

**BUYER BEWARE:  
A GLOBAL INVESTOR'S GUIDE TO SOVEREIGN CREDIT DEFAULT SWAPS**

FINAL TERM PAPER

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## **BUYER BEWARE: A GLOBAL INVESTOR'S GUIDE TO SOVEREIGN CREDIT DEFAULT SWAPS**

As international economies continue to become more interconnected, global investors have found themselves increasingly exposed to country-specific risk. This risk exposure can manifest itself through a number of avenues, including trade, politics, interest rates, and currencies. Not surprisingly, the financial markets have developed tools to enable investors to mitigate these sorts of risks. In this paper, we will investigate one specific instrument, the sovereign credit default swap (CDS), that has evolved out of a need for global investors to hedge the credit risk of countries in which they invest or do business. Sovereign CDS protection is particularly relevant today given the aggregate global rise in sovereign debt levels over the past 15 years, weakening global GDP growth rates, and rapidly approaching debt maturity dates (Exhibits 1 and 2).<sup>1</sup> The recent turmoil in the European markets underscores the importance for global investors to understand the strengths and weaknesses of the CDS instrument and how the market has evolved. Investors should consider trigger risks, counterparty risks, and pricing risks as they form a view on how much protection these CDS hedges actually provide.

### **Birth of the CDS Instrument**

CDS evolved in the early 1990s as a tool for commercial banks to reduce excess credit risk. The very first CDS was written by J.P. Morgan (JPM) in 1994 when Exxon needed a line of credit of up to \$5 billion to cover potential liabilities from the Exxon Valdez oil spill.<sup>2</sup> Basel regulations would have required JPM to maintain 8% of its capital in reserve against the risk of this loan going poorly. In order to make the loan and, at the same time, maintain balance sheet flexibility, JPM proposed selling the credit risk to the European Bank of Reconstruction and Development (EBRD) in exchange for fee premiums. Thus, the EBRD, in essence, sold insurance to JPM which allowed the bank to transfer its credit risk and free-up regulated capital in order to make more profitable loans. The CDS nomenclature was chosen to reflect both the bilateral nature of the agreement as well as to avoid the insurance label, which was thought to increase the likelihood of unwanted regulatory oversight.<sup>3</sup> This oversight was avoided in the late 1990s in both the European and American markets through benchmark legal opinions obtained from Robin Potts, Queen's Council, and the New York State Insurance Department. These

authorities ruled that because CDS agreements do not require ownership of the underlying asset, they are not insurance products despite sharing many economic and commercial similarities.<sup>4</sup> The lack of oversight has meant that the CDS instrument evolved as part of the self-regulated derivatives market where less regulatory protection is available relative to the insurance market.

As a result, the corporate CDS market was born. In this market, CDS are quoted as a spread to face value and buyers of protection pay quarterly premiums in exchange for protection in the event of default (Exhibit 3 for a more detailed description of payment flows). As market participants gained comfort with CDS instruments, the market eventually grew to include sovereign CDS. Historically, most credit derivatives associated with sovereign risk were focused on the mitigation of interest rate or liquidity risk (through interest rate and foreign exchange derivatives), rather than credit default risk (through CDS). Following the 1997-2003 debt crises in emerging markets around the world, bond investors became particularly concerned about managing their credit risk, which created turmoil in the bond markets of Russia, Ecuador, Ukraine, and Argentina, among others.<sup>5,6</sup> Use of the sovereign CDS instrument therefore evolved to help market participants hedge risk associated with credit default risk in emerging markets.<sup>5</sup>

### **Growth of the Sovereign CDS Market**

Emerging market CDS in Latin America and Asia continue to represent a substantial portion of the CDS market, at 18% and 13% respectively of total gross outstanding sovereign CDS.<sup>7</sup> Traditional valuation of developed market sovereign debt historically considered default an extremely low-probability event, which is why long-term government bond rates in developed countries are frequently used as the risk-free rate.<sup>5</sup> However, as a result of the recent global recession, the sovereign CDS market's attention has shifted to developed sovereigns. Today, 10 of the top 15 sovereign names with the largest CDS markets are developed countries (Exhibit 4). More specifically, over the past three years, the sovereign CDS market has come to be dominated by European sovereign CDS. A recent Fitch Ratings report suggests that since 2008, the sovereign market has almost doubled, with over \$1.5 trillion of new gross sovereign CDS exposure created. Approximately

two-thirds of that exposure referenced Europe, such that today, Europe represents over 60% of total gross outstanding sovereign CDS.<sup>7</sup>

The growth in European sovereign CDS has been driven predominately by increased purchases by holders of European sovereign debt (such as depository commercial banks and other institutional investors) who principally use sovereign CDS to hedge their holdings of sovereign debt. Total sovereign debt has risen dramatically in the past decade (Exhibit 2), and as illustrated in a recent IMF study that looked at a number of European countries as a proxy, domestic and international financial institutions are significant end-purchasers of government bonds (Exhibit 5).<sup>8</sup> Accordingly, as these institutions look to manage their sovereign credit risks, they use sovereign CDS to accomplish the following: i) to free up credit exposure to enable more profitable loans, ii) to hedge or reduce country-specific exposure for which they no longer have the risk appetite, and iii) to reduce credit risk without incurring the political risk of not extending credit to sovereign nations (e.g. European commercial banks feeling the pressure to buy sovereign bonds in order to avoid damaging their relationship with the EU, ECB, and their home countries).<sup>9,10</sup>

While this sort of direct hedging is responsible for a large part of the sovereign CDS market, it fails to tell the full story of sovereign CDS growth. Investor use of sovereign CDS has grown for a number of additional reasons, including: i) to indirectly hedge country-specific risk in otherwise unrelated investments, ii) to assume directional risk positions based on expectations regarding short-to-medium term movement in credit default spreads, iii) to arbitrage inefficiencies in the pricing of underlying government bonds and their credit derivatives, and iv) to trade relative-value between two different countries.<sup>5</sup>

However, unlike the corporate bond market, where total gross corporate CDS issuance is estimated to match or exceed total corporate bond issuances at approximately \$10 trillion, the sovereign CDS market is not as developed.<sup>11</sup> Our estimate of the total CDS market using Depository and Trust Clearing Corporation (DTCC) data, the largest central data repository for CDS transactions, suggests that total sovereign CDS exposure is approximately \$3.1 trillion on a gross basis and \$260 billion on a net basis (see Counterparty Risk discussion for

explanation of gross and net exposure).<sup>12</sup> The size of the sovereign CDS market is dwarfed by the total sovereign debt market which at year-end 2010 totaled \$39 trillion (Exhibit 6).

The disparity between sovereign CDS coverage and corporate CDS coverage, combined with the year-long turmoil in the European bond markets, suggests that pure speculation is likely not the major driver of volume in the sovereign CDS market, particularly when compared to other credit derivatives. Nonetheless, it is clear that some of the trading activity in sovereign CDS is based on directional speculation and indirect hedging (defined as hedging of sovereign credit risk by non-holders of sovereign debt). For example, there is a \$2.6 billion gross CDS market for Saudi Arabia, a country with no externally-held sovereign debt.<sup>12,13</sup>

As the CDS market continues to evolve, it gains in scale, sophistication, and complexity. In order to understand the sovereign CDS market, it is important to understand how CDS contracts are actually structured between participants. All CDS contracts are conducted over-the-counter (OTC), which means they are bilateral agreements between a purchaser and a seller of credit default protection. Participants must have legal documentation with their counterparties to document the agreement. Initially, this documentation was created separately for each transaction and counterparty, such that every CDS was a customized agreement, limiting the availability and liquidity of the credit derivatives market. In the early 1990s the International Swaps and Derivatives Association (ISDA) standardized all derivative transactions by formulating a master agreement (MA) that has continued to evolve to include documentation for a variety of instruments, including credit derivatives. The ISDA MA and its supporting documentation provide the framework by which the majority of sovereign CDS contracts trade today.<sup>14</sup>

#### **TRIGGER RISK: When Does a Sovereign Credit Default Trigger a CDS Payout?**

Despite the standardization that ISDA has brought to the market, derivative products often evolve faster than their supporting framework, creating uncertainty in outcomes that have yet to occur. A critical issue for any investor in sovereign CDS is to understand the trigger risks that these specific instruments introduce. Specifically, an investor must consider risks associated with the sovereign liabilities (also known as obligations) that are

covered under a CDS, the potential for conflicts of interests in determining when and how a sovereign credit event (ie. a default) is triggered, and what defines a credit event.

### *Covered Obligations*

CDS are written to transfer the credit risk of default of an underlying entity, which is referred to as the reference entity. Sovereign CDS are most commonly structured to protect against default tied to a “single-name” reference entity (e.g. the Hellenic Republic).<sup>12</sup> It is important to understand that not every liability of a sovereign is covered by a CDS contract. Because a reference entity could be liable for a series of financial instruments, not all of which necessarily default together, the ISDA framework provides for definitions of liabilities (which they label as “obligations”) that qualify for inclusion in the reference entity upon which a CDS can be triggered.<sup>14</sup> Specific examples of obligations include traded instruments such as treasury bonds or more esoteric instruments such as sovereign-guaranteed bonds held by state-owned enterprises. The ISDA framework helps participants distinguish between obligations in two ways. First, ISDA defines six obligation categories which range from broad to narrow (e.g. a broad obligation category is “borrowed money”, while a more narrow obligation category is “bonds”). Second, the obligation categories themselves can be further restricted by seven characteristics.<sup>14</sup> Most importantly, while these characteristics vary in purpose, they allow CDS market participants to differentiate between foreign and domestic obligations of the sovereign (e.g. to distinguish coverage by issuance, currency, governing law, etc.) (see Exhibits 7 and 8 for specific definitions of categories and characteristics). Accordingly, specific obligations may differ across sovereign reference entities.

