27	0.23
Hellenic Telecommunications	453	0.501	45	9	44	-0.18	-0.64	0.96	193	0.291	90	33	90	0.35	-0.53	0.95
Iberdrola SA	300	0.331	25	5	23	0.14	-1.39	0.96	65	0.098	97	32	91	1.11	1.18	0.80
Koninklijke KPN NV	567	0.627	51	15	48	1.03	0.45	0.99	219	0.330	77	31	74	0.67	-0.40	0.97
LVMH Moet Hennessy Louis Vuitton	319	0.352	36	9	35	0.01	-0.15	0.98	100	0.151	77	39	64	1.41	1.88	0.93
Marks and Spencer PLC	55	0.061	41	13	38	1.92	3.10	0.90	211	0.318	187	107	170	0.65	-0.19	0.97
Metro AG	420	0.464	47	11	45	0.31	-0.40	0.98	130	0.196	143	94	114	0.94	-0.04	0.95
Banca Monte Dei Paschi Di Siena Spa	324	0.358	20	3	19	-0.06	1.83	0.92	42	0.063	78	26	75	0.19	-0.52	0.72
Muenchener Rueckversicherung	325	0.359	25	3	26	-1.57	7.22	0.89	28	0.042	50	21	48	1.11	1.81	0.64
Koninklijke Philips Electronics NV	129	0.143	33	9	33	-0.06	-1.05	0.96	108	0.163	67	27	63	0.61	0.46	0.90
PPR	474	0.524	85	38	72	0.78	-0.58	0.99	137	0.206	201	126	191	2.03	5.21	0.96
Repsol YPF SA	289	0.319	42	11	39	0.18	-1.43	0.99	43	0.065	147	99	106	1.75	2.55	0.80
RWE Aktiengesellschaft	335	0.370	23	6	22	0.34	0.07	0.97	54	0.081	55	20	50	0.45	-0.17	0.85
Compagnie de Saint-Gobain	211	0.233	34	7	36	0.71	1.23	0.94	49	0.074	144	54	125	0.84	0.61	0.80
Siemens Aktiengesellschaft	134	0.148	22	6	22	0.06	-1.31	0.96	113	0.170	83	42	73	0.63	-0.34	0.96
Sodexho Alliance	.	.	.	.	.	.	.	.	84	0.127	65	22	61	0.57	-0.37	0.87
GDF Suez	.	.	.	.	.	.	.	.	31	0.047	59	15	57	2.61	7.20	0.71
Swiss Reinsurance Company	317	0.350	23	4	23	1.95	12.94	0.83	25	0.038	114	56	114	1.15	2.39	0.67
Telecom Italia SPA	728	0.804	57	11	55	0.40	0.16	0.96	336	0.506	153	83	141	1.09	1.13	0.98
Telefonica SA	614	0.678	39	9	39	0.24	-0.64	0.97	263	0.396	95	42	88	0.72	0.22	0.97
Unilever NV	215	0.238	17	3	16	0.79	-0.37	0.93	92	0.139	41	16	38	0.55	-0.70	0.91
Veolia Environnement	344	0.380	42	36	34	5.96	37.25	0.86	75	0.113	94	31	90	0.52	-0.59	0.85
Vodafone Group PLC	471	0.520	30	7	27	0.89	0.07	0.97	229	0.345	90	42	80	0.72	-0.26	0.98
Volkswagen Aktiengesellschaft	415	0.459	55	16	59	-0.58	-0.39	0.99	116	0.175	118	70	103	1.34	2.17	0.93
Aktiebolaget Volvo	262	0.290	37	6	38	-0.85	0.06	0.94	77	0.116	139	108	107	2.05	3.93	0.95
Average	331	0.366	35	10	33	0.55	2.58	0.95	104	0.156	95	47	87	0.95	1.47	0.83

Panel C: CMA

	Before 9th August 2007							After 9th August 2007						
	Quotes	Mean	Std Dev	Median	Skew	Kurt	AR(1)	Quotes	Mean	Std Dev	Median	Skew	Kurt	AR(1)
Accor	905	58	20	56	0.74	0.14	0.99	664	127	57	125	0.31	-0.75	0.99
Aegon NV	905	21	8	23	0.16	0.47	0.99	664	191	124	144	1.10	0.52	0.99
AKZO Nobel NV	905	30	7	28	1.03	0.47	0.99	664	74	33	68	0.87	0.27	0.99
AXA	905	22	8	23	-0.09	-0.91	0.98	664	110	55	97	0.74	-0.36	0.99
Barclays Bank PLC	905	10	3	9	3.62	23.15	0.99	664	108	51	94	0.66	-0.10	0.99
Bayer Aktiengesellschaft	905	30	8	28	0.61	-0.32	0.99	664	62	25	53	1.28	1.24	0.99
Bertelsmann AG	905	36	9	35	-0.06	-0.30	0.99	664	150	88	139	0.50	-0.79	1.00
Bayerische Motoren Werke AG	905	21	8	21	0.27	-0.46	1.00	664	144	111	103	1.32	0.83	0.99
British American Tobacco PLC	905	45	18	43	0.67	-0.08	1.00	664	74	30	66	1.19	1.35	0.99
Carrefour	905	21	6	21	0.38	-0.11	0.98	664	59	21	58	0.60	0.97	0.99
Commerzbank Aktiengesellschaft	905	18	8	17	1.64	6.19	0.98	664	81	26	74	0.84	0.32	0.97
Deutsche Bank Aktiengesellschaft	905	15	4	15	2.85	18.36	0.97	664	90	32	86	0.30	-0.32	0.98
Deutsche Telekom AG	905	41	10	40	0.57	0.16	0.99	664	90	32	90	0.41	-0.07	0.99
EADS NV	902	25	6	24	0.48	-0.73	0.99	664	126	104	90	2.07	4.23	1.00
Edison SPA	905	32	17	29	1.09	0.35	1.00	664	75	35	76	0.92	0.60	0.99
Electricite de France	905	17	7	17	0.33	-0.67	0.99	664	59	31	49	1.23	1.09	0.99
EnBW Energie Baden-Wuerttemberg	905	22	9	21	0.79	-0.13	0.99	664	49	15	52	0.18	0.33	0.98
Enel SPA	905	20	6	20	0.93	1.05	0.99	664	152	138	96	1.98	3.00	1.00
EDP - Energias de Portugal SA	905	23	8	22	0.41	-0.37	0.99	664	81	33	78	0.47	-0.66	0.99
E.ON AG	905	19	5	18	0.50	0.68	0.99	664	64	23	59	0.72	0.92	0.99
Fortum Oyj	905	25	10	26	0.17	-0.78	1.00	664	60	25	50	1.55	2.41	0.99
France Telecom	905	41	13	41	0.21	-0.59	0.99	664	69	27	60	0.39	-1.08	0.99
Hannover Rueckversicherung AG	905	23	10	23	0.63	0.66	0.99	664	64	24	62	0.73	0.56	0.98
Hellenic Telecommunications	905	45	9	45	-0.32	-0.69	0.98	664	91	33	85	0.66	-0.12	0.99
Iberdrola SA	905	22	5	22	0.33	-0.58	0.98	664	96	44	88	1.14	1.26	0.99
Koninklijke KPN NV	905	53	16	50	0.88	0.02	0.99	664	77	28	70	0.82	0.18	0.99
LVMH Moet Hennessy Louis Vuitton	905	32	10	31	0.45	-0.23	0.99	664	75	40	62	1.54	1.80	0.99
Marks and Spencer PLC	905	72	49	49	1.64	3.29	0.99	664	192	112	164	0.88	0.18	0.99
Metro AG	905	42	11	42	0.54	-0.24	0.99	664	140	90	111	1.09	0.43	0.99
Banca Monte Dei Paschi Di Siena Spa	905	16	6	16	0.33	0.50	0.99	664	80	28	77	0.61	0.21	0.98
Muenchener Rueckversicherung	905	19	8	21	-0.12	-0.84	0.99	664	51	19	47	1.33	2.51	0.98
Koninklijke Philips Electronics NV	905	31	9	32	0.03	-0.73	0.99	664	67	31	54	1.05	0.53	0.99
PPR	905	75	37	61	1.13	0.09	1.00	664	259	166	214	1.15	0.26	1.00
Repsol YPF SA	905	36	10	35	0.86	0.65	1.00	664	137	99	102	1.90	3.01	1.00
RWE Aktiengesellschaft	905	19	6	19	0.76	0.73	0.99	664	52	18	47	0.48	-0.06	0.98
Compagnie de Saint-Gobain	905	32	6	31	0.89	1.97	0.98	664	181	108	149	1.17	0.79	1.00
Siemens Aktiengesellschaft	905	18	5	17	0.66	-0.48	0.99	664	83	45	69	1.18	1.29	0.99
Sodexho Alliance	905	43	19	39	0.48	-1.13	1.00	664	59	21	53	0.76	-0.17	0.99
GDF Suez	905	13	4	13	0.18	0.08	0.97	664	53	23	51	1.64	3.29	0.99
Swiss Reinsurance Company	905	19	6	20	-0.20	0.54	0.99	664	212	190	126	1.29	0.45	1.00
Telecom Italia SPA	905	56	11	55	0.35	0.38	0.98	664	180	105	148	1.03	0.24	1.00
Telefonica SA	905	39	9	38	0.34	-0.52	0.99	664	100	39	94	0.88	0.93	0.99
Unilever NV	905	19	5	17	1.00	0.47	0.98	664	39	15	35	0.98	0.59	0.99
Veolia Environnement	905	33	9	32	0.95	0.22	0.99	664	95	38	85	0.63	-0.41	0.99
Vodafone Group PLC	905	30	6	29	0.63	-0.16	0.99	664	95	43	85	1.01	0.33	0.99
Volkswagen Aktiengesellschaft	905	45	19	45	0.05	-1.33	1.00	664	139	78	118	0.77	-0.13	0.99
Aktiebolaget Volvo	905	32	7	31	0.38	-0.80	0.98	664	220	161	178	0.75	-0.58	1.00
Average	905	31	10	29	0.64	1.01	0.99	664	105	58	89	0.96	0.67	0.99