While investors should understand the specific obligations covered under any individual contract, the scope of obligations covered by CDS contracts tends to be broadly similar depending on whether the CDS covers emerging market sovereigns or developed market sovereigns. Developed market CDS are designed to provide the broadest category coverage among sovereign CDS. Accordingly, it is often unclear exactly what is covered. Investors should be careful in assuming that more esoteric or indirect obligations are automatically included. On the other hand, emerging country CDS are typically limited to the country’s foreign currency denominated and

internationally governed obligations (see Exhibit 9 for a breakdown of obligations by region). These restrictions allow a country to default on certain obligations without triggering a CDS. An investor unaware of this distinction could find himself unhedged.

### *Conflicts of Interest*

Market participants rely on ISDA to provide certainty around the determination of covered obligations and the constitution of credit events. The ISDA framework is highly transparent, but its lack of independence as a trade association may cause potential conflicts of interest to arise.<sup>15</sup> Whether a credit event has occurred is determined by regional Credit Derivatives Determinations Committees (DCs), made up of ten sell-side firms and five buy-side firms that are elected based on aggregate trading volume of credit derivatives (see Exhibit 10 for list of DC members).<sup>16</sup> This appears to be a potential conflict of interest that any smaller investor should be aware of: the system is designed such that the biggest participants with the most exposure to default are the arbiters of the default itself. That said, the system is generally set-up to achieve agreement between the buy-side and sell-side, as most decisions generally require a supermajority (12 of 15 members), and all rulings and votes by members are made public.<sup>17</sup> Nonetheless, a simple majority decision can be approved subject to review by an independent expert panel. More importantly, the interests of the largest buy-side firms that sit on the DC could potentially be more closely aligned with the sell-side members than with small players who have no representation.<sup>17</sup> Accordingly, the outcomes of the DC may be partial to the needs of the largest players.

### *Credit Events*

There are six types of credit events that trigger CDS contracts as defined by the 2003 Credit Derivative Definitions (Derivative Definitions) provided by ISDA (see Exhibit 11 for a list and description of credit events). Not all sovereign CDS have the same credit events, but by definition they exclude bankruptcy as it relates to the underlying entity rather than the obligation and obviously control of a sovereign cannot be transferred to its creditors nor can it be liquidated. The other credit events relate to various forms of a failure to pay or restructuring (see Exhibit 12 for a breakdown of credit events by region). Credit events that qualify as failure to

pay are clear cut and generally leave little room for interpretation. However, with regard to credit events that would be considered restructuring, there is considerable uncertainty as definitions are less clear cut and most potential outcomes have yet to be tested. The major issues that an investor must consider when evaluating a potential restructuring credit event are: i) mandatory vs. voluntary amendment, ii) subordination, iii) multiple holder requirement, and iv) currency.

Mandatory vs. Voluntary Amendment: The market seemed to be caught by surprise in October of 2011 when the proposed voluntary ‘haircut’ on Greek debt looked unlikely to trigger CDS contracts based on an ISDA press release.<sup>18</sup> ISDA pointed to the Derivative Definitions, which states that a restructuring must occur “in a form that binds all holders”.<sup>14</sup> From a market participant’s perspective, the key question is whether the many banks and other holders of Greek sovereign debt were being coerced to agree to the restructuring by third-party governments and supranational agencies, or whether it was a truly voluntary exchange based on negotiations between bondholders and Greece. Said another way, did governments engineer an economic default without triggering a legal default? Once it became evident that for ISDA this distinction is irrelevant, market participants began to question the utility of CDS for indirect hedging (i.e. an investor that buys a CDS, but does not own the underlying bond) and for directional speculation, as is evident in the extreme volatility in Greek CDS pricing immediately following ISDA’s announcement (Exhibit 13). Interestingly, the spread between Greek CDS prices and Greek bond yields dramatically widened, supporting the thesis that the market began to question the utility of sovereign CDS as an indirect hedge.

With respect to direct hedging, this debate is less relevant. Anyone holding Greek sovereign debt and a CDS contract could continue to do so, and in the event a credit event did occur after the “voluntary” exchange, the CDS would still be triggered, and holders of CDS would be made whole.<sup>19</sup> On a go-forward basis, a global investor should be aware that indirect hedging and speculation using sovereign CDS may not be as protected as direct hedging (particularly in Europe, where the EU is placing restrictions on so-called “naked” CDS positions).<sup>20</sup>

Subordination: One of the definitions of restructuring considers if “a change in the ranking in priority of payment of any Obligation, causing the Subordination of such Obligation to any other Obligation”.<sup>14</sup> However, the ISDA framework specifies that subordination can only occur if the sovereign obligations in question contain express provisions as to a priority status (e.g. a bond specifying explicitly that it be paid before any other obligation).<sup>21</sup> This specification is generally not found in sovereign obligations.<sup>21</sup> This means, for example, that the IMF can provide emergency lending (which does carry a prioritization over other obligations) without legally subordinating other sovereign debt. The DC provided its opinion on this general question with respect to Ireland:

*“...the priority of an Irish bondholder in a sovereign debt restructuring has never been expressly delineated in the terms and conditions of an Irish sovereign bond or in Irish Law, therefore an Irish sovereign bondholder has no express right with respect to this matter. As such the Republic of Ireland may freely grant such a preferential right to the IMF that changes the ranking of priority of payments without varying a contractual term in the original bondholder’s terms and conditions.”<sup>21</sup>*

Here again, you find an economic consequence unprotected by a legal framework, whereby an investor needs to carefully evaluate the risk of political action affecting his CDS positions.

Multiple Holder Requirement: A multiple holder requirement mandates that restructuring can only trigger a CDS if the sovereign obligation is held by at least three holders that are not affiliated with each other, and further requires that at least 66.7% of those holders consent to a restructuring.<sup>14</sup> When this is in place, emergency funding provided by the IMF or another singular agent can be unilaterally or bilaterally restructured without triggering a credit event. Interestingly, this requirement is not included for Latin America, Emerging Europe, the Middle East, or Japan, suggesting less flexibility for emergency funding in these markets (Exhibit 12).

Currency: There has been some concern in the market that if a country were to leave the European Monetary Union (EMU) and institute a new sovereign currency that it might continue to make payments (and thereby avoid triggering a credit event), but in a devalued currency that is effectively much less valuable. This in effect would limit the usefulness of sovereign CDS. A change in currency is considered a restructuring credit event if the currency is not considered a ‘Permitted Currency’.<sup>14</sup> A permitted currency is that of any “Group of

Seven” country (of which Germany, France and Italy are a part) or any country that is a member of the OECD and has a local currency long-term debt rating of AAA from S&P, Aaa from Moody’s, or AAA from Fitch.<sup>14</sup> For instance, in a scenario in which Italy leaves the European Monetary Union (abandons the euro), it seems that Italy could theoretically continue to pay its obligations in a newly issued and devalued currency, with the ability to print money, without triggering a CDS credit event (even if a rating agency downgrades Italy below investment-grade). This is particularly troubling for global investors given that Italy is by far the largest sovereign CDS market (Exhibit 4).

Despite the framework created by ISDA to provide greater transparency and security in derivative transactions, the issues described above serve to highlight the significant uncertainties that still exist in the ultimate functioning of sovereign CDS around potential credit events. Much of this is due to a lack of precedent that exists in the market and that is unlikely to become established in a robust form given the nature of the underlying obligations covered.<sup>6,22</sup> Trigger risks exist given the uncertainties around economic versus legal outcomes in the event of apparent sovereign credit default. Assuming CDS investors can get comfortable with these risks, they must then evaluate their exposure to counterparties.

#### **COUNTERPARTY RISK: Collateral, Contagion and the Risk of Payment**

Regardless of the underlying reason for why a firm chooses to purchase or sell CDS, they must find a counterparty to take the opposite side of the trade. Therefore, participants in the CDS market must be cognizant of counterparty risk, i.e. the risk that the party on the other side of the trade will not be able to honor its obligations. Accordingly, a global investor should understand the motivations and incentives of other market participants and most importantly, the broker/dealers in the CDS market.

Because CDS were historically illiquid and customized instruments, central middlemen were required to concentrate sufficient volume necessary for these instruments to trade. This role was and continues to be filled by investment banks who are still best positioned to provide the vast majority of liquidity to the marketplace as broker/dealers (i.e. market makers). It is difficult to obtain information for the sovereign CDS market in isolation,

but according to ISDA, the fourteen largest broker/dealers (commonly referred to as the “G14”), are the counterparties in over 90% of credit derivative transactions.<sup>23</sup> The five largest U.S. dealers alone (which are JPMorgan Chase, Citibank, Bank of America, Goldman Sachs, and Morgan Stanley) make up 45% of the volume.<sup>24</sup> Supporting research by the Federal Reserve Bank of New York suggests that these ratios also hold in close approximation in the sovereign debt market.<sup>25</sup> This data suggests that not only are broker/dealers entering into CDS with hedge funds, banks, and other financial institutions, but also that broker/dealers frequently enter into CDS agreements with other broker/dealers. Accordingly, there is a high degree of interconnectedness within the system.

### *Collateral*

An investor need look back no further than the collapse of AIG to understand that the insurance provided by CDS is only valuable insofar as the CDS seller is able to make the CDS buyer whole in the event of a credit default. Most of the larger market actors, including ISDA as well as the G14 broker/dealers, appear to believe that there is little risk that an “AIG-like” counterparty is assuming all the risk and collecting premiums as a large, systemic seller in the sovereign CDS market.<sup>26,27</sup> Nonetheless, the interconnectedness of the system calls into question the consequences of a broker/dealer not being able to honor its obligations as one of the major challenges for all CDS market participants.

In general, the most common way for counterparty risk to be managed is for counterparties to post collateral. The CDS market is no exception, with the further distinction that because both parties have potential obligations (premiums on the side of the buyer, potential default-related payments on the side of the seller), collateral is usually owed by both sides.<sup>28</sup> Exposures are calculated on a mark-to-market basis using probabilistic analysis of default and recovery rates, and the required level of collateral on each side of the agreement depends on perception of counterparty risk as negotiated by the parties, which is often based on credit ratings and corporate CDS spreads when available.<sup>29,30</sup> While data is not available for sovereign CDS agreements, the 2011 ISDA Margin Survey suggested that collateral thresholds on net exposure in the broader CDS market can

range from a high of 178% for large hedge funds to a low of 10% for local governments, with broker/dealers typically posting approximately 78% collateral (Exhibit 14).<sup>29</sup>

Furthermore, the ISDA MA allows market participants to collateralize only the net obligation across all agreements.<sup>31</sup> This is useful because many participants (and especially the broker/dealers) both buy and sell protection to each other in a variety of OTC derivatives. At any point in time (usually measured daily), the party that is the net obligator, across all agreements between the two parties, posts their required collateral for the value of the net obligation. As a result, the net collateral tracks net CDS exposure rather than gross. While data availability on collateral levels in the sovereign CDS market is extremely limited, the consequences of this netting are evident in the statistics. ISDA estimates the total collateral obligations across all derivatives at \$2.9 trillion, which compares evenly to the Bank for International Settlements' (BIS) estimate of 2010 net derivatives exposures of \$3.3 trillion.<sup>28,29</sup> Interestingly, aggregate net derivatives exposures are quite low relative to the total gross volume of derivatives (which was placed at \$601 trillion in 2010 by the BIS). This is because net exposures in individual derivative markets (e.g. \$1.35 trillion in the CDS market, \$14.6 trillion in the interest rate derivatives market, \$2.5 trillion in the foreign exchange derivative market, etc.) can be further netted out when evaluating relative counterparty exposure, which is why there exists only \$3.3 trillion of total net derivatives exposure.<sup>28</sup> This is further evidence of the relatively few number of participants in the total derivatives market, relative to size and number of transactions. The sufficiency of collateral is further called into question when considering the fact that broker/dealers are allowed to rehypothecate collateral (i.e. collateral received from one party can be used as the broker/dealers collateral owed to a different party).<sup>28</sup> For the global investor concerned about sovereign CDS, it is important to consider the ramifications of the above with respect to the counterparty risk embedded in the concentration of CDS trading at the broker/dealers.

The concentration and interconnectedness of the market means that an investor must closely assess the risks that his counterparty (i.e. the broker/dealer) is assuming. This is because a failure of one broker/dealer might lead to other broker/dealers failing, a concept known as the knock-on effect. In this context, it is

important to understand the different ways in which a broker/dealer might fail. This includes basis risk, jump-to-default risk, and wrong-way risk.

Basis Risk: The broker/dealers make markets in CDS as a way to generate fee revenue by collecting the bid/ask spread of providing CDS to the market. As the CDS market has grown, investment banks are increasingly reliant on profits from derivative market making.<sup>32</sup> For example, Goldman Sachs' derivatives market making business generated 25-35% of its total revenues in 2009 and 2010.<sup>33</sup> However, because CDS are bilateral agreements, and the broker/dealers are counterparties in every trade they make, they are exposed to posting additional collateral. Unlike many of the investors with which they trade, in general, broker/dealers are typically not interested in taking long-term positions on the direction of market movements because losses from posting required collateral could destroy the profits collected by earning bid/ask spreads.<sup>26</sup> Accordingly, broker/dealers offset their derivative positions so as to avoid posting collateral due to directional movements in the CDS or the underlying bonds. Any exposure not offset is known as basis risk. Therefore, broker/dealers hedge most of their CDS basis exposure through a variety of hedging agreements which they predominately obtain from other broker/dealers.<sup>24</sup>

It is difficult to find evidence of how hedged these institutions truly are, given that the dealers have highly proprietary strategies that inform implementation of hedging as well as their willingness to be exposed to basis risk.<sup>26</sup> Some recent research by the Federal Reserve Bank of New York suggests that a majority of dealers do not create perfect hedges when they make significant directional CDS issuances. Instead, it is suggested that broker/dealers hedge their directional CDS basis risk more holistically, most likely through indices or through outright bond positions.<sup>25</sup> Accordingly, if a broker/dealer's basis risk leads to failure, a sovereign CDS investor could find themselves unhedged.

Jump-to-Default Risk: The relatively few number of market participants introduces a number of additional broader systemic risks to the trading in the CDS market that a global investor must consider, particularly in the context of the sovereign CDS market. ISDA and others have argued that because more

collateral is posted as sovereign CDS spreads rise, counterparty risk is effectively managed. This ignores the reality that compared to corporate defaults, sovereign default is highly political and is hard to evaluate or predict. Accordingly, spreads can widen extremely quickly, also known as “jump-to-default” risk. This significantly reduces the ability of a gradual increase in collateral to help participants manage counter-party risk.

Wrong-Way Risk: Additionally, investors must be particularly wary during times of crises, as cross-asset and cross-sovereign correlations increase and net exposures rise across the board. When there is a high degree of correlation between the reference entity and the counterparty (for example, a European sovereign and a European bank who wrote the CDS protection), it becomes more and more likely that a default in the reference entity will lead to a default in the counterparty.<sup>10</sup> This phenomenon is known as “wrong-way risk”.

With both wrong-way risk and jump-to-default risk, the global investor is susceptible to unseen correlations and sudden movements in prices, particularly when there is insufficient collateral in the system.

#### *Concentration: A Double-Edged Sword?*

Ironically, the risks described above are a major reason why so much of the counterparty risk is concentrated with relatively few broker/dealers, and why those broker/dealers tend to also be large depository institutions. Because broker/dealers trade large volumes of CDS, are able to hedge their exposure, have large balance sheets, and often carry implicit if not explicit government support (as evidenced by the globe-wide governmental support provided to these institutions during the 2008 economic crisis), the theory has been that these institutions are best positioned to minimize counterparty risk. This is not dissimilar to an insurance market, where tail-risk is considered minimal but payouts are high, necessitating scale in the insuring entities.<sup>3,34</sup> It is the strength provided by this combination of factors that is considered the major reason why regulatory oversight in the CDS market has been historically limited.<sup>25</sup> However, there are increasing concerns on the part of regulators that the risk of European sovereign defaults leading to contagion (knock-on effects) in the CDS market is growing.<sup>32,35</sup> Momentum is therefore rising in both the U.S. and Europe towards a mandate of central clearing counterparties (“CCP”) for the different forms of OTC derivative trading.

### *CCPs and Introduction of Political and Oversight Risks*

The CCPs, while still private entities, will be designed as the ultimate repositories for counterparty risk. Broker/dealers will still make markets in derivatives, but will then transfer the contracts to the CCPs in exchange for a fee.<sup>32,36</sup> The theory is that by aggregating the counterparty risk into fewer entities, overall counterparty risk will be reduced and allow for better central monitoring by regulators.<sup>35,37</sup> The proposal has so far been met with mixed reception, although at this point the political writing appears to be on the wall. As Riccardo Rebonato, head of front-office risk management and quantitative analytics at RBS in London, states, “We are moving...to a hub-and-spoke system that must be 100% resilient. If the hub is ever allowed to fail, the aftermath of Lehman’s default is going to look like a picnic. So we are placing a lot of reliance on regulators to get these standards right and ensure CCPs are really robust.”<sup>37</sup> Academics have also questioned whether the proposed design of the system will function as intended, suggesting that unless there is a single CCP that clears all derivatives, a system that creates multiple CCPs or distinguishes CCPs by derivative type might actually increase counterparty risk relative to the current system.<sup>38</sup> Accordingly, as CCPs increasingly become utilized, and counterparties become more concentrated, the global investor must incorporate an assessment of political and regulatory oversight risk into their counterparty strategy.

### **PRICING RISKS: Do Sovereign CDS Prices Accurately Reflect Risk?**

Global investors who want to trade in the sovereign CDS market should understand the theory and reality of sovereign CDS pricing and the impact of liquidity and other factors on efficient price discovery.

#### *Pricing Models Diverge from Actual Models*

The most basic methodology to price CDS is to forecast the expected cash flows. In such models, the CDS spread is an internal rate of return that equates present value of expected premium payments to present value of expected loss payments;  $PV(\text{expected spread payments}) = PV(\text{expected default losses})$ .<sup>39</sup> This would in theory generate a CDS price (shown as a percentage of face value – a spread). Because a CDS is intended to recreate the risk profile and payout structure of the underlying bond (the market value of which considers probability of

default and recovery rates), in theory, the CDS spread and the bond spread (bond yield minus risk-free rate) should be identical.<sup>5</sup> Said differently, in a perfect market, combining a CDS and a bond eliminates the risk of default and therefore would allow an investor to only earn the risk-free rate.

Given this financial identity, a comparison between bond spreads and CDS spreads between 2006 and 2010 suggests a divergence between theoretical and actual pricing for sovereign CDS (Exhibit 15 and 16). The difference between bond spreads and CDS spreads has vacillated differently for different sovereigns in both positive and negative directions over time.<sup>5</sup> The law of one price would suggest that arbitrageurs should be able to capitalize on this spread differential to generate risk-free profits by synthetically recreating the spread through going long/short the risk-free rate and underlying bond. However, the theoretical ability of arbitrageurs to capitalize on this strategy is limited primarily by liquidity issues, as well as by other structural concerns endemic to the sovereign CDS market.

#### *Liquidity Issues*

Given that sovereign CDS contracts trade differently than bonds, the relative liquidity between the sovereign CDS instrument and the underlying bond is of natural concern.<sup>40</sup> In the absence of publicly available data on CDS volumes, we examined: i) cost of shorting, ii) bid/ask spreads, iii) estimates of trading frequency, iv) transaction sizes, and v) behavioral and political motivations of market participants in order to assess this relative market liquidity, and in turn, pricing efficiency and its impact on investors.