Panel D: Markit

	Before 9th August 2007							After 9th August 2007						
	Quotes	Mean	Std Dev	Median	Skew	Kurt	AR(1)	Quotes	Mean	Std Dev	Median	Skew	Kurt	AR(1)
Accor	905	58	20	56	0.76	0.19	1.00	587	123	59	116	0.47	-0.74	1.00
Aegon NV	905	21	7	23	0.02	-0.18	1.00	587	198	129	158	0.88	-0.05	0.99
AKZO Nobel NV	905	30	7	27	1.06	0.51	0.99	587	76	35	70	0.73	-0.18	0.99
AXA	412	15	6	13	1.90	6.30	0.99	587	113	58	101	0.54	-0.72	0.99
Barclays Bank PLC	905	10	3	9	3.30	20.23	1.01	587	110	53	98	0.50	-0.49	0.99
Bayer Aktiengesellschaft	905	30	8	28	0.64	-0.32	0.99	587	64	26	57	1.09	0.70	0.99
Bertelsmann AG	905	36	9	34	-0.05	-0.27	0.99	587	150	94	121	0.46	-1.06	1.00
Bayerische Motoren Werke AG	905	21	8	21	0.28	-0.46	1.00	587	151	116	110	1.12	0.29	1.00
British American Tobacco PLC	905	45	18	44	0.66	-0.12	1.00	587	76	31	70	0.98	0.81	0.99
Carrefour	905	22	6	21	0.39	-0.02	0.99	587	59	22	57	0.62	0.57	0.99
Commerzbank Aktiengesellschaft	905	18	8	16	1.62	5.81	0.99	587	82	27	74	0.68	-0.12	0.98
Deutsche Bank Aktiengesellschaft	905	15	4	15	2.87	17.78	0.98	587	90	33	88	0.19	-0.69	0.98
Deutsche Telekom AG	905	41	10	39	0.57	0.10	0.99	587	93	33	95	0.20	-0.21	0.99
EADS NV	905	26	7	24	0.76	-0.25	0.99	587	131	109	91	1.85	3.20	1.00
Edison SPA	905	32	17	28	1.10	0.34	1.00	587	74	37	69	0.94	0.21	0.99
Electricite de France	683	15	5	15	0.26	-0.51	1.00	587	60	32	49	1.10	0.60	0.99
EnBW Energie Baden-Wuerttemberg	561	17	5	17	0.26	-0.67	0.99	587	48	15	51	0.33	0.15	0.99
Enel SPA	905	20	6	19	0.96	1.19	1.00	587	161	143	99	1.77	2.13	1.00
EDP - Energias de Portugal SA	704	20	6	21	-0.17	-1.07	1.00	587	78	33	76	0.57	-0.54	0.99
E.ON AG	905	19	5	18	0.51	0.67	0.99	587	65	24	61	0.55	0.45	0.99
Fortum Oyj	905	25	10	26	0.17	-0.78	1.00	587	61	26	51	1.37	1.78	0.99
France Telecom	905	41	12	40	0.22	-0.57	0.99	587	71	28	74	0.17	-1.13	0.99
Hannover Rueckversicherung AG	905	23	10	23	0.51	0.22	0.99	587	64	25	61	0.67	0.14	0.98
Hellenic Telecommunications	905	45	9	45	-0.35	-0.68	0.99	587	89	34	81	0.80	-0.10	0.99
Iberdrola SA	905	22	5	22	0.28	-0.57	0.99	587	99	46	91	1.01	0.80	0.99
Koninklijke KPN NV	905	52	16	50	0.85	-0.08	1.00	587	80	29	79	0.64	-0.01	0.99
LVMH Moet Hennessy Louis Vuitton	905	32	10	31	0.47	-0.20	1.00	587	78	42	62	1.35	1.10	0.99
Marks and Spencer PLC	905	72	49	49	1.65	3.35	0.99	587	200	116	183	0.68	-0.20	0.99
Metro AG	905	42	11	42	0.55	-0.22	0.99	587	144	93	129	0.90	-0.07	0.99
Banca Monte Dei Paschi Di Siena Spa	905	16	6	16	0.31	0.21	1.00	587	78	29	74	0.72	0.20	0.98
Muenchener Rueckversicherung	905	19	8	21	-0.18	-0.94	1.00	587	52	19	49	1.12	1.71	0.98
Koninklijke Philips Electronics NV	905	30	9	32	0.03	-0.74	1.00	585	70	33	57	0.84	0.09	0.99
PPR	559	52	12	49	1.32	2.29	0.98	585	275	170	226	0.96	-0.15	1.00
Repsol YPF SA	905	36	10	35	0.89	0.63	1.00	585	142	105	103	1.69	2.08	1.00
RWE Aktiengesellschaft	905	19	6	19	0.77	0.68	1.00	585	53	19	48	0.33	-0.45	0.99
Compagnie de Saint-Gobain	905	32	6	31	0.87	1.90	0.99	585	190	111	163	0.91	0.16	1.00
Siemens Aktiengesellschaft	905	18	5	17	0.63	-0.57	1.00	585	86	47	71	0.99	0.74	0.99
Sodexho Alliance	.	.	.	.	.	.	.	472	64	22	58	0.60	-0.75	0.99
GDF Suez	.	.	.	.	.	.	.	332	64	24	55	1.56	1.28	0.99
Swiss Reinsurance Company	.	.	.	.	.	.	.	411	293	201	212	0.70	-0.86	1.00
Telecom Italia SPA	905	56	11	54	0.34	0.27	0.98	587	187	110	153	0.85	-0.15	1.00
Telefonica SA	905	39	9	38	0.28	-0.70	0.99	585	102	41	98	0.70	0.45	0.99
Unilever NV	905	19	5	18	0.94	0.29	0.99	585	40	16	36	0.85	0.13	0.99
Veolia Environnement	905	33	9	31	1.00	0.34	1.00	587	98	40	96	0.43	-0.72	0.99
Vodafone Group PLC	905	30	6	29	0.63	-0.26	0.99	587	98	45	94	0.82	-0.05	0.99
Volkswagen Aktiengesellschaft	905	45	19	45	0.04	-1.34	1.00	587	145	80	126	0.56	-0.44	0.99
Aktiebolaget Volvo	905	32	8	31	0.37	-0.86	0.99	585	225	170	168	0.61	-0.93	1.00
Average	869	30	10	29	0.69	1.16	0.99	575	110	60	94	0.82	0.19	0.99

Panel E: Fenics

	Before 9th August 2007							After 9th August 2007						
	Quotes	Mean	Std Dev	Median	Skew	Kurt	AR(1)	Quotes	Mean	Std Dev	Median	Skew	Kurt	AR(1)
Accor	902	58	20	56	0.79	0.32	0.99	447	109	57	92	0.99	0.44	0.99
Aegon NV	904	21	8	23	0.29	1.95	0.98	446	206	151	147	0.85	0.14	0.99
AKZO Nobel NV	904	30	7	27	1.09	0.75	0.98	446	76	39	64	0.53	-0.87	0.99
AXA	904	22	8	23	-0.20	-1.06	0.99	446	123	65	109	0.39	-0.72	0.99
Barclays Bank PLC	904	10	3	9	3.62	24.29	0.98	446	114	57	116	0.25	-1.04	0.98
Bayer Aktiengesellschaft	900	30	8	28	0.65	-0.31	0.99	250	52	18	50	0.75	0.78	0.98
Bertelsmann AG	904	36	9	35	0.02	-0.14	0.99	446	130	98	89	1.05	-0.21	1.00
Bayerische Motoren Werke AG	904	21	9	21	1.34	8.57	0.95	446	160	135	102	0.97	-0.28	0.99
British American Tobacco PLC	902	46	18	44	0.63	-0.25	0.99	447	79	35	75	0.70	-0.03	0.99
Carrefour	904	22	6	21	0.40	0.30	0.97	446	58	25	58	0.72	0.42	0.98
Commerzbank Aktiengesellschaft	903	18	8	17	1.71	6.66	0.97	446	81	28	75	0.71	-0.14	0.97
Deutsche Bank Aktiengesellschaft	724	14	4	14	3.79	23.99	0.96	659	89	31	87	0.18	-0.54	0.97
Deutsche Telekom AG	903	41	10	39	0.54	0.05	0.98	446	97	36	99	-0.03	-0.53	0.98
EADS NV	895	26	7	24	0.77	-0.23	0.98	454	142	120	94	1.46	1.58	0.99
Edison SPA	896	33	17	28	1.12	0.39	0.99	456	71	40	54	1.01	-0.26	0.99
Electricite de France	904	18	7	17	0.36	-0.61	0.99	446	63	36	52	0.84	-0.14	0.99
EnBW Energie Baden-Wuerttemberg	902	22	10	21	0.83	-0.05	0.99	447	47	17	44	0.63	-0.03	0.98
Enel SPA	896	20	6	20	1.00	1.22	1.00	453	177	156	99	1.34	0.65	0.99
EDP - Energias de Portugal SA	895	23	8	22	0.31	-0.53	0.99	454	77	37	61	0.72	-0.73	0.98
E.ON AG	902	19	5	19	0.49	0.74	0.98	447	66	27	64	0.35	-0.23	0.98
Fortum Oyj	903	25	10	26	0.14	-0.76	1.00	446	65	29	57	1.09	0.87	0.98
France Telecom	896	41	13	40	0.23	-0.57	0.98	453	79	27	85	-0.34	-0.77	0.98
Hannover Rueckversicherung AG	903	24	11	23	2.05	13.87	0.95	446	69	25	68	0.19	-0.22	0.98
Hellenic Telecommunications	904	45	9	45	-0.29	-0.65	0.98	449	92	37	87	0.50	-0.82	0.99
Iberdrola SA	902	23	5	22	0.30	-0.57	0.99	447	100	52	86	0.81	-0.06	0.99
Koninklijke KPN NV	904	53	16	50	0.91	0.15	0.99	446	87	29	86	0.29	0.09	0.98
LVMH Moet Hennessy Louis Vuitton	904	32	9	32	0.27	-0.26	0.99	450	83	47	63	0.97	-0.05	0.99
Marks and Spencer PLC	896	72	49	48	1.71	3.69	0.98	474	217	125	208	0.37	-0.58	0.99
Metro AG	904	42	11	42	0.53	-0.24	0.99	450	138	104	87	1.01	-0.26	0.99
Banca Monte Dei Paschi Di Siena Spa	904	16	6	17	0.25	0.17	0.99	450	81	33	78	0.54	-0.43	0.98
Muenchener Rueckversicherung	904	19	8	21	0.00	0.14	0.96	450	56	19	55	0.59	0.85	0.97
Koninklijke Philips Electronics NV	896	31	9	32	0.01	-0.87	0.99	453	72	35	60	0.58	-0.60	0.99
PPR	903	75	37	61	1.13	0.13	1.00	451	291	190	240	0.70	-0.75	0.99
Repsol YPF SA	903	36	10	35	0.83	0.51	0.98	451	153	122	86	1.46	1.23	0.99
RWE Aktiengesellschaft	904	19	6	19	0.81	0.94	0.99	450	55	21	53	0.09	-0.82	0.98
Compagnie de Saint-Gobain	903	32	6	30	0.90	1.72	0.98	451	200	118	183	0.42	-1.01	0.99
Siemens Aktiengesellschaft	902	18	6	17	0.73	-0.30	0.99	451	89	53	75	0.73	-0.11	0.99
Sodexho Alliance	397	27	6	26	0.79	0.26	0.98	659	60	21	53	0.75	-0.28	0.98
GDF Suez	397	12	4	12	0.01	-0.62	0.99	659	53	24	51	1.61	2.91	0.99
Swiss Reinsurance Company	902	19	6	20	-0.20	0.64	0.98	451	252	220	129	0.65	-1.27	0.99
Telecom Italia SPA	896	56	11	54	0.37	0.44	0.97	458	197	122	165	0.59	-0.79	0.99
Telefonica SA	903	39	9	38	0.34	-0.54	0.98	449	106	45	102	0.49	-0.10	0.98
Unilever NV	798	18	4	17	1.50	3.13	0.96	603	40	15	36	0.82	0.10	0.98
Veolia Environnement	902	33	9	31	1.01	0.39	0.99	450	96	45	80	0.61	-0.82	0.99
Vodafone Group PLC	903	30	6	29	0.60	-0.30	0.98	448	106	49	101	0.50	-0.52	0.99
Volkswagen Aktiengesellschaft	904	45	19	45	0.03	-1.35	1.00	447	147	88	124	0.49	-0.71	0.99
Aktiebolaget Volvo	902	30	8	28	0.63	-0.69	0.99	449	204	183	103	0.88	-0.78	1.00
Average	874	31	10	29	0.75	1.80	0.98	462	111	66	90	0.68	-0.16	0.99