Cost of Shorting: As described previously, the size of the sovereign debt market dwarfs both gross and net sovereign CDS exposure (Exhibit 6). Despite this, it is both expensive and difficult to short bonds, primarily because the repo market is short-term in duration and the liquidity in the underlying sovereign bond market is very heterogeneous, suggesting synthetic replication is difficult.<sup>5,41</sup> This difficulty grows in times of distress.

Bid/Ask Spread: One measure of liquidity of an asset is the bid/ask spread of that asset. By analyzing bid/ask spreads of 10-year bonds and CDS prices of eight Euro Zone Member States between 2007 and 2010, it became evident that spreads for both the bond and CDS began to widen in 2008 and generally widen at times of

distress.<sup>41,42</sup> The spreads in the CDS market have improved more than in the bond market since 2008, suggesting that on average, the CDS market is currently more liquid than the cash bond market (Exhibit 17).

Trading Frequency: Furthermore, based on a report issued by the Federal Reserve Bank of New York (NY Fed), the distribution of trading frequency over a three month period (May to July 2010) at the reference entity level shows that for sovereign CDS, the trading activity was relatively low, with market activity dropping off quickly after the top set of traded names and a long tail of reference entities trading less than once a day.<sup>25</sup> While the data set included contracts on a large number of reference entities, only a much smaller subset were actively traded in any maturity over the period. Moreover, while trading activity was concentrated in a limited number of reference entities, the specific reference entities garnering the most trading activity were not constant over the sample period. This suggests that liquidity for a given CDS will change over time and that pricing may diverge relative to changes in liquidity of the underlying bond.

To further understand the characteristics of the most frequently traded reference entities and compare them to those of less frequently traded reference entities, the study divided reference entities into three different categories according to their trading frequency: “actively traded,” “less actively traded,” and “infrequently traded” (Exhibit 18). The actively traded sovereign reference entities traded on average thirty times daily, less actively traded sovereigns traded on average fifteen times per day, and infrequently traded sovereign contracts traded an average of twice daily. Unfortunately, data on which reference entities are most actively traded is not available, but it is highly likely that the biggest sovereign CDS reference entities fall into this category, with smaller CDS markets accordingly less liquid. As described previously, the size of a CDS market for a given reference entity is not directly correlated with the size of that sovereign’s underlying bond market (Exhibits 4 and 6). This introduces differences between the liquidity of CDS and their underlying bonds, as compared across different sovereigns.

Transaction Size: One way to evaluate liquidity is to consider how individual trades might distort the market. Using the NY Fed data, it appears that the median transaction size during the measurement period was

\$10 million over approximately 29,000 trades. Based on these numbers, the average daily volume of each reference entity (as discussed above) can be estimated to be around \$300 million for “actively traded” entities and \$150 million for “less actively traded” (Exhibit 19). Given that the size of the European sovereign debt market is approaching \$10 trillion, it is unlikely that many of the largest bond market participants could hedge more than a fraction of their holdings on any given day without severely distorting pricing.

Behavioral and Political Motivation of Market Participants: Lastly, the sovereign debt market has unique market dynamics as developed sovereign credit has been perceived, at least historically, as having the very lowest credit risk (see earlier discussion on sovereign bond rate usage as risk-free rates). As such, when the economic outlook worsens and risk aversion increases, investors invest in liquid and safe securities as relative safe-havens (i.e. highly-rated sovereign debt such as Germany or the U.S., even though the absolute risk in those particular securities has become inherently greater in the face of economic malaise (Exhibit 20)). This has happened repeatedly through history, with a recent example being the S&P downgrade of the U.S. to AA+ in early August 2011. In the same month, the yield on the 10-year note went below 2%, a 60-year low.<sup>43,44</sup> This dynamic at least partially explains the recent negative correlation between the bond yields and CDS spreads of Germany and France. This phenomenon is at least partially the result of concentrated liquidity flooding a bond market. This flooding can happen not only through increased risk-aversion on the part of investors, but also through politically-driven action on the part of central banks. For example, the ECB’s recent market intervention to buy sovereign debt has increased liquidity in the bond market and pushed down yields on bonds without directly affecting liquidity in the CDS market (Exhibit 21).

#### *Other Structural Reasons for Divergence*

Currency: Given that U.S. dollar-denominated CDS contracts are the ISDA standard for European reference entities (which often issue debt denominated in Euros), a change in the actual or expected Euro-U.S. Dollar exchange rate may also influence the variation in CDS spreads versus the bonds.<sup>5</sup>

Trigger and Counterparty Risks: The previous discussions about trigger and counterparty risks illustrated the uncertainty in the market about the utility of sovereign CDS. This uncertainty acts to divorce the economic equivalence of the CDS contract and the underlying bond. This separation creates a pricing differential between the spreads. Furthermore, as the perception of these counterparty and trigger risks change over time, the pricing differential will fluctuate.

#### *Implications for Investors*

The divergence between CDS and bond spreads means that CDS pricing does not always accurately reflect the risk of default. As shown above, the direction and magnitude of changes in CDS prices are both unpredictable and can happen rapidly. This introduces a set of challenges for investors who aim to take directional speculative positions on CDS spread movements, calling into question their ability to accurately predict movements.

With respect to investors interested in using sovereign CDS to hedge either indirect or direct exposure, one possible interpretation of the spread differential and its unpredictability is that these investors should be less concerned about pricing inefficiencies, given that the direction and magnitude of spread movements pre-default do not impact the CDS payout amount at time of default. This interpretation misses that short-term volatility in CDS pricing can have meaningful consequences on collateral requirements, the posting of which is not costless for investors. Furthermore, if spread differentials are positive (CDS spread > bond spread), then insurance is relatively expensive for an investor who wishes to hedge, calling into question whether an investor must overpay to acquire the hedge. Conversely, in the event that spread differentials are negative (CDS spread < bond spread), a seller of protection is not adequately being compensated for the underlying risk.

## Final Thoughts

Broadly speaking, we believe an investor in the sovereign CDS market should evaluate three major types of risk: trigger risk, counterparty risk, and pricing risk. It is likely that these risks will persist in the market given the continuing evolution and rapid growth. In particular, we would highlight the following as areas of concern going forward:

- 1) There continues to be a startling lack of legal precedence relative to the importance of the sovereign CDS market and it is unlikely that this limitation will be remedied given the natural paucity of sovereign defaults. The ISDA framework, while having ruled in over 90 total credit events (across all credit derivatives), has only mediated one sovereign credit event – Ecuador in 2008.<sup>6,22,27</sup>
- 2) In light of the sovereign European debt crisis, governments are increasingly exerting political and regulatory control over public and private financial institutions, suggesting that uncertainty will continue. For example, while the details are yet to be finalized, the EU is banning so-called “naked” CDS positions, in which an investor purchases a CDS without an underlying correlation in their portfolio to the reference entity.<sup>20,45</sup> Interestingly, this ban calls into question the previous legal ruling that CDS are not insurance contracts – if all CDS purchases will need to have some form of “insurable interest”, does this mean that the CDS market is now by definition an insurance market and must be regulated as such?
- 3) In a related vein, it is somewhat puzzling why sovereign governments have gone to such great lengths to avoid CDS triggers and limit their use. Examples include the coercive restructuring of Greek debt in a manner to avoid CDS trigger, or the fact that U.S. broker/dealers do not trade in U.S. sovereign CDS, despite the absence of legal restrictions.<sup>26</sup> One possible interpretation is that despite their improving access to counterparty data, governments remain fearful that a sovereign CDS trigger could potentially cascade into a broader financial contagion. As evidence, a strong correlation has developed between Italian and Spanish CDS prices (Exhibit 22).

4) On the other hand, it is worth asking the question why anyone would bother purchasing sovereign CDS on a country like the U.S. (or Japan, or the U.K., etc.) which can always print money to avoid a credit event. The tension these countries face is the tradeoff between potentially damaging inflation and default on an obligation that limits future market access. Regardless, it is unclear that this sovereign option is accounted for in CDS pricing.

Our final analysis is that CDS contracts do provide some utility to their owners, but fundamentally, it is a market dominated by big players (including governments) with interests that can be widely divergent from the interest of the market's smaller participants. Accordingly, global investors must be wary of being little fish in a big pond.

## Exhibit 1: Government Debt Dynamics in 2011

### Government debt dynamics

Countries ranked\* by heaviest debt burden

	% of GDP, 2011, forecast		GDP growth less cost of finance <sup>‡</sup> , %	Sovereign debt, years to maturity <sup>§</sup>
	Primary budget balance, cyclically adjusted <sup>†</sup>	Net debt <sup>†</sup>		
Japan	-4.9	127.8	-0.8	5.8
Ireland	-2.2	70.0	-13.8	6.3
Britain	-4.4	62.4	0.9	13.8
Greece	2.6	124.8	-19.3	6.8
Portugal	0.6	75.5	-16.7	5.9
Spain	-0.9	45.7	-3.2	6.2
United States	-6.8	74.8	2.8	5.1
France	-1.4	60.2	0.8	7.0
Belgium	0.3	80.8	0.5	6.3
Italy	2.3	100.6	-2.5	7.1
Netherlands	-1.3	37.6	0.3	6.0
Hungary	0.2	54.2	-0.3	3.5
Poland	-3.5	32.6	1.4	5.1
Czech Republic	-1.2	7.4	0.5	5.8
Austria	-0.4	45.7	1.3	7.3
Canada	-3.0	33.7	2.7	5.9
Germany	<i>nil</i>	50.2	2.0	5.7
Norway	-4.6	-161.5	6.3	2.4
Denmark	0.5	2.7	1.6	7.2
Australia	-0.7	6.1	3.0	5.0
South Korea	-0.1	-38.1	2.7	3.7
Switzerland	1.1	0.5	2.1	7.1
Finland	0.5	-59.2	2.8	5.4
Sweden	1.8	-25.0	2.9	5.9

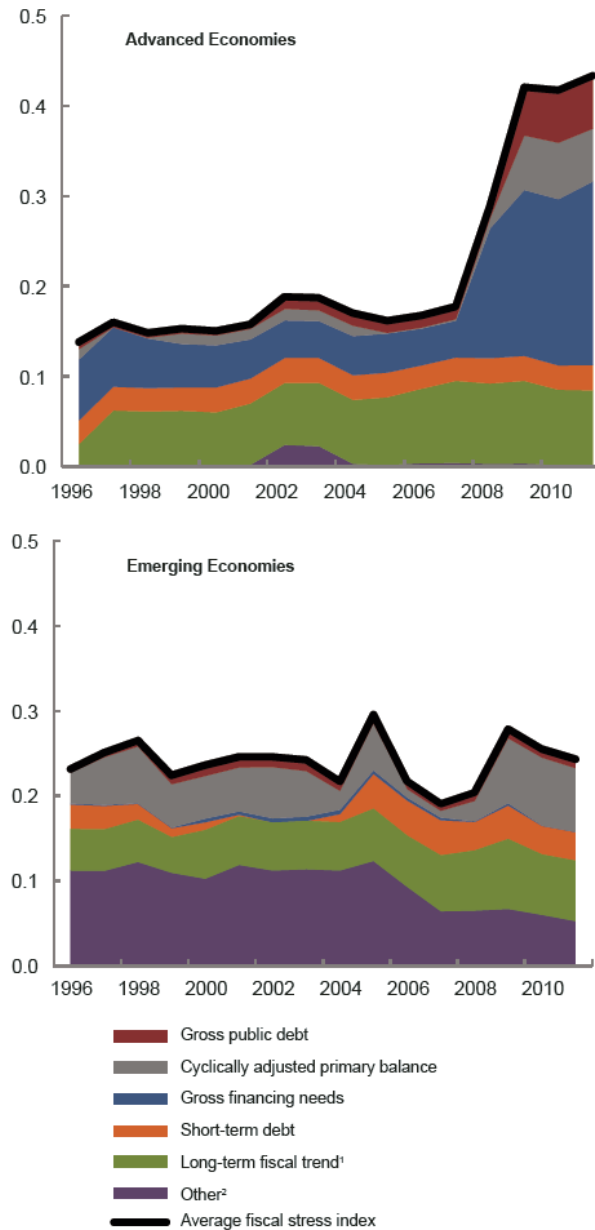
\*Based on the sum of the countries' rank for the first three debt measures

†General government ‡Forecast average nominal GDP growth for 2011-12 less latest yield on government bonds of average maturity §Weighted average

Sources: Bloomberg; OECD; *The Economist*

**Exhibit 2: Rising Tide of Sovereign Debt**

**Components of the Fiscal Indicators Index,  
1996–2011**  
(Scale, 0–1)



Sources: Baldacci and others (2011); and IMF staff calculations.  
 Note: 2009 PPP-GDP weights used to calculate weighted averages. Larger values of the FII suggest higher fiscal risk.  
<sup>1</sup> Includes fertility rate, dependency ratio, and pension and health spending.  
<sup>2</sup> Includes interest rate–growth differential, average debt maturity, and debt held by nonresidents (for advanced economies) and foreign-currency-denominated debt and short-term external debt to reserves (for emerging economies).

### Exhibit 3: Explanation and Description of Payment Flows

“Buyer” of credit protection = pay credit spread = “short” the credit risk

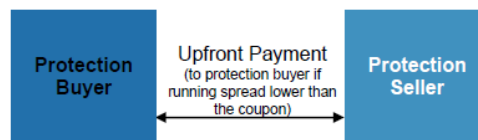
“Seller” of credit protection = receive credit spread = “long” the credit risk

CDS premium is generally quoted as an annual spread. It is paid partly as coupon (standardized generally at 100, 500) and partly as an upfront amount.

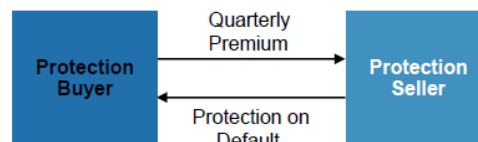
The upfront amount is the present value of the quoted spread and the standard coupon.

Upon a default, the CDS is cash settled based on the recovery value determined in an auction process.

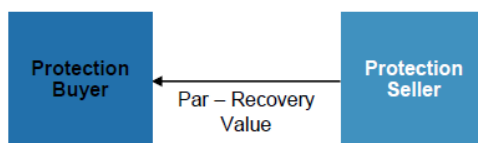
#### CDS Cash Flows At Inception



#### CDS Cash Flows Before Maturity / Default



#### Auction Cash Settlement in Case of Default



Source: Sovereign CDS: Credit Event and Auction Primer, Morgan Stanley, May 2011.

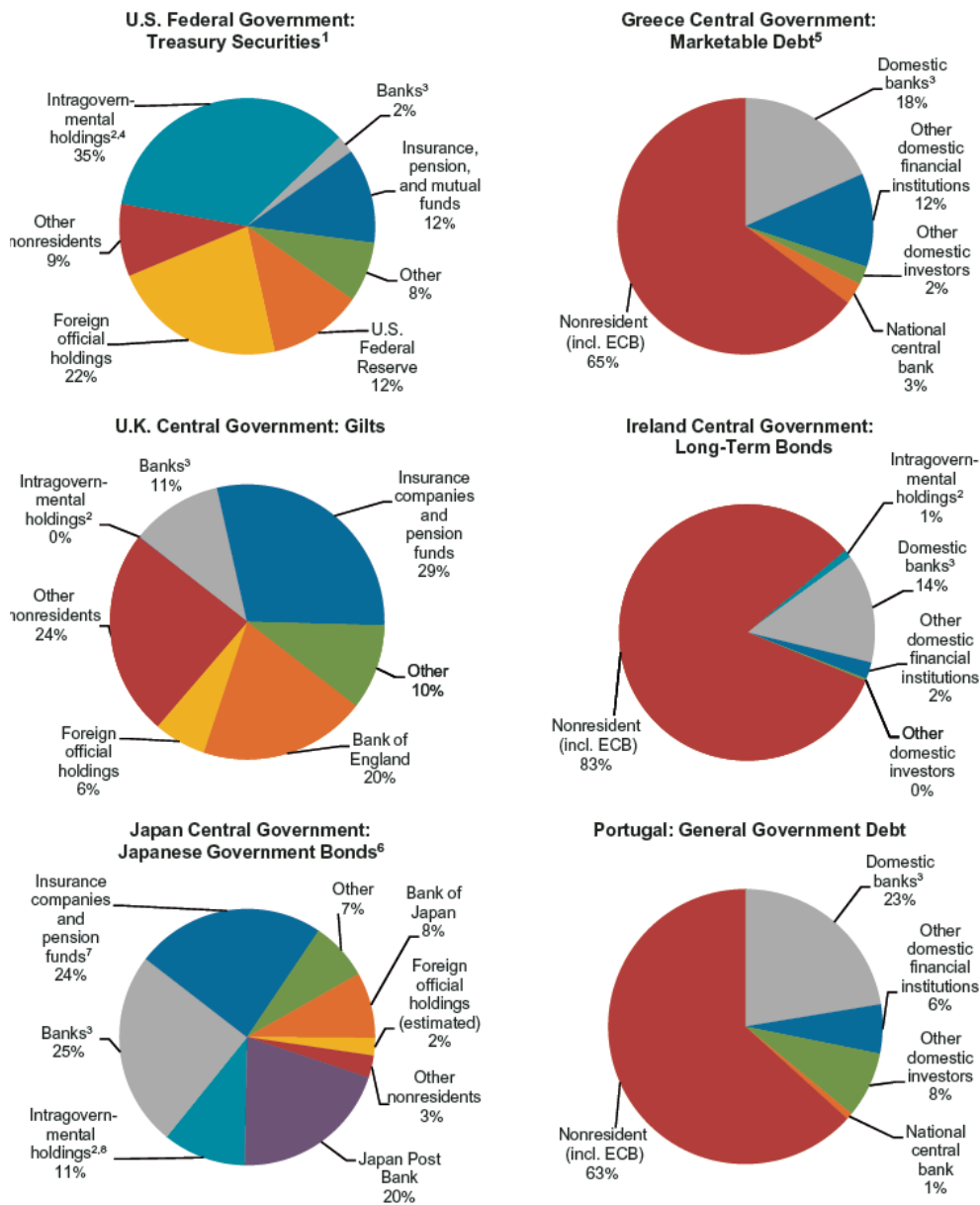
### Exhibit 4: Top 15 Sovereign CDS Reference Entities, as of November 2011

Reference Entity	Gross Notional	Net Notional	# of Contracts
1 REPUBLIC OF ITALY	312,550,673,504	20,122,240,743	10,077
2 FEDERATIVE REPUBLIC OF BRAZIL	180,139,136,327	17,884,811,600	11,979
3 KINGDOM OF SPAIN	171,113,519,054	15,517,936,879	7,842
4 REPUBLIC OF TURKEY	147,891,297,716	4,522,105,724	9,400
5 FRENCH REPUBLIC	141,272,628,299	22,603,701,852	7,507
6 UNITED MEXICAN STATES	130,681,621,053	8,725,395,897	9,678
7 FEDERAL REPUBLIC OF GERMANY	122,228,429,619	19,905,589,894	4,664
8 RUSSIAN FEDERATION	114,920,678,520	4,533,375,771	8,752
9 HELLENIC REPUBLIC	74,494,526,982	3,514,561,244	4,499
10 UNITED KINGDOM (GB AND N. IRELAND)	73,030,778,347	12,450,766,785	5,047
11 PORTUGUESE REPUBLIC	68,709,969,470	5,664,211,256	3,938
12 REPUBLIC OF HUNGARY	66,848,578,812	2,540,999,599	5,827
13 REPUBLIC OF KOREA	65,312,422,895	4,940,875,092	7,458
14 JAPAN	63,916,314,312	8,922,067,447	6,364
15 PEOPLE'S REPUBLIC OF CHINA	62,397,965,630	9,654,935,335	7,320
<b>TOTAL, TOP 15</b>	<b>1,795,508,540,540</b>	<b>161,503,575,118</b>	<b>110,352</b>
REST OF WORLD	929,161,907,998	76,689,938,996	85,488
SOVEREIGN CDS INDICES	359,613,289,446	21,638,509,000	16,353
<b>TOTAL</b>	<b>3,084,283,737,984</b>	<b>259,832,023,114</b>	<b>212,193</b>

Source: Author compiled from DTCC data

**Exhibit 5: Estimates of Major Sovereign Debt Holders**

**Holders of Government Debt**  
(Percent of total outstanding)



Sources: Country authorities; Japan Post Bank; Currency Composition of Official Foreign Exchange Reserves (COFER) database; and IMF staff estimates.  
 Note: Data as of 2011:Q2 for Greece, Ireland, and the United States, 2011:Q1 for Japan and the United Kingdom, and 2010:Q4 for Portugal.