Panel F: Reuters EOD

	Before 9th August 2007							After 9th August 2007						
	Quotes	Mean	Std Dev	Median	Skew	Kurt	AR(1)	Quotes	Mean	Std Dev	Median	Skew	Kurt	AR(1)
Accor								539	143	50	137	0.38	-0.74	0.99
Aegon NV								539	217	115	170	1.17	0.29	0.99
AKZO Nobel NV								540	83	30	73	1.07	0.22	0.99
AXA								538	123	51	106	0.76	-0.49	0.99
Barclays Bank PLC								538	122	45	113	0.70	-0.40	0.98
Bayer Aktiengesellschaft								513	67	25	57	1.31	0.81	0.99
Bertelsmann AG								536	173	80	160	0.38	-0.89	0.99
Bayerische Motoren Werke AG								537	167	110	115	1.25	0.47	0.99
British American Tobacco PLC								538	81	27	73	1.52	2.07	0.99
Carrefour								535	65	18	62	1.12	2.15	0.98
Commerzbank Aktiengesellschaft								535	87	23	80	0.92	0.08	0.97
Deutsche Bank Aktiengesellschaft								533	99	25	95	0.53	-0.36	0.97
Deutsche Telekom AG								530	99	27	97	0.76	0.18	0.99
EADS NV								538	141	100	95	1.85	3.12	1.00
Edison SPA								527	82	34	82	0.65	0.30	0.99
Electricite de France								529	66	29	57	1.35	1.17	0.99
EnBW Energie Baden-Wuerttemberg								514	53	12	54	0.59	1.34	0.98
Enel SPA								529	173	142	102	1.74	1.97	1.00
EDP - Energias de Portugal SA								528	89	31	89	0.33	-0.61	0.99
E.ON AG								514	70	20	63	1.42	1.77	0.98
Fortum Oyj								514	65	25	54	1.68	2.67	0.99
France Telecom								514	74	26	77	0.25	-1.11	0.99
Hannover Rueckversicherung AG								524	69	22	66	0.82	0.68	0.98
Hellenic Telecommunications								512	99	30	93	0.79	-0.21	0.99
Iberdrola SA								524	107	40	95	1.36	1.34	0.99
Koninklijke KPN NV								514	80	27	79	0.81	0.52	0.99
LVMH Moet Hennessy Louis Vuitton								517	83	40	64	1.48	1.21	0.99
Marks and Spencer PLC								514	223	102	194	0.96	0.06	0.99
Metro AG								517	162	85	141	0.99	0.09	0.99
Banca Monte Dei Paschi Di Siena Spa								513	88	26	82	1.01	0.40	0.97
Muenchener Rueckversicherung								513	53	17	49	1.48	3.33	0.97
Koninklijke Philips Electronics NV								511	74	31	57	0.97	0.08	0.99
PPR								510	300	162	240	1.03	-0.27	1.00
Repsol YPF SA								508	155	105	111	1.61	1.81	0.99
RWE Aktiengesellschaft								514	57	16	50	0.95	-0.04	0.98
Compagnie de Saint-Gobain								552	202	101	167	1.18	0.51	0.99
Siemens Aktiengesellschaft								514	95	42	73	1.43	1.71	0.99
Sodexho Alliance								554	63	20	58	0.77	-0.33	0.99
GDF Suez								514	57	22	52	1.72	2.86	0.99
Swiss Reinsurance Company								535	238	190	139	1.22	0.26	1.00
Telecom Italia SPA								517	208	97	164	1.10	0.00	0.99
Telefonica SA								518	109	34	101	1.25	1.24	0.99
Unilever NV								554	42	14	38	1.05	0.61	0.99
Veolia Environnement								554	104	35	98	0.66	-0.47	0.99
Vodafone Group PLC								535	105	41	96	1.04	0.27	0.99
Volkswagen Aktiengesellschaft								514	161	72	134	0.83	-0.21	0.99
Aktiebolaget Volvo								551	253	155	203	0.58	-0.77	1.00
Average								527	118	55	99	1.04	0.61	0.99

Panel G: GFI

	Before 9th August 2007								After 9th August 2007							
	Trades	Trad/Days	Mean	Std Dev	Median	Skew	Kurt	AR(1)	Trades	Trad/Days	Mean	Std Dev	Median	Skew	Kurt	AR(1)
Ace Limited	18	0.020	32	0	32	.	.	.	8	0.012	118	24	123	.	.	.
Alcoa Inc.	61	0.067	30	5	27	1.46	5.93	0.58	2	0.003	159	165	159	.	.	.
Altria Group, Inc.	258	0.285	139	49	139	-0.13	-0.82	1.00	13	0.020	69	28	65	.	.	.
American Express Company	190	0.210	26	5	29	0.42	1.29	0.94	61	0.092	209	148	180	1.80	3.20	0.81
American International Group, Inc.	442	0.488	24	0	24	.	.	.	157	0.236	59	133	24	3.95	14.82	1.03
Anadarko Petroleum Corporation	59	0.065	38	7	37	1.10	-0.01	0.91	8	0.012	123	91	98	.	.	.
Arrow Electronics, Inc.	263	0.291	105	31	105	0.19	-1.42	1.00	11	0.017	74	24	82	.	.	.
AT&T Inc.	301	0.333	39	10	37	0.39	-0.71	0.99	7	0.011	66	34	77	.	.	.
AutoZone, Inc.	129	0.143	88	14	90	-0.73	1.01	0.86	8	0.012	95	49	85	.	.	.
Baxter International Inc.	48	0.053	40	10	43	-1.06	-0.12	0.96	2	0.003	26	4	26	.	.	.
Boeing Capital Corporation	156	0.172	35	10	39	-0.29	-1.43	0.99	5	0.008	73	43	67	.	.	.
Bristol-Myers Squibb Company	59	0.065	36	11	39	-0.64	-0.79	0.97	3	0.005	26	5	24	.	.	.
Campbell Soup Company	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cardinal Health, Inc.	80	0.088	72	41	65	0.44	-1.26	0.95	2	0.003	49	16	49	.	.	.
Carnival Corporation	34	0.038	21	1	22	-0.53	-1.36	0.91	5	0.008	62	38	82	.	.	.
CenturyTel, Inc.	286	0.316	88	24	88	0.08	-0.96	0.96	10	0.015	101	33	96	.	.	.
Cigna Corporation	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Comcast Cable Communications, LLC	228	0.252	62	17	67	-0.25	-1.02	0.97	11	0.017	64	18	59	.	.	.
ConocoPhillips	54	0.060	29	4	30	-1.63	1.09	0.80	2	0.003	94	17	94	.	.	.
Constellation Energy Group, Inc.	102	0.113	45	11	52	-0.31	-1.71	0.86	16	0.024	132	87	94	.	.	.
CSX Corporation	115	0.127	54	14	50	0.35	-0.68	0.92	3	0.005	112	17	110	.	.	.
Devon Energy Corporation	70	0.077	39	4	40	0.29	-0.36	0.84	6	0.009	77	35	85	.	.	.
Dominion Resources, Inc.	122	0.135	46	11	47	-0.10	-0.79	0.91	7	0.011	60	14	57	.	.	.
The Dow Chemical Company	135	0.149	42	10	44	-0.11	-1.27	0.94	4	0.006	180	180	93	.	.	.
Eastman Chemical Company	118	0.130	61	7	61	0.36	-0.60	0.90	8	0.012	84	40	81	.	.	.
General Electric Capital Corporation	329	0.364	27	5	26	-0.30	-0.20	0.96	42	0.063	158	137	125	1.85	2.62	0.83
Honeywell International Inc	6	0.007	17	4	19	-1.23	-0.34	4.25	6	0.009	42	14	34	.	.	.
Loews Corporation	20	0.022	64	8	60	3.17	10.23	0.16	4	0.006	80	8	82	.	.	.
Marsh & McLennan, Inc.	21	0.023	81	13	72	0.72	-1.41	0.83	5	0.008	77	18	70	.	.	.
Omnicom Group Inc.	124	0.137	42	11	41	0.22	-0.53	0.87	6	0.009	126	126	66	.	.	.
Progress Energy, Inc.	115	0.127	53	8	53	0.50	5.77	0.80	14	0.021	50	15	44	.	.	.
Safeway Inc.	268	0.296	71	12	71	0.19	0.56	0.94	3	0.005	65	23	60	.	.	.
Sempra Energy	124	0.137	45	9	41	0.48	-0.85	0.89	8	0.012	61	27	56	.	.	.
Simon Property Group, L.P.	53	0.059	49	7	51	-1.27	0.66	0.96	16	0.024	243	202	183	.	.	.
Southwest Airlines Co.	134	0.148	55	16	47	0.39	-1.57	0.97	2	0.003	215	86	215	.	.	.
Time Warner Inc.	192	0.212	57	16	57	0.33	-1.25	0.97	14	0.021	99	46	110	.	.	.
Transocean Inc.	37	0.041	39	5	40	-0.43	4.16	0.55	5	0.008	214	119	260	.	.	.
Union Pacific Corporation	92	0.102	43	6	46	-0.65	-1.02	0.95	4	0.006	59	23	64	.	.	.
Valero Energy Corporation	79	0.087	58	14	55	1.12	0.22	0.95	3	0.005	108	91	56	.	.	.
The Walt Disney Company	205	0.227	47	15	46	0.04	-1.06	0.98	9	0.014	53	15	60	.	.	.
Wells Fargo & Company	199	0.220	22	6	26	-0.17	0.28	0.96	76	0.114	96	62	86	1.53	2.23	0.89
Whirlpool Corporation	125	0.138	59	20	64	-0.22	-1.65	0.95	6	0.009	113	76	89	.	.	.
XL Capital Ltd.	309	0.341	52	2	52	0.00	0.00	0.00	2	0.003	98	118	98	.	.	.
Average	140	0.155	50	12	51	0.06	0.15	0.95	14	0.021	99	60	89	2.28	5.72	0.89

Panel H: CMA

	Before 9th August 2007							After 9th August 2007						
	Quotes	Mean	Std Dev	Median	Skew	Kurt	AR(1)	Quotes	Mean	Std Dev	Median	Skew	Kurt	AR(1)
Ace Limited	905	40	14	41	0.14	-0.76	0.99	664	80	32	73	0.60	0.26	0.98
Alcoa Inc.	905	27	9	25	0.75	-0.42	0.99	664	282	244	207	1.20	0.53	1.00
Altria Group, Inc.	905	88	55	80	0.60	-0.66	1.00	664	85	33	86	0.09	-0.75	0.99
American Express Company	905	21	7	21	0.32	0.44	0.99	664	208	154	165	1.38	1.26	0.99
American International Group, Inc.	905	20	9	19	1.36	3.08	0.99	664	714	717	535	1.47	2.00	0.98
Anadarko Petroleum Corporation	905	34	7	34	1.18	2.54	0.98	664	107	72	78	1.48	0.95	1.00
Arrow Electronics, Inc.	905	76	28	67	1.04	0.01	1.00	664	95	48	82	1.62	2.93	0.99
AT&T Inc.	905	32	11	32	0.57	2.71	0.99	664	90	43	80	0.82	3.41	0.99
AutoZone, Inc.	905	31	22	69	0.03	-0.84	0.99	664	84	37	72	0.98	0.78	0.99
Baxter International Inc.	905	27	13	25	0.69	0.11	1.00	664	30	9	27	0.50	-0.77	0.99
Boeing Capital Corporation	905	22	12	20	0.64	-0.60	1.00	664	102	75	82	0.99	0.33	0.99
Bristol-Myers Squibb Company	905	22	10	20	0.86	-0.09	1.00	664	38	12	35	0.70	-0.15	0.99
Campbell Soup Company	905	22	7	23	0.01	-0.84	0.98	664	31	10	30	0.81	0.43	0.98
Cardinal Health, Inc.	905	47	30	35	2.11	4.72	0.99	664	55	17	52	0.70	0.76	0.98
Carnival Corporation	905	32	13	28	1.20	0.30	0.99	664	155	103	128	1.31	0.94	1.00
CenturyTel, Inc.	905	74	20	71	1.22	1.11	0.99	664	108	45	98	0.49	-0.77	0.99
Cigna Corporation	905	38	14	37	0.49	-0.20	0.99	664	124	76	110	1.03	0.78	0.99
Comcast Cable Communications, LLC	905	45	16	41	0.59	-0.65	1.00	664	124	58	119	0.80	1.15	0.99
ConocoPhillips	905	22	5	22	-0.32	-0.08	0.99	664	56	25	48	1.19	0.60	0.99
Constellation Energy Group, Inc.	905	36	11	36	0.06	-0.86	0.99	664	196	120	163	1.05	0.68	0.98
CSX Corporation	905	40	13	37	0.59	-0.46	0.99	664	97	45	81	0.60	-0.99	0.99
Devon Energy Corporation	905	36	13	34	0.72	-0.06	0.99	664	59	24	56	0.85	0.23	0.99
Dominion Resources, Inc.	905	39	13	40	-0.01	-0.67	0.99	664	58	21	52	1.72	2.80	0.99
The Dow Chemical Company	905	31	11	28	0.72	-0.54	0.98	664	168	155	113	1.66	1.93	1.00
Eastman Chemical Company	905	51	10	50	0.42	-0.28	0.98	664	78	41	63	1.38	0.99	0.99
General Electric Capital Corporation	905	21	7	21	0.31	-0.91	1.00	664	262	205	191	1.10	0.56	0.99
Honeywell International Inc	905	20	7	18	1.23	0.63	0.99	664	52	27	45	1.38	1.59	0.99
Loews Corporation	905	31	17	27	0.81	-0.30	1.00	664	57	20	55	0.25	-0.36	0.99
Marsh & McLennan, Inc.	905	55	28	46	3.12	15.76	0.97	664	67	19	64	0.78	0.54	0.98
Omnicom Group Inc.	905	30	11	30	0.34	-0.56	0.99	664	109	94	69	1.58	1.19	1.00
Progress Energy, Inc.	905	39	17	44	-0.26	-0.78	1.00	664	54	14	53	0.18	-1.03	0.98
Safeway Inc.	905	60	16	60	0.28	-0.44	0.99	664	73	23	71	0.13	0.18	0.99
Sempra Energy	905	35	13	39	-0.10	-0.38	0.99	664	74	30	71	0.36	-0.72	0.99
Simon Property Group, L.P.	905	36	13	36	0.14	-1.10	0.99	664	248	202	162	1.54	1.30	1.00
Southwest Airlines Co.	905	44	15	42	0.59	-0.31	0.99	664	181	95	169	1.16	1.66	0.99
Time Warner Inc.	905	50	17	47	0.40	-0.85	0.99	664	101	48	88	0.54	-0.69	0.99
Transocean Inc.	905	32	7	30	0.69	-0.44	0.98	664	110	78	86	1.69	1.87	1.00
Union Pacific Corporation	905	35	9	36	0.44	0.46	0.98	664	63	24	58	1.07	1.28	0.99
Valero Energy Corporation	905	44	14	42	0.94	1.67	0.99	664	176	81	189	-0.07	-0.81	0.99
The Walt Disney Company	905	31	16	29	0.59	-0.52	1.00	664	52	22	47	1.15	1.50	0.99
Wells Fargo & Company	905	15	6	14	0.82	0.62	0.99	664	110	54	97	1.24	2.05	0.98
Whirlpool Corporation	905	50	13	48	0.41	-0.60	0.99	664	185	129	141	1.28	0.75	1.00
XL Capital Ltd.	905	41	11	43	-0.07	1.12	1.00	664	358	298	250	1.02	-0.24	0.99
Average	905	38	14	37	0.62	0.47	0.99	664	129	86	106	0.97	0.72	0.99

Panel I: Markit

	Before 9th August 2007							After 9th August 2007						
	Quotes	Mean	Std Dev	Median	Skew	Kurt	AR(1)	Quotes	Mean	Std Dev	Median	Skew	Kurt	AR(1)
Ace Limited	905	40	15	40	0.57	1.10	0.99	586	81	34	75	0.43	-0.28	0.99
Alcoa Inc.	905	27	9	25	0.89	0.01	0.99	586	291	260	190	1.04	0.01	1.00
Altria Group, Inc.	905	88	55	81	0.58	-0.71	1.00	584	82	33	83	0.22	-0.73	1.00
American Express Company	905	21	7	21	0.24	0.11	1.00	586	226	158	182	1.19	0.72	0.99
American International Group, Inc.	905	20	9	19	1.37	3.24	1.00	586	745	756	503	1.23	0.96	0.99
Anadarko Petroleum Corporation	905	34	7	34	1.19	2.41	0.99	586	114	75	85	1.25	0.29	1.00
Arrow Electronics, Inc.	905	76	28	67	1.05	0.03	1.00	586	95	51	82	1.57	2.44	0.99
AT&T Inc.	431	26	8	23	0.59	-0.97	0.99	584	92	46	83	0.64	-0.10	0.99
AutoZone, Inc.	905	67	22	68	-0.02	-0.93	1.00	586	87	38	78	0.76	0.31	0.99
Baxter International Inc.	905	26	13	24	0.68	0.03	1.00	586	29	9	26	0.69	-0.61	0.99
Boeing Capital Corporation	905	22	12	20	0.66	-0.61	1.00	586	108	78	91	0.77	-0.18	0.99
Bristol-Myers Squibb Company	905	22	10	20	0.86	-0.11	1.00	586	38	13	35	0.72	-0.35	0.99
Campbell Soup Company	905	22	7	22	-0.02	-0.86	1.00	586	31	10	28	0.92	0.33	0.99
Cardinal Health, Inc.	905	47	30	35	2.13	4.80	0.99	586	55	18	50	0.63	0.23	0.99
Carnival Corporation	905	32	13	27	1.17	0.18	1.00	586	163	107	134	1.09	0.38	1.00
CenturyTel, Inc.	905	74	20	71	1.20	1.03	0.99	586	109	47	99	0.43	-0.94	0.99
Cigna Corporation	905	38	14	37	0.91	1.77	0.99	586	127	81	115	0.83	0.13	1.00
Comcast Cable Communications, LLC	905	44	17	40	0.46	-0.70	1.00	586	130	59	127	0.65	0.79	0.99
ConocoPhillips	905	22	5	22	-0.33	-0.11	1.00	586	59	26	50	0.97	0.12	0.99
Constellation Energy Group, Inc.	905	36	11	36	0.06	-0.88	1.00	586	203	125	178	0.76	-0.29	0.99
CSX Corporation	905	40	13	36	0.57	-0.48	1.00	586	102	45	89	0.41	-1.15	0.99
Devon Energy Corporation	905	36	13	34	0.70	-0.13	1.00	586	60	25	57	0.69	-0.22	0.99
Dominion Resources, Inc.	905	39	12	40	-0.08	-0.62	1.00	586	59	22	52	1.58	2.22	0.99
The Dow Chemical Company	905	31	11	27	0.71	-0.55	0.99	586	177	164	112	1.43	1.09	1.00
Eastman Chemical Company	905	50	10	49	0.40	-0.44	0.99	586	82	43	65	1.15	0.33	0.99
General Electric Capital Corporation	905	21	7	21	0.33	-0.94	1.00	586	276	218	205	0.91	0.10	0.99
Honeywell International Inc	905	20	7	18	0.96	0.26	1.00	586	54	29	45	1.18	0.88	1.00
Loews Corporation	905	31	17	27	0.82	-0.30	1.00	586	56	21	54	0.26	-0.75	0.99
Marsh & McLennan, Inc.	905	55	28	46	3.13	15.75	0.98	586	66	19	61	1.02	1.11	0.99
Omnicom Group Inc.	905	29	11	30	0.33	-0.58	1.00	586	114	98	70	1.37	0.50	1.00
Progress Energy, Inc.	905	39	16	44	-0.30	-0.83	1.00	584	52	14	50	0.33	-0.93	0.99
Safeway Inc.	905	59	15	60	0.23	-0.56	1.00	584	72	24	70	0.18	-0.12	0.99
Sempra Energy	905	35	12	39	-0.15	-0.47	0.99	586	74	31	72	0.33	-0.91	0.99
Simon Property Group, L.P.	905	36	13	36	0.10	-1.17	1.00	584	264	211	176	1.29	0.50	1.00
Southwest Airlines Co.	905	44	15	42	0.58	-0.35	1.00	584	187	100	175	0.91	0.90	0.99
Time Warner Inc.	905	50	17	47	0.39	-0.87	1.00	584	107	48	106	0.34	-0.78	0.99
Transocean Inc.	905	32	7	30	0.65	-0.54	0.99	584	117	80	89	1.49	1.18	1.00
Union Pacific Corporation	905	35	9	35	0.38	0.32	0.99	584	64	26	60	0.90	0.71	0.99
Valero Energy Corporation	486	36	7	36	-0.08	-0.74	0.99	584	174	87	186	0.02	-1.09	1.00
The Walt Disney Company	905	30	15	29	0.59	-0.51	1.00	586	52	23	46	1.01	0.92	0.99
Wells Fargo & Company	905	15	6	14	0.80	0.51	1.00	586	112	58	99	1.08	1.33	0.99
Whirlpool Corporation	905	50	13	47	0.35	-0.76	0.99	584	196	135	152	1.04	0.13	1.00
XL Capital Ltd.	905	41	11	43	-0.03	0.70	1.00	584	392	304	283	0.83	-0.66	0.99
Average	884	38	14	36	0.60	0.36	1.00	585	134	89	109	0.85	0.20	0.99