<sup>1</sup>Includes marketable and nonmarketable debt.

<sup>2</sup>Holdings by general government institutions.

<sup>3</sup>For the United States, refers to depository institutions; for Greece, Portugal, and the United Kingdom, refers to monetary financial institutions excluding the central bank; for Ireland, refers to monetary financial institutions and national central bank; and for Japan, includes depository institutions, securities investment trusts, and securities companies and excludes Japan Post Bank.

<sup>4</sup>Includes Government Account Series securities held by government trust funds, revolving funds, and special funds, and Federal Financing Bank securities.

<sup>5</sup>Includes bonds, T-bills, and other short-term notes.

<sup>6</sup>Includes Fiscal Investment and Loan Program (FILP) bonds and does not include T-bills.

<sup>7</sup>Includes Japan Post Insurance and excludes public pensions.

<sup>8</sup>Includes public pensions.

## Exhibit 6: Sovereign Global Debt and CDS Volumes

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Table 1: Global Debt and CDS Volumes

	Dec 2010			Nov 2011			
	<u>Total Debt</u>	<u>Gross CDS</u>	<u>% of Debt</u>	<u>% of Tot.</u> <u>Gross CDS</u>	<u>Net CDS</u>	<u>% of Debt</u>	<u>% of Tot.</u> <u>Net CDS</u>
Europe	\$9,759	\$1,829	19%	59%	\$158	2%	61%
US	11,152	30	0%	1%	5	0%	2%
Rest of World	18,049	1,225	7%	40%	97	1%	37%
<b>Total</b>	<b>\$38,960</b>	<b>\$3,084</b>	<b>8%</b>	<b>100%</b>	<b>\$260</b>	<b>1%</b>	<b>100%</b>

\$ amounts in trillions. Compiled from DTCC and BIS statistics

## Exhibit 7: Obligation Category Definitions

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Only one category can be specified in the CDS contract (Confirmation).

### Obligation Category

- 1) Payment: means any obligation (whether present or future, contingent or otherwise) for the payment or repayment of money, including, without limitation, Borrowed Money.
- 2) Borrowed Money: means any obligation (excluding an obligation under a revolving credit arrangement for which there are no outstanding, unpaid drawings in respect of principal) for the payment or repayment of borrowed money (which term shall include, without limitation, deposits and reimbursement obligations arising from drawings pursuant to letters of credit).
- 3) Reference Obligation Only: means any obligation that is a Reference Obligation and no Obligation Characteristics shall be applicable to Reference Obligations Only.
- 4) Bond: means any obligation of a type included in the "Borrowed Money" Obligation Category that is in the form of, or represented by, a bond, note (other than notes delivered pursuant to Loans), certificated debt security or other debt security and shall not include any other type of Borrowed Money.
- 5) Loan: means any obligation of a type included in the "Borrowed Money" Obligation Category that is documented by a term loan agreement, revolving loan agreement or other similar credit agreement and shall not include any other type of Borrowed Money.
- 6) Bond or Loan: means any obligation that is either a Bond or a Loan.

Source: 2003 ISDA Credit Derivatives Definitions (pp.12 -13)

Note: Capitalized terms have the meaning prescribed to them in the 2003 ISDA Credit Derivatives Definitions.

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## Exhibit 8: Obligation Characteristics Definitions

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Any characteristics can be specified in the CDS contract (Confirmation).

### Obligation Characteristics

- 1) Not Subordinated: means any obligation that is not Subordinated to (i) the most senior Reference Obligation in priority of payment or (ii) if no Reference Obligation is specified in the related Confirmation, any unsubordinated Borrowed Money obligation of the Reference Entity.
- 2) Specified Currency: means an obligation that is payable in the currency or currencies specified as such in the related Confirmation (or, if Specified Currency is specified in a Confirmation and no currency is so specified, any of the lawful currencies of Canada, Japan, Switzerland, the United Kingdom and the United States of America and the euro and any successor currency to any of the aforementioned currencies, which currencies shall be referred to collectively in a Confirmation as the “Standard Specified Currencies”).
- 3) Not Sovereign Lender: means any obligation that is not primarily owed to a Sovereign or Supranational Organization, including, without limitation, obligations generally referred to as “Paris Club debt”.
- 4) Not Domestic Currency: means any obligation that is payable in any currency other than the Domestic Currency.
- 5) Not Domestic Law: means any obligation that is not governed by the laws of (A) the relevant Reference Entity, if such Reference Entity is a Sovereign, or (B) the jurisdiction of organization of the relevant Reference Entity, if such Reference Entity is not a Sovereign.
- 6) Listed: means an obligation that is quoted, listed or ordinarily purchased and sold on an exchange.
- 7) Not Domestic Issuance: means any obligation other than an obligation that was, at the time the relevant obligation was issued (or reissued, as the case may be) or incurred, intended to be offered for sale primarily in the domestic market of the relevant Reference Entity. Any obligation that is registered or qualified for sale outside the domestic market of the relevant Reference Entity (regardless of whether such obligation is also registered or qualified for sale within the domestic market of the relevant Reference Entity) shall be deemed not to be intended for sale primarily in the domestic market of the Reference Entity.

Source: 2003 ISDA Credit Derivatives Definitions (pp.13 -14)

Note: Capitalized terms have the meaning prescribed to them in the 2003 ISDA Credit Derivatives Definitions.

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**Exhibit 9: Covered Obligations and Characteristics by Sovereign CDS Market**

	Obligation Category	Not Subordinated	Not Sovereign Lender	Not Domestic Currency	Not Domestic Law	Not Domestic Issuance	Standard Specified Curr. & Domestic Currency
Asia Sovereign	Bond /Loan	Y	Y	Y	Y	Y	N
Singapore Sovereign	Bond /Loan	Y	Y	N	N	N	Y
Latin America Sovereign	Bond	Y	N	Y	Y	Y	N
Emerging European & Middle Eastern Sov.	Bond	Y	N	Y	Y	Y	N
Western European Sovereign	BM	N	N	N	N	N	N
Japan Sovereign	BM	N	N	N	N	N	N
Australia Sovereign	BM	N	N	N	N	N	N
New Zealand Sovereign	BM	N	N	N	N	N	N
U.S. Municipal Full Faith And Credit	BM	Y	N	N	N	N	N
U.S. Municipal General Fund	BM	Y	N	N	N	N	N
U.S. Municipal Revenue	BM	Y	N	N	N	N	N
North American Corporate	BM	N	N	N	N	N	N
European Corporate	BM	N	N	N	N	N	N
Asia Corporate	Bond /Loan	Y	Y	Y	Y	Y	N
Japan Corporate	BM	Y	N	N	N	N	N
Singapore Corporate	Bond /Loan	Y	Y	N	N	N	Y
Australia Corporate	BM	N	N	N	N	N	N
New Zealand Corporate	BM	N	N	N	N	N	N
Emerging European Corporate	Bond /Loan	Y	N	Y	Y	Y	N
"Latin America Corporate B"	Bond	Y	N	Y	Y	Y	N
"Latin America Corporate BL"	Bond /Loan	Y	Y	Y	Y	Y	N

Notes: BM – Borrowed Money

Source: ISDA. (see [http://www.isda.org/c\\_and\\_a/Credit-Derivatives-Physical-Settlement-Matrix.html](http://www.isda.org/c_and_a/Credit-Derivatives-Physical-Settlement-Matrix.html))

Source: Sovereign CDS: Credit Event and Auction Primer, May 31, 2011 (Morgan Stanley), p.22

**Exhibit 10: List of Current Credit Derivatives Determinations Committee Members by Region (Effective Nov 30, 2011)**

<b>Americas</b>	<b>Asia (ex-Japan)</b>	<b>Australia / NZ</b>	<b>EMEA</b>	<b>Japan</b>
<b>Voting Dealers</b>				
Bank of America	Bank of America	Bank of America	Bank of America	Bank of America
Barclays	Barclays	Barclays	Barclays	Barclays
Credit Suisse	Credit Suisse	Credit Suisse	Credit Suisse	Credit Suisse
Deutsche Bank	Deutsche Bank	Deutsche Bank	Deutsche Bank	Deutsche Bank
Goldman Sachs	Goldman Sachs	Goldman Sachs	Goldman Sachs	Goldman Sachs
JPMorgan Chase	JPMorgan Chase	JPMorgan Chase	JPMorgan Chase	JPMorgan Chase
Morgan Stanley	Morgan Stanley	Morgan Stanley	Morgan Stanley	Morgan Stanley
UBS	UBS	UBS	UBS	UBS
Societe Generale		Societe Generale	Societe Generale	
	BNP Paribas	BNP Paribas	BNP Paribas	BNP Paribas
Citibank	Citibank			
	Royal Bank of Scotland			Mizuho
<b>Voting Non-Dealers</b>				
BlueMountain Capital	BlueMountain Capital	BlueMountain Capital	BlueMountain Capital	BlueMountain Capital
Citadel LLC	Citadel LLC	Citadel LLC	Citadel LLC	Citadel LLC
D.E. Shaw Group	D.E. Shaw Group	D.E. Shaw Group	D.E. Shaw Group	D.E. Shaw Group
Elliott Management Corporation	Elliott Management Corporation	Elliott Management Corporation	Elliott Management Corporation	Elliott Management Corporation
PIMCO	PIMCO	PIMCO	PIMCO	PIMCO