Panel J: Fenics

	Before 9th August 2007							After 9th August 2007						
	Quotes	Mean	Std Dev	Median	Skew	Kurt	AR(1)	Quotes	Mean	Std Dev	Median	Skew	Kurt	AR(1)
Ace Limited	904	44	16	42	0.87	1.19	0.99	460	81	38	77	0.49	-0.25	0.99
Alcoa Inc.	904	28	11	26	2.27	8.39	0.98	450	146	104	108	0.61	-1.03	1.00
Altria Group, Inc.	904	89	55	80	0.57	-0.71	1.00	447	85	45	75	0.68	-0.54	0.99
American Express Company	903	22	7	21	0.11	-0.16	1.00	454	248	178	205	0.84	-0.19	0.98
American International Group, Inc.	904	21	7	20	0.84	0.24	0.99	450	707	1002	104	1.54	1.16	0.97
Anadarko Petroleum Corporation	904	35	8	34	1.02	0.56	0.98	453	131	81	95	0.63	-1.23	1.00
Arrow Electronics, Inc.	904	77	28	68	1.05	0.04	0.99	453	97	48	88	0.85	0.28	0.99
AT&T Inc.	904	33	11	32	0.51	-0.30	0.99	450	96	57	78	0.89	0.01	0.99
AutoZone, Inc.	903	67	23	67	0.03	-0.85	0.98	454	100	43	99	0.50	-0.04	0.99
Baxter International Inc.	903	28	13	25	0.79	0.15	1.00	448	31	7	31	0.21	-0.65	0.97
Boeing Capital Corporation	904	21	10	18	1.09	0.11	0.99	448	86	57	69	0.42	-1.23	1.00
Bristol-Myers Squibb Company	904	21	10	20	0.80	0.04	0.99	446	43	15	42	0.19	-0.96	0.99
Campbell Soup Company	904	22	7	23	0.06	-0.75	0.99	450	57	27	51	0.30	-1.10	0.99
Cardinal Health, Inc.	724	46	25	39	1.79	4.62	0.99	659	56	15	51	1.38	2.12	0.99
Carnival Corporation	618	21	3	21	0.63	2.85	0.95	659	86	49	77	0.67	-0.44	0.99
CenturyTel, Inc.	534	67	10	69	-0.35	-0.71	0.95	659	120	62	91	1.22	0.87	0.99
Cigna Corporation	904	50	25	51	0.79	0.28	0.99	453	59	31	49	0.47	-0.92	0.99
Comcast Cable Communications, LLC	.	.	.	.	.	.	.	480	68	34	57	1.51	3.21	0.96
ConocoPhillips	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Constellation Energy Group, Inc.	904	37	11	36	0.05	-0.81	0.99	453	188	116	149	0.38	-1.28	0.99
CSX Corporation	904	40	14	37	0.50	-0.57	0.99	450	122	57	120	0.47	-0.64	0.99
Devon Energy Corporation	904	35	7	34	0.22	-0.94	0.99	450	72	28	72	0.29	-0.62	0.99
Dominion Resources, Inc.	903	39	12	40	-0.06	-0.60	0.99	451	62	22	57	0.89	0.23	0.99
The Dow Chemical Company	904	31	11	29	0.60	-0.79	0.99	450	175	189	87	1.39	0.51	1.00
Eastman Chemical Company	904	50	10	50	0.77	0.32	0.98	446	86	45	67	0.82	-0.59	0.99
General Electric Capital Corporation	904	13	3	13	3.10	17.08	0.99	449	114	70	83	0.58	-0.99	0.99
Honeywell International Inc	896	20	8	18	0.91	0.30	0.99	457	46	17	45	0.18	-1.08	0.99
Loews Corporation	904	35	20	33	1.05	0.97	0.99	450	64	27	69	0.03	-0.51	0.99
Marsh & McLennan, Inc.	775	61	26	57	2.96	13.35	0.94	627	79	18	72	1.44	2.25	0.98
Omnicom Group Inc.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Progress Energy, Inc.	904	40	16	44	-0.20	-0.65	0.99	450	52	15	50	0.80	0.88	0.93
Safeway Inc.	904	60	16	60	0.86	2.97	0.94	450	71	23	68	0.51	-0.35	0.99
Sempra Energy	904	35	12	39	-0.11	-0.65	0.99	449	71	32	66	0.79	0.06	0.98
Simon Property Group, L.P.	903	36	12	39	-0.14	-1.38	1.00	451	262	229	163	0.90	-0.61	0.99
Southwest Airlines Co.	904	44	15	43	0.42	-0.33	0.99	450	166	105	153	0.91	0.03	0.99
Time Warner Inc.	904	48	15	47	0.43	-0.35	0.99	450	124	50	131	-0.02	-0.72	0.99
Transocean Inc.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Union Pacific Corporation	904	35	9	36	0.27	-0.04	0.98	450	70	29	68	0.24	-0.75	0.99
Valero Energy Corporation	.	.	.	.	.	.	.	.	.	.	.	.	.	.
The Walt Disney Company	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Wells Fargo & Company	903	15	6	14	1.04	2.08	0.99	451	117	72	101	1.13	0.85	0.98
Whirlpool Corporation	904	51	14	50	0.25	-0.66	0.98	450	191	146	136	1.14	0.00	0.99
XL Capital Ltd.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Average	877	39	14	38	0.72	1.23	0.98	473	120	86	86	0.71	-0.12	0.99

Panel K: Reuters EOD

	Before 9th August 2007						After 9th August 2007						
	Quotes	Mean	Std Dev	Median	Skew	Kurt	AR(1)	Quotes	Mean	Std Dev	Median	Skew	Kurt	AR(1)
Ace Limited								560	87	29	75	0.85	1.09	0.98
Alcoa Inc.								179	637	179	630	0.62	-0.06	0.99
Altria Group, Inc.								560	92	28	90	0.17	-0.54	0.99
American Express Company								559	232	153	180	1.35	0.98	0.99
American International Group, Inc.								556	825	757	587	2.02	8.31	0.92
Anadarko Petroleum Corporation								561	116	72	86	1.29	0.34	1.00
Arrow Electronics, Inc.								560	103	46	85	1.88	3.36	0.99
AT&T Inc.								482	103	40	85	1.21	0.60	0.99
AutoZone, Inc.								559	90	34	78	0.99	0.79	0.99
Baxter International Inc.								560	31	8	30	0.49	-0.67	0.98
Boeing Capital Corporation								561	106	60	88	1.03	0.21	0.99
Bristol-Myers Squibb Company								477	41	12	39	0.68	-0.63	0.98
Campbell Soup Company								560	33	9	32	0.84	0.53	0.99
Cardinal Health, Inc.								557	58	15	56	0.89	1.28	0.98
Carnival Corporation								508	102	44	85	0.78	-0.82	1.00
CenturyTel, Inc.								561	117	41	105	0.55	-0.95	0.99
Cigna Corporation								561	136	75	128	0.97	0.56	0.99
Comcast Cable Communications, LLC								538	69	32	59	1.90	4.15	0.99
ConocoPhillips								561	59	25	49	1.25	0.54	0.99
Constellation Energy Group, Inc.								561	216	113	178	0.96	-0.01	0.99
CSX Corporation								173	130	44	145	-0.14	-1.40	0.99
Devon Energy Corporation								558	64	22	61	1.02	0.35	0.99
Dominion Resources, Inc.								561	61	21	54	1.63	2.24	0.99
The Dow Chemical Company								555	189	156	130	1.56	1.39	1.00
Eastman Chemical Company								556	86	41	67	1.28	0.50	0.99
General Electric Capital Corporation								562	297	198	206	0.97	0.05	0.99
Honeywell International Inc								560	57	26	48	1.39	1.52	0.99
Loews Corporation								553	61	16	57	0.38	-0.13	0.98
Marsh & McLennan, Inc.								561	70	18	68	0.72	0.98	0.99
Omnicom Group Inc.								561	120	95	75	1.43	0.58	1.00
Progress Energy, Inc.								551	57	13	59	0.02	-0.85	0.98
Safeway Inc.								536	78	19	79	0.56	0.78	0.98
Sempra Energy								551	80	27	78	0.07	-0.93	0.98
Simon Property Group, L.P.								552	276	205	181	1.41	0.72	1.00
Southwest Airlines Co.								561	200	83	175	1.50	1.88	0.99
Time Warner Inc.								561	109	48	105	0.40	-0.71	0.99
Transocean Inc.								501	124	81	89	1.46	0.85	0.99
Union Pacific Corporation								561	67	23	60	1.28	1.45	0.99
Valero Energy Corporation								559	196	70	199	0.04	-0.62	0.99
The Walt Disney Company								561	55	20	49	1.40	1.86	0.99
Wells Fargo & Company								559	120	50	104	1.69	2.77	0.98
Whirlpool Corporation								561	204	124	154	1.26	0.49	1.00
XL Capital Ltd.								530	415	298	309	0.77	-0.92	0.99
Average								533	148	81	123	1.00	0.74	0.99

Panel L: Using all the observations

	Before 9th August 2007				After 9th August 2007			
Europe	Average Number of Quotes or Trades	Mean	S.D.	Median	Average Number of Quotes or Trades	Mean	S.D.	Median
GFI	331	35	20	32	104	95	71	85
CMA	905	31	20	27	664	105	89	78
Markit	869	30	18	27	575	110	94	80
Fenics	874	31	20	27	462	111	101	78
Reuters					527	118	93	89
US	Average Number of Quotes or Trades	Mean	S.D.	Median	Average Number of Quotes or Trades	Mean	S.D.	Median
GFI	140	50	33	47	14	99	119	67
CMA	905	40	27	34	664	128	186	76
Markit	884	38	23	34	585	134	195	79
Fenics	877	39	24	35	473	120	209	74
Reuters					533	148	203	83

Panel M: Using the observations in the days in which there is a trade and quotes in all the data sources

	Before 9th August 2007				After 9th August 2007			
Europe	Average Number of Trades and Quotes	Mean	S.D.	Median	Average Number of Trades and Quotes	Mean	S.D.	Median
GFI	306	36	17	33	51	128	82	105
CMA	306	35	16	32	51	128	82	104
Markit	306	35	16	32	51	128	81	104
Fenics	306	36	16	32	51	128	82	105
Reuters					51	127	81	103
US	Average Number of Trades and Quotes	Mean	S.D.	Median	Average Number of Trades and Quotes	Mean	S.D.	Median
GFI	122	54	36	44	11	131	129	95
CMA	122	52	36	44	11	149	124	111
Markit	122	52	36	44	11	148	122	113
Fenics	122	51	37	44	11	130	115	92
Reuters					11	147	123	109

Panel N: Using the observations in the days in which there is not a trade but quotes in all the data sources