Source: <http://www.isda.org/dc/committees.html>

## Exhibit 11: Credit Event Definitions

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One or more can be specified in the CDS contract (Confirmation)

### Credit Events

- 1) Bankruptcy: Not applicable for Sovereign CDS contracts.
- 2) Obligation Acceleration: means one or more Obligations in an aggregate amount of not less than the Default Requirement have become due and payable before they would otherwise have been due and payable as a result of, or on the basis of, the occurrence of a default, event of default or other similar condition or event (however described), other than a failure to make any required payment, in respect of a Reference Entity under one or more Obligations.
- 3) Obligation Default: means one or more Obligations in an aggregate amount of not less than the Default Requirement have become capable of being declared due and payable before they would otherwise have been due and payable as a result of, or on the basis of, the occurrence of a default, event of default or other similar condition or event (however described), other than a failure to make any required payment, in respect of a Reference Entity under one or more Obligations.
- 4) Failure to Pay: means, after the expiration of any applicable Grace Period (after the satisfaction of any conditions precedent to the commencement of such Grace Period), the failure by a Reference Entity to make, when and where due, any payments in an aggregate amount of not less than the Payment Requirement under one or more Obligations, in accordance with the terms of such Obligations at the time of such failure.
- 5) Repudiation/Moratorium: means the occurrence of both of the following events: (i) an authorized officer of a Reference Entity or a Governmental Authority (x) disaffirms, disclaims, repudiates or rejects, in whole or in part, or challenges the validity of, one or more Obligations in an aggregate amount of not less than the Default Requirement and (ii) a Failure to Pay, determined without regard to the Payment Requirement, or a Restructuring, determined without regard to the Default Requirement, with respect to any such Obligation occurs on or prior to the Repudiation/Moratorium Evaluation Date.
- 6) Restructuring: means that, with respect to one or more Obligations and in relation to an aggregate amount of not less than the Default Requirement, any one or more of the following events occurs in a form that binds all holders of such Obligation, is agreed between the Reference Entity or a Governmental Authority and a sufficient number of holders of such Obligation to bind all holders of the Obligation or is announced (or otherwise decreed), by a Reference Entity or a Governmental Authority in a form that binds all holders of such Obligation, and such event is not expressly provided for under the terms of such Obligation in effect as of the later of the Trade Date and the date as of which such Obligation is issued or incurred:
  - i. a reduction in the rate or amount of interest payable or the amount of scheduled interest accruals;
  - ii. a reduction in the amount of principal or premium payable at maturity or at scheduled redemption dates;
  - iii. a postponement or other deferral of a date or dates either (A) the payment or accrual of interest or (B) the payment of principal or premium;
  - iv. a change in the ranking in priority of payment of any Obligation, causing the Subordination of such Obligation to any other Obligation; or
  - v. any change in the currency or composition of any payment of interest or principal to any currency which is not a Permitted Currency.

Source: 2003 ISDA Credit Derivatives Definitions (pp.30 -32)

Note: Capitalized terms have the meaning prescribed to them in the 2003 ISDA Credit Derivatives Definitions.

**Exhibit 12: Credit Events by Region**

	Failure to Pay (Grace Period)								Restructuring (Multiple Holder Obligation Required?)
	Bankruptcy	Failure to Pay	Extension Appl.]	Obligation Acceleration	Repudiation/ Moratorium	Restructuring (Old R)	Restructuring (Mod R)	Restructuring (Mod Mod R)	
Asia Sovereign	N	Y	N	N	Y	Y	N	N	Y
Singapore Sovereign	N	Y	N	N	Y	Y	N	N	Y
Latin America Sovereign	N	N	Y	Y	Y	Y	N	N	N
Emerging European & Middle Eastern Sovereign	N	N	Y	Y	Y	Y	N	N	N
Western European Sovereign	N	Y	N	N	Y	Y	N	N	Y
Japan Sovereign	N	Y	N	N	Y	Y	N	N	N
Australia Sovereign	N	Y	N	N	Y	N	Y	N	Y
New Zealand Sovereign	N	Y	N	N	Y	N	Y	N	Y
U.S. Municipal Full Faith And Credit	N	Y	N	N	N	Y	N	N	N
U.S. Municipal General Fund	N	Y	N	N	N	Y	N	N	N
U.S. Municipal Revenue	N	Y	N	N	N	Y	N	N	N
North American Corporate	Y	Y	N	N	N	N	N	N	Y
European Corporate	Y	Y	N	N	N	N	N	Y	Y
Asia Corporate	Y	Y	N	N	N	Y	N	N	Y
Japan Corporate	Y	Y	N	N	N	Y	N	N	N
Singapore Corporate	Y	Y	N	N	N	Y	N	N	Y
Australia Corporate	Y	Y	N	N	N	N	Y	N	Y
New Zealand Corporate	Y	Y	N	N	N	N	Y	N	Y
Emerging European Corporate	Y	N	Y	N	Y	Y	N	N	Y/N
"Latin America Corporate B"	Y	N	Y	Y	Y	Y	N	N	N
"Latin America Corporate BL"	Y	N	Y	Y	Y	Y	N	N	Y

Notes:  
 Mod Mod R - Modified Restructuring Maturity Limitation and Conditionally Transferable Obligation  
 Mod R - Restructuring Maturity Limitation and Fully Transferable Obligation

Source: ISDA. (see [http://www.isda.org/c\\_and\\_a/Credit-Derivatives-Physical-Settlement-Matrix.html](http://www.isda.org/c_and_a/Credit-Derivatives-Physical-Settlement-Matrix.html))

Source: Sovereign CDS: Credit Event and Auction Primer, May 31, 2011 (Morgan Stanley), p.11

**Exhibit 13: Greek Bond Yields in percentages (yellow) and CDS Price in basis points (orange)**



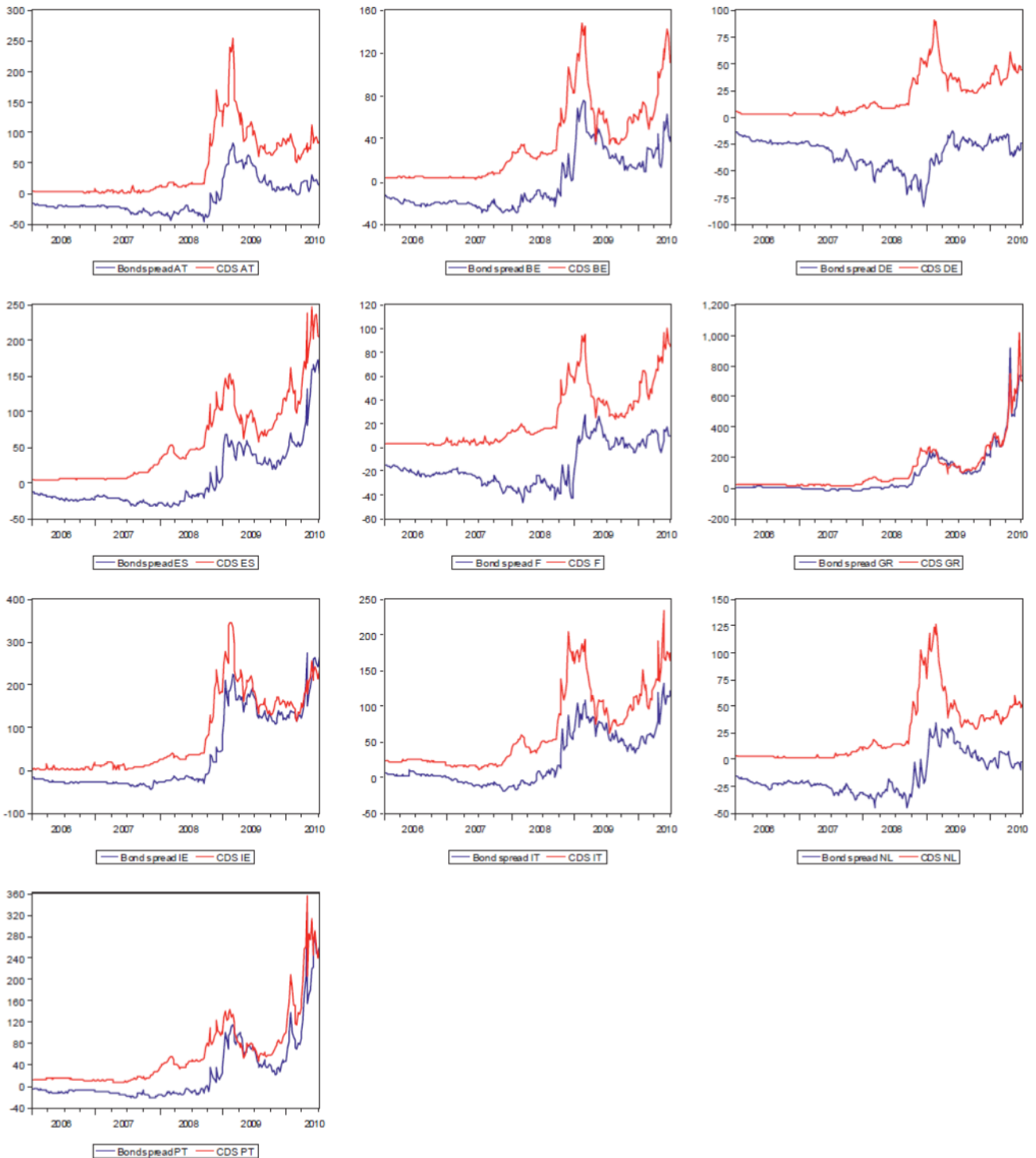
Source: Bloomberg

**Exhibit 14: Derivative Collateralization Levels (in %) by Counterparty type, 2010**

	Large, Average	Med/Small Average	ALL-Average
All OTC Derivatives	72.2	73.4	73.1
Banks/Broker-dealers	88.6	73.6	78.6
Hedge funds	177.9	101.4	159.9
Mutual funds	79.1	128.0	99.5
Pension funds	73.4	n/a	70.7
Insurance companies	65.9	70.9	67.5
Energy/ Commodity firm	36.7	38.0	37.2
Nonfinancial corporations	42.7	24.3	37.3
Special purpose vehicles (SPV)	19.3	n/a	19.3
Supranationals	0.0	n/a	24.2
Government-sponsored entities/ Government Agencies	52.7	57.9	54.1
Sovereign national governments	13.9	n/a	17.6
Local or regional government entities	10.4	n/a	9.4
Other	59.4	38.0	51.4