	Before 9th August 2007				After 9th August 2007			
Europe	Average Number Quotes	Mean	S.D.	Median	Average Number Quotes	Mean	S.D.	Median
CMA	553	28	19	25	264	135	114	96
Markit	553	28	19	25	264	135	113	96
Fenics	553	28	19	25	264	136	114	97
Reuters					264	135	113	96
US	Average Number Quotes	Mean	S.D.	Median	Average Number Quotes	Mean	S.D.	Median
CMA	749	36	20	33	339	151	224	91
Markit	749	36	20	33	339	153	224	93
Fenics	749	37	21	34	339	140	239	88
Reuters					339	147	230	86

Panel O: Unit Root Europe

	Before 9th August 2007				After 9th August 2007			
	CMA	Markit	Fenics	Reuters	CMA	Markit	Fenics	Reuters
Accor	I(0)	I(0)	I(0)		**I(1)**	**I(1)**	**I(0)**	**I(1)**
Aegon NV	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
AKZO Nobel NV	I(0)	I(0)	I(0)		I(1)	I(1)	I(1)	I(1)
AXA	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Barclays Bank PLC	I(1)	I(1)	I(1)		**I(1)**	**I(1)**	**I(0)**	**I(1)**
Bayer Aktiengesellschaft	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Bertelsmann AG	I(0)	I(0)	I(0)		I(1)	I(1)	I(1)	I(1)
Bayerische Motoren Werke AG	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
British American Tobacco PLC	I(0)	I(0)	I(0)		I(1)	I(1)	I(1)	I(1)
Carrefour	I(0)	I(0)	I(0)		I(1)	I(1)	I(1)	I(1)
Commerzbank Aktiengesellschaft	I(1)	I(1)	I(1)		I(0)	I(0)	I(0)	I(0)
Deutsche Bank Aktiengesellschaft	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Deutsche Telekom AG	I(0)	I(0)	I(0)		I(1)	I(1)	I(1)	I(1)
EADS NV	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Edison SPA	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Electricite de France	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
EnBW Energie Baden-Wuerttemberg	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Enel SPA	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
EDP - Energias de Portugal SA	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
E.ON AG	I(0)	I(0)	I(0)		I(1)	I(1)	I(1)	I(1)
Fortum Oyj	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
France Telecom	I(0)	I(0)	I(0)		I(1)	I(1)	I(1)	I(1)
Hannover Rueckversicherung AG	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Hellenic Telecommunications	**I(1)**	**I(0)**	**I(1)**		I(1)	I(1)	I(1)	I(1)
Iberdrola SA	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Koninklijke KPN NV	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
LVMH Moet Hennessy Louis Vuitton	I(0)	I(0)	I(0)		I(1)	I(1)	I(1)	I(1)
Marks and Spencer PLC	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Metro AG	I(0)	I(0)	I(0)		I(1)	I(1)	I(1)	I(1)
Banca Monte Dei Paschi Di Siena Spa	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Muenchener Rueckversicherung	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Koninklijke Philips Electronics NV	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
PPR	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Repsol YPF SA	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
RWE Aktiengesellschaft	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Compagnie de Saint-Gobain	I(0)	I(0)	I(0)		I(1)	I(1)	I(1)	I(1)
Siemens Aktiengesellschaft	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Sodexho Alliance	I(1)	-	I(1)		I(1)	I(1)	I(1)	I(1)
GDF Suez	I(1)	-	I(1)		I(1)	I(1)	I(1)	I(1)
Swiss Reinsurance Company	I(1)	-	I(1)		I(1)	I(1)	I(1)	I(1)
Telecom Italia SPA	I(0)	I(0)	I(0)		I(1)	I(1)	I(1)	I(1)
Telefonica SA	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Unilever NV	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Veolia Environnement	I(1)	I(1)	I(1)		**I(0)**	**I(1)**	**I(0)**	**I(1)**
Vodafone Group PLC	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Volkswagen Aktiengesellschaft	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Aktiebolaget Volvo	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)

Panel P: Unit Root US

	Before 9th August 2007				After 9th August 2007			
	CMA	Markit	Fenics	Reuters	CMA	Markit	Fenics	Reuters
Ace Limited	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Alcoa Inc.	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Altria Group, Inc.	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
American Express Company	I(1)	I(1)	I(1)		**I(1)**	**I(1)**	**I(0)**	**I(1)**
American International Group, Inc.	I(1)	I(1)	I(1)		**I(1)**	**I(1)**	**I(1)**	**I(0)**
Anadarko Petroleum Corporation	I(0)	I(0)	I(0)		I(1)	I(1)	I(1)	I(1)
Arrow Electronics, Inc.	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
AT&T Inc.	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
AutoZone, Inc.	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Baxter International Inc.	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Boeing Capital Corporation	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Bristol-Myers Squibb Company	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Campbell Soup Company	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Cardinal Health, Inc.	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Carnival Corporation	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
CenturyTel, Inc.	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Cigna Corporation	**I(1)**	**I(1)**	**I(0)**		I(1)	I(1)	I(1)	I(1)
Comcast Cable Communications, LLC	I(1)	I(1)	-		I(1)	I(1)	I(1)	I(1)
ConocoPhillips	I(1)	I(1)	-		I(1)	I(1)	-	I(1)
Constellation Energy Group, Inc.	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
CSX Corporation	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Devon Energy Corporation	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Dominion Resources, Inc.	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
The Dow Chemical Company	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Eastman Chemical Company	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
General Electric Capital Corporation	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Honeywell International Inc	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Loews Corporation	I(1)	I(1)	I(1)		**I(1)**	**I(0)**	**I(1)**	**I(1)**
Marsh & McLennan, Inc.	I(0)	I(0)	I(0)		I(1)	I(1)	I(1)	I(1)
Omnicom Group Inc.	I(1)	I(1)	-		I(1)	I(1)	-	I(1)
Progress Energy, Inc.	I(1)	I(1)	I(1)		I(0)	I(0)	I(0)	I(0)
Safeway Inc.	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Sempra Energy	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Simon Property Group, L.P.	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Southwest Airlines Co.	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Time Warner Inc.	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Transocean Inc.	I(1)	I(1)	-		I(1)	I(1)	-	I(1)
Union Pacific Corporation	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Valero Energy Corporation	**I(0)**	**I(1)**	**-**		I(1)	I(1)	-	I(1)
The Walt Disney Company	I(1)	I(1)	-		I(1)	I(1)	-	I(1)
Wells Fargo & Company	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
Whirlpool Corporation	I(1)	I(1)	I(1)		I(1)	I(1)	I(1)	I(1)
XL Capital Ltd.	I(1)	I(1)	-		I(1)	I(1)	-	I(1)

Table 2: The distribution of the quoted and traded CDS spreads

Summary statistics for the distribution of the quoted and traded 5y CDS spreads for the firms in Table 1. Panel A provides the distribution of the number of quoted spreads on a given day for a single name CDS. The first column reports the number of observations for which there are 1, 2, 3 and 4 quotes, respectively. The second column reports the percentage of cases in which there are 1, 2, 3, and 4 quotes, respectively, and is obtained as the ratio of second column and the total number of days. The last column of Panel A reports the cumulative percentage across the range of quotes. Panel B reports the distribution of the range of the mean absolute difference, in basis points, among all the possible pairs of quoted spreads on a given day for a single 5-year CDS. For instance, the first row in the first column reports the number of days in which the absolute difference between the different pairs of databases is lower than 1 basis point, and so on. Panel C provides the distribution of the range of the mean absolute difference, in basis points, between all the possible pairs formed by the GFI traded CDS spread and one of the different quoted CDS spreads. The sample period is January 2004 to March 2010.

Panel A

Number of Quotes	Number of Observations	Percentage	Cumulative Percentage
1	1870	0.013	0.013
2	18428	0.131	0.144
3	93168	0.660	0.804
4	27744	0.196	1.000
Total Days	141210		
Total Trades	26126	0.185	

Panel B

Range of the mean difference among quotes (in b.p.)	Observations	Percentage	Cumulative Percentage
Dif < 1	63172	0.447	0.447
1 < Dif < 2	30232	0.214	0.661
2 < Dif < 3	13234	0.094	0.755
3 < Dif < 4	7558	0.054	0.809
4 < Dif < 5	4808	0.034	0.843
5 < Dif < 6	3460	0.025	0.867
6 < Dif < 7	2762	0.020	0.887
7 < Dif < 8	2137	0.015	0.902
8 < Dif < 9	1645	0.012	0.914
9 < Dif < 10	1306	0.009	0.923
10 < Dif < 11	1100	0.008	0.931
11 < Dif < 12	941	0.007	0.937
12 < Dif < 13	749	0.005	0.943
13 < Dif < 14	620	0.004	0.947
14 < Dif < 15	610	0.004	0.951
15 < Dif < 16	422	0.003	0.954
16 < Dif < 17	405	0.003	0.957
17 < Dif < 18	292	0.002	0.959
18 < Dif < 19	295	0.002	0.961
19 < Dif < 20	283	0.002	0.963
Dif >= 20	5179	0.037	1.000
Total Quotes	141210		

Table 2 Continued: The distribution of the quoted and traded CDS spreads

Panel C

Range of the mean difference between the traded and quoted spreads (in b.p.)	Observations	Percentage	Cumulative Percentage
Dif < 1	10886	0.409	0.409
1 < Dif < 2	5409	0.203	0.612
2 < Dif < 3	2594	0.097	0.709
3 < Dif < 4	1663	0.062	0.772
4 < Dif < 5	1224	0.046	0.818
5 < Dif < 6	858	0.032	0.850
6 < Dif < 7	628	0.024	0.873
7 < Dif < 8	407	0.015	0.889
8 < Dif < 9	297	0.011	0.900
9 < Dif < 10	261	0.010	0.910
10 < Dif < 11	243	0.009	0.919
11 < Dif < 12	172	0.006	0.925
12 < Dif < 13	235	0.009	0.934
13 < Dif < 14	168	0.006	0.940
14 < Dif < 15	117	0.004	0.945
15 < Dif < 16	101	0.004	0.948
16 < Dif < 17	106	0.004	0.952
17 < Dif < 18	72	0.003	0.955
18 < Dif < 19	43	0.002	0.957
19 < Dif < 20	22	0.001	0.958
Dif >= 20	620	0.023	0.981
Total Quotes	26126		

Table 3: Time-serial correlation between variables

This table reports the correlation coefficients between the dependent and explanatory variables employed in equation (1). Log(Std. Dev. CDS spreads), the dependent variable in equation (1), refers to the cross-sectional standard deviation among the CDS spreads reported by the different data sources in a given day. Log (Mkt. Cap.) refers to the logarithm of the firm market capitalization. Trade is a dummy variable which is equal to one if there is a trade registered in GFI in the current date and to zero otherwise. Days w/o a trade represents the number of days without a trade up to the current date. Interaction Trade and Days w/o trade is constructed as the interaction between the number of days without a transaction up to one day ago and a dummy variable (Trade) which equals one if there is a trade the current date. CDS Bid-Ask Spread refers to the daily CDS bid-ask spread which is obtained from CMA. VIX Index represents the value of the VIX Index. Max quotes refers to a dummy variable which equals one when all the data sources available at a given date report a quote and is equal to zero otherwise.