Source: 2011 ISDA Margin Survey

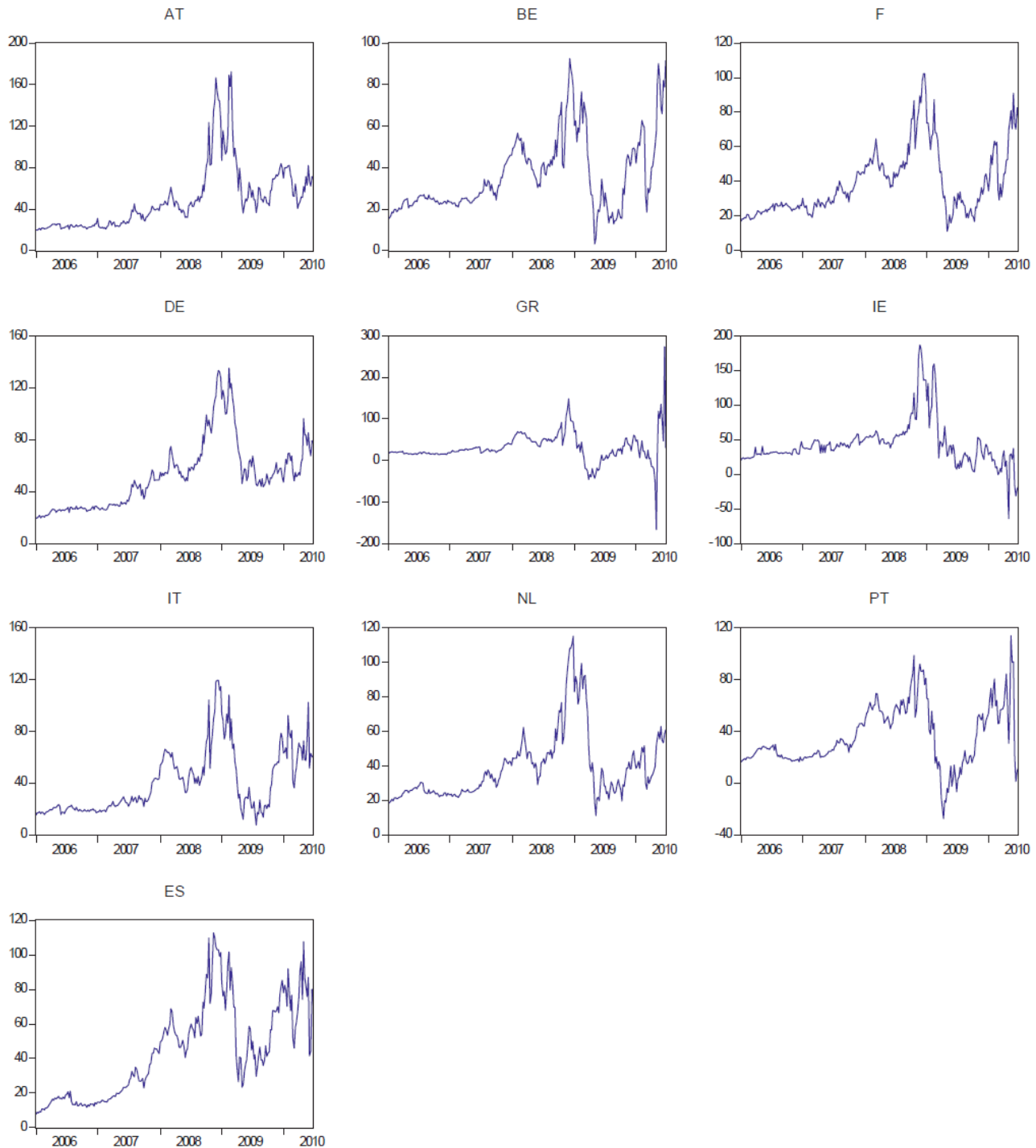
**Exhibit 15: CDS Spreads and bond spreads for Euro area sovereigns**



AT = Austria; BE = Belgium; F = France; DE = Germany; GR = Greece; IE = Ireland; IT = Italy; NL = Netherlands; PT = Portugal; ES = Spain.

Source: Alessandro Fontana and Martin Scheicher, "AN ANALYSIS OF EURO AREA SOVEREIGN CDS AND THEIR RELATION WITH GOVERNMENT BONDS", European Central Bank Working Paper Series No. 1271, 2010, <http://www.ecb.int/pub/pdf/scpwps/ecbwp1271.pdf>, accessed December 2011.

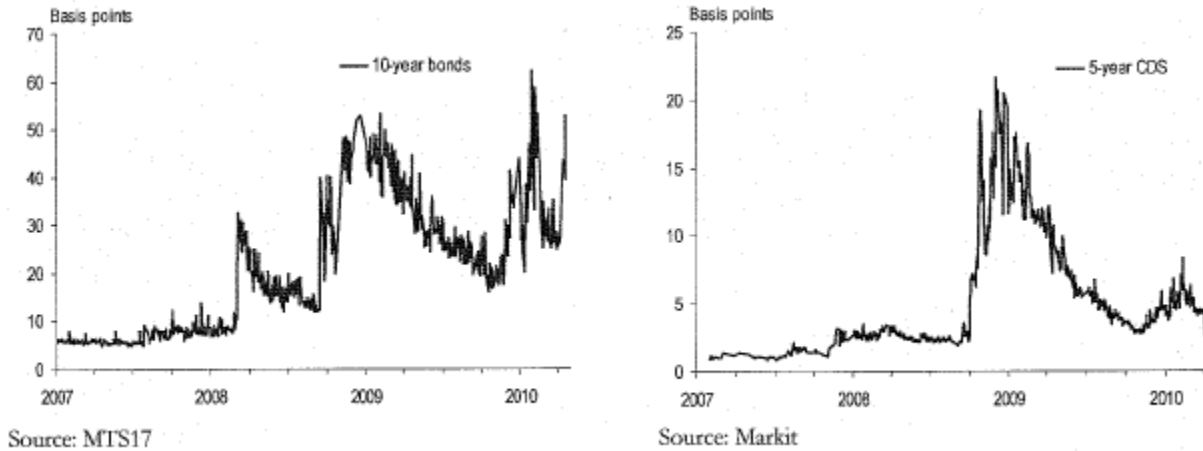
**Exhibit 16: Spread (CDS – bond spread) for Euro area sovereigns**



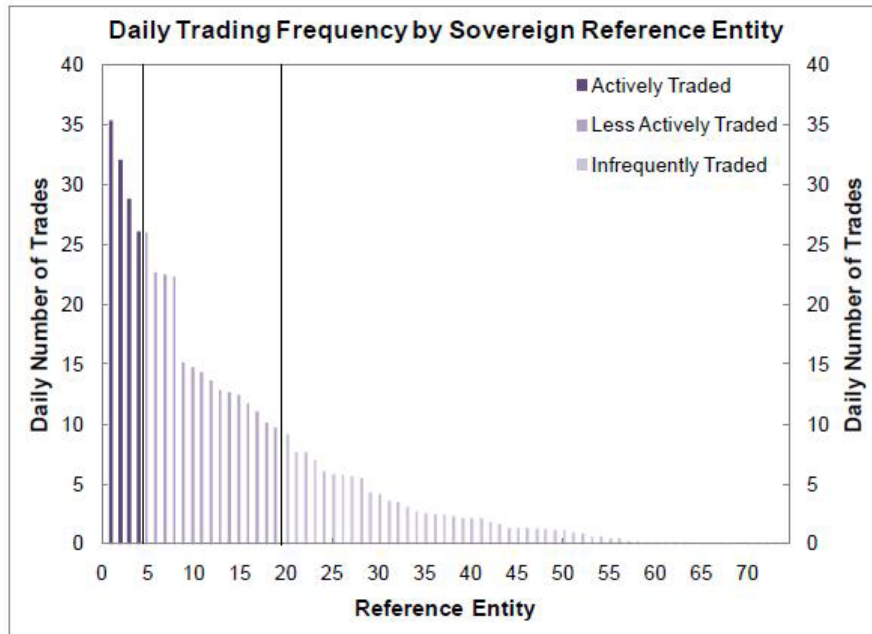
AT = Austria; BE = Belgium; F = France; DE = Germany; GR = Greece; IE = Ireland; IT = Italy; NL = Netherlands; PT = Portugal; ES = Spain.

Source: Alessandro Fontana and Martin Scheicher, "AN ANALYSIS OF EURO AREA SOVEREIGN