Observations = 138653	Log(Std. Dev. CDS spreads)	Log(Mkt. Cap.)	Trade	Days w/o trade	Interaction Trade and Days w/o trade	CDS Bid-Ask Spread	VIX Index	Max Quotes
Log(Std. Dev. CDS spreads)								
Log(Mkt. Cap.)	-0.059							
Trade	-0.157	0.065						
Days w/o a trade	0.152	-0.058	-0.206					
Interaction Trade and Days w/o trade	-0.005	0.000	0.156	-0.032				
CDS Bid-Ask Spread	0.414	-0.080	-0.099	0.017	-0.001			
VIX Index	0.456	-0.051	-0.133	0.041	0.010	0.480		
Max Quotes	0.057	0.025	0.099	-0.157	0.008	-0.053	-0.041	

Table 4: Determinants of the standard deviation among the CDS data sources

This table reports the regression coefficients of the unbalanced panel regressions. The dependent variable is the standard deviation among the different CDS data sources (CMA, Markit, Fenics, Reuters EOD). The database includes ninety European and US firms (47 of the firms are European and the rest are American) which are the most liquid CDSs included in either the Itraxx or the CDX Index since the launching of the indexes, from January 2004 to April 2010. The estimation uses a fixed-effects model robust to heteroskedasticity. Column (1) reports the results for the whole sample of firms, Column (2) reports the results for the subsample of European firms, and Column (3) reports the results for the subsample of American firms. The *t-statistics* are reported between brackets.

		(1)	(2)	(3)
Log(Mkt. Cap.)		-0.095	-0.048	-0.187
		(-10.53)	(-5.91)	(-12.17)
Trade		-0.079	-0.061	-0.078
		(-10.01)	(-7.11)	(-4.95)
Days w/o a trade		0.0003	0.0000	0.0004
		(10.80)	(1.05)	(13.21)
Interaction Trade and Days w/o trade		-0.0006	0.0003	-0.0013
		(-1.97)	(0.61)	(-3.47)
CDS Bid-Ask Spread		0.041	0.075	0.030
		(14.76)	(34.77)	(11.39)
VIX Index		0.045	0.032	0.051
		(64.85)	(49.05)	(77.25)
Max Quotes		0.290	0.080	0.565
		(32.86)	(7.86)	(37.42)
Constant		0.938	-0.370	3.327
		(4.30)	(-1.89)	(9.00)
R-squared		0.481	0.371	0.458
Number of observations		138653	71605	67048
Number of groups		90	47	43
Observations per group	Minimum	940	940	1150
	Average	1541	1524	1559
	Maximum	1569	1569	1569
F-statistic		6922.270	4315.440	3337.690
Prob. > F-statistic		0	0	0
Condition Index		6.64	7.60	6.19

Table 5: Determinants of the standard deviation among the CDS data sources using the number of contributors as an explanatory variable

This table reports the regression coefficients of the unbalanced panel regressions. The dependent variable is the standard deviation among the different CDS data sources (CMA, Markit, Fenics, Reuters EOD). The database includes ninety European and US firms (47 of the firms are European and the rest are American) which are the most liquid CDSs included in either the Itraxx or the CDX Index since the launching of the indexes, from January 2004 to April 2010. The estimation uses a fixed-effects model robust to heteroskedasticity. Column (1) reports the baseline regression's results for the whole sample of firms without using the number of contributors as an explanatory variable. Column (2) reports the results obtained by adding the number of contributors as an additional explanatory variable to the ones in Column (1). Column (3) reports the results obtained using as an additional explanatory variable a generated regressor which is obtained after regressing the number of contributors on the VIX Index and the CDS bid-ask spread and then using the residual to proxy the number of contributors net of the global risk and the illiquidity effect in the CDS market. In order to estimate the coefficients presented in Column (3) of this table we use the bootsptrap methodology to correct any potential bias in the standard errors due to the use of a generated regressor. The *t-statistics* are reported between brackets.

		(1)	(2)	(3)
Log(Mkt. Cap.)		-0.095	-0.105	-0.105
		(-10.53)	(-10.33)	(-10.27)
Trade		-0.079	-0.134	-0.134
		(-10.01)	(-16.75)	(-15.95)
Days w/o a trade		0.0003	0.0004	0.0004
		(10.80)	(14.61)	(14.73)
Interaction Trade and Days w/o trade		-0.001	-0.0003	-0.0003
		(-1.97)	(-1.09)	(-1.10)
CDS Bid-Ask Spread		0.041	0.041	0.041
		(14.76)	(14.33)	(13.70)
VIX Index		0.045	0.048	0.046
		(64.85)	(66.66)	(63.80)
Max Quotes		0.290	0.338	0.338
		(32.86)	(29.74)	(30.23)
Number of Contributors			0.014	0.014
			(21.33)	(19.86)
Constant		0.938	0.854	1.101
		(4.30)	(3.49)	(4.46)
R-squared		0.481	0.495	0.495
Number of observations		138653	128179	128179
Number of groups		90	90	90
Observations per group	Minimum	940	332	332
	Average	1541	1424	1424
	Maximum	1569	1492	1492
F-statistic		6922.270	5870.500	
Prob. > F-statistic		0	0	
Wald Chi2				47673.88
Prob. > Wald Chi2				0
Condition Index		6.64	10.67	10.67

Table 6: Price Discovery Analysis by Pairs of CDS spreads

This table reports the results of the price discovery analysis. First, we estimate the Gonzalo-Granger (GG) price discovery metrics for different pairs of 5-year single name CDS spreads using different data sources. The estimations are based on a VECM in which the VAR-length is selected according to the Schwarz information criteria. Then we calculate the average Gonzalo-Granger metric for all the firms, the European and the American firms for the different pairs of data sources. When the price discovery metric is higher than 0.5, the corresponding data source leads the price discovery process. The symbols ***, **, and * (^^^, ^^, and ^) summarize the statistical significance test and indicate that the average price discovery metric (GG) corresponding to a given data source is significantly higher (lower) than 0.5 at a significance level of 99, 95 and 90%, respectively.

CMA versus Markit GG Price Discovery Metrics

	Total	Europe	US
CMA	0.574**	0.502	0.660***
Markit	0.426^^	0.498	0.340^^^

CMA versus Fenics GG Price Discovery Metrics

	Total	Europe	US
CMA	0.734***	0.754***	0.708***
Fenics	0.266^^^	0.246^^^	0.292^^^

CMA versus Reuters EOD GG Price Discovery Metrics

	Total	Europe	US
CMA	0.798***	0.859***	0.718***
Reuters EOD	0.202^^^	0.141^^^	0.282^^^

Markit versus Fenics GG Price Discovery Metrics

	Total	Europe	US
Markit	0.771***	0.800***	0.735***
Fenics	0.229^^^	0.200^^^	0.265^^^

Markit versus Reuters EOD GG Price Discovery Metrics

	Total	Europe	US
Markit	0.783***	0.893***	0.644***
Reuters EOD	0.217^^^	0.107^^^	0.356^^^

Fenics versus Reuters EOD GG Price Discovery Metrics

	Total	Europe	US
Fenics	0.398^^^	0.461	0.318^^^
Reuters EOD	0.602***	0.539	0.682***

Table 7: Determinants of the standard deviation among the CDS data sources using proxies for the VIX Index and the CDS illiquidity measure

This table reports the regression coefficients of the unbalanced panel regressions. The dependent variable is the standard deviation among the different CDS data sources (CMA, Markit, Fenics, Reuters EOD). The database includes ninety European and US firms (47 of the firms are European and the rest are American) which are the most liquid CDSs included in either the Itraxx or the CDX Index since the launching of the indexes, from January 2004 to April 2010. The estimation uses a fixed-effects model robust to heteroskedasticity. Column (1) reports the baseline regression results which are the same as in Column (1) of Table 4. Column (2) provides the results obtained when we use as an explanatory variable a generated regressor which is obtained as the residual of a regression in which the VIX Index is regressed on the CDS bid-ask spread. Column (3) reports the results obtained when we use as an explanatory variable a generated regressor which is obtained as the residual of a regression in which the CDS bid-ask spread is regressed on the VIX Index. In order to estimate the coefficients presented in Columns (2) and (3) we use the bootstrap methodology to correct any potential bias in the standard errors due to the use of generated regressors. The *t-statistics* are reported between brackets.

		(1)	(2)	(3)
Log(Mkt. Cap.)		-0.095	-0.095	-0.095
		(-10.53)	(-10.18)	(-10.15)
Trade		-0.079	-0.079	-0.079
		(-10.01)	(-10.05)	(-11.27)
Days w/o a trade		0.0003	0.0003	0.0003
		(10.80)	(11.54)	(11.29)
Interaction Trade and Days w/o trade		-0.0006	-0.0006	-0.0006
		(-1.97)	(-2.12)	(-1.81)
CDS Bid-Ask Spread		0.041	0.082	
		(14.76)	(38.96)	
VIX Index		0.045		0.057
		(64.85)		(206.26)
VIX Index net of the CDS Bid-Ask Spread effect			0.045	
			(64.96)	
CDS Bid-Ask Spread net of the VIX Index effect				0.041
				(13.54)
Max Quotes		0.290	0.290	0.290
		(32.86)	(33.99)	(31.30)
Constant		0.938	1.642	0.928
		(4.30)	(7.09)	(4.11)
R-squared		0.481	0.482	0.482
Number of observations		138653	138653	138653
Number of groups		90	90	90
Observations per group	Minimum	940	940	940
	Average	1541	1540.6	1540.6
	Maximum	1569	1569	1569
F-statistic		6922.270		
Prob. > F-statistic		0.000		
Wald Chi2			40905.47	60080.36
Prob. > Wald Chi2			0.000	0.000
Condition Index		6.64	5.06	6.1

Table 8: Determinants of the standard deviation among the CDS data sources using alternative regression methods

This table reports the regression coefficients of the unbalanced panel regressions. The dependent variable is the standard deviation among the different CDS data sources (CMA, Markit, Fenics, Reuters EOD). The database includes ninety European and US firms (47 of the firms are European and the rest are American) which are the most liquid CDSs included in either the Itraxx or the CDX Index since the launching of the indexes, from January 2004 to April 2010. We estimate the coefficients of the determinants of the standard deviation among the CDS data sources by means of different methodologies. Column (1) reports the results obtained using a fixed-effects model robust to heteroskedasticity as in Column (1) of Table 4. The results presented in Column (2) are obtained by means of a pooled-regression. Column (3) reports the results obtained using a Prais-Winsten regression with correlated panels corrected standard errors (PCSEs) and robust to heteroskedasticity, contemporaneous correlation across panels and serial autocorrelation within panels. The correlation within panels is treated as a first-order autocorrelation AR(1) and the coefficient of this process common to all the panels. Each element in the covariance matrix of the disturbances is computed with all available observations that are common to the two panels contributing to the covariance. The *t-statistics* are reported between brackets.

		(1)	(2)	(3)
Log(Mkt. Cap.)		-0.095	-0.012	-0.019
		(-10.53)	(-4.96)	(-4.87)
Trade		-0.079	-0.270	-0.081
		(-10.01)	(-31.14)	(-10.06)
Days w/o a trade		0.0003	0.0011	0.0012
		(10.80)	(54.31)	(29.88)
Interaction Trade and Days w/o trade		-0.0006	0.0009	0.0001
		(-1.97)	(2.72)	(0.28)
CDS Bid-Ask Spread		0.041	0.055	0.033
		(14.76)	(16.76)	(37.84)
VIX Index		0.045	0.041	0.043
		(64.85)	(46.94)	(39.18)
Max Quotes		0.290	0.384	0.394
		(32.86)	(44.12)	(17.00)
Constant		0.938	-1.144	-0.937
		(4.30)	(-19.79)	(-9.34)
R-squared		0.481	0.292	0.093
Number of observations		138653	138653	138653
Number of groups		90		90
Observations per group	Minimum	940		940
	Average	1540.6		1540.589
	Maximum	1569		1569
F-statistic		6922.27	5799.58	
Prob. > F-statistic		0.000	0.000	
Autorregressive (AR(1)) coefficient				0.63
Wald Chi2				4712.68
Prob. > Wald Chi2				0.000

Table 9: Determinants of the differences between JPM and Fenics CDS spreads

This table reports the regression coefficients of the unbalanced panel regressions. The database includes ninety European and US firms (47 of the firms are European and the rest are American) which are the most liquid CDSs included in either the Itraxx or the CDX Index since the launching of the indexes, from January 2004 to April 2010. The estimation uses a fixed-effects model robust to heteroskedasticity. Columns (1) and (2) report the coefficients of the determinants of the JPM and Fenics CDS spreads difference in absolute terms when we exclude the CDS Bid-Ask Spread and the VIX Index variables, respectively. Columns (3) and (4) provide the coefficients of the determinants of the JPM and Fenics CDS difference in relative terms when we exclude the CDS Bid-Ask Spread and the VIX Index variables, respectively. The difference in relative terms is obtained as the ratio between the difference in absolute terms and the mean between JPM and Fenics spreads. The *t-statistics* are reported between brackets.

		(1)	(2)	(3)	(4)
Log(Mkt. Cap.)		-2.325	0.029	-0.012	-0.009
		(-18.31)	(0.26)	(-10.41)	(-7.37)
Trade		-0.634	-0.019	-0.006	-0.005
		(-9.05)	(-0.25)	(-9.67)	(-7.96)
Days w/o a trade		0.016	0.012	0.000	0.000
		(14.04)	(11.14)	(13.55)	(13.14)
Interaction Trade and Days w/o trade		-0.004	-0.012	0.00002	0.00001
		(-0.68)	(-1.08)	(0.74)	(0.26)
VIX Index		0.3171		0.0003	
		(42.29)		(11.38)	
CDS Bid-Ask Spread			1.0290		0.0013
			(32.18)		(13.36)
Constant		53.738	-2.658	0.330	0.252
		(17.74)	(-0.98)	(12.00)	(8.91)
R-squared		0.203	0.320	0.108	0.115
Number of observations		46772	46772	46772	46772
Number of groups		43	43	43	43
Observations per group	Minimum	891	891	891	891
	Average	1088	1088	1088	1088
	Maximum	1149	1149	1149	1149
F-statistic		369.480	250.080	114.520	109.030
Prob. > F-statistic		0	0	0	0
Condition Index		4.40	2.99	4.40	2.99

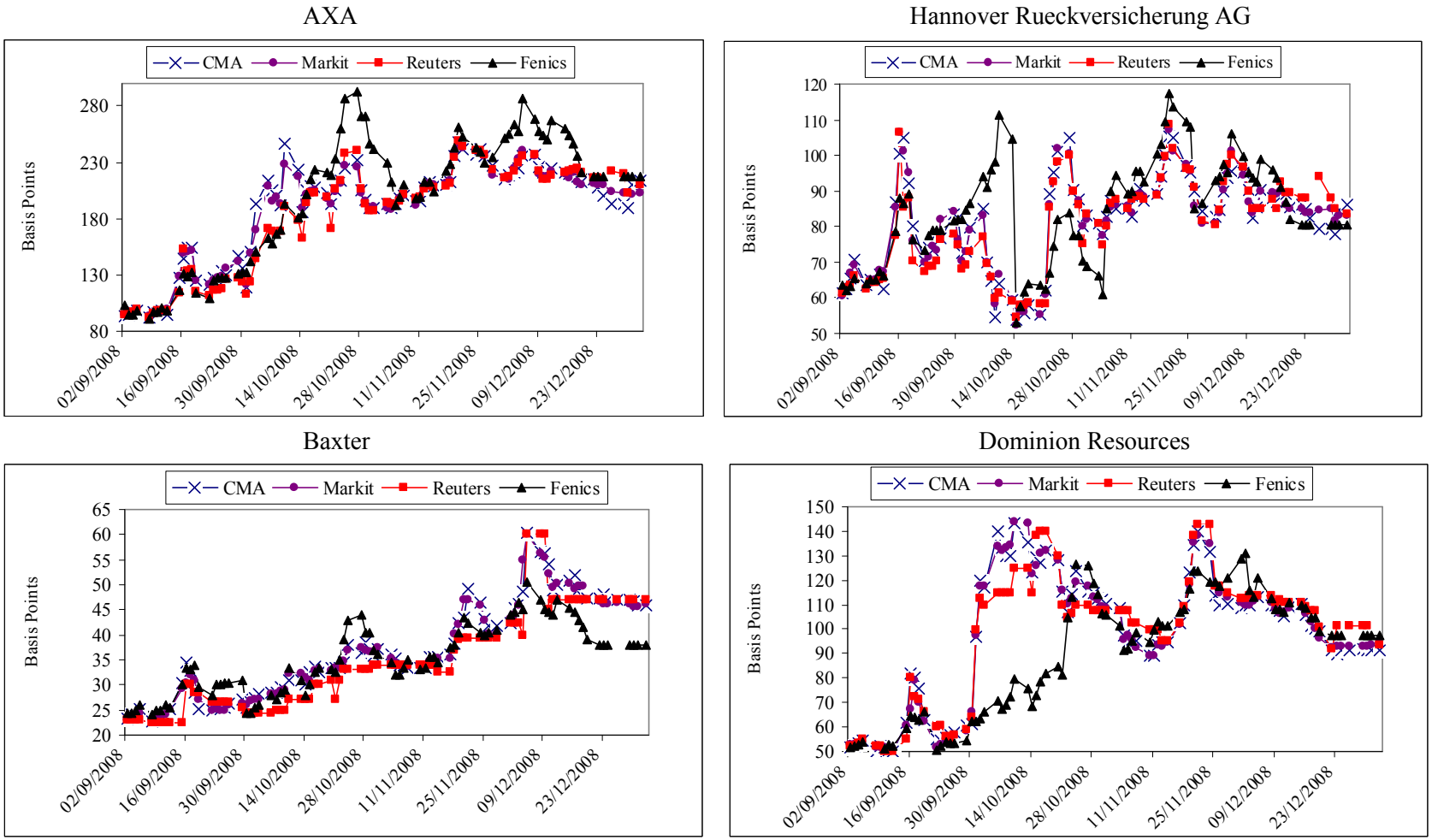

Figure 1: Single name CDS spreads from different data sources. This figure shows the CDS spreads time series (in basis points) for the different data sources (CMA, Markit, Reuters and Fenics) during the period September 2008 – January 2009.

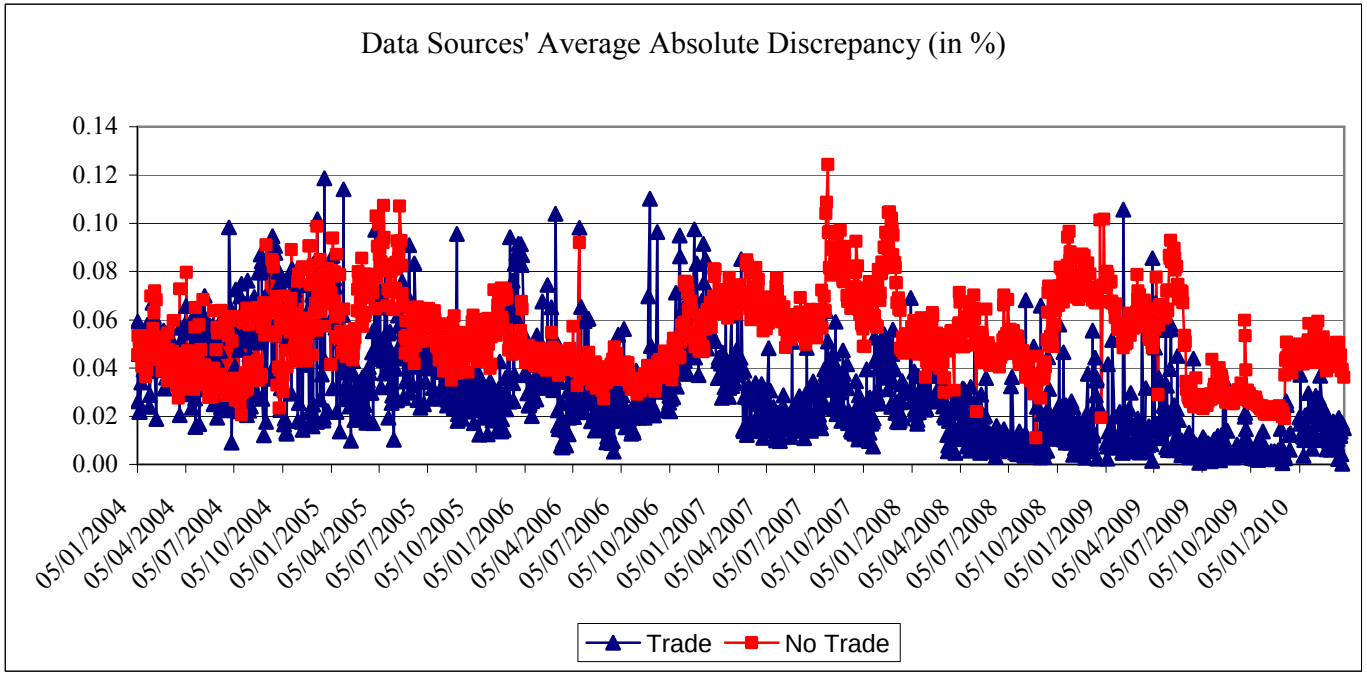

Figure 2. Data Sources' Average Absolute Discrepancies (AAD). This figure shows the cross-sectional deviations across data sources over time. The series is computed as the absolute value of the average difference across pairs of data sources (CMA - Markit, CMA - Fenics, CMA - Reuters, Markit - Fenics, Markit - Reuters, Fenics – Reuters) divided by the average CDS spread across the four previous data sources (CMA, Markit, Fenics, and Reuters) for each firm. Then, we calculate the average of the previous series date by date across the total number of entities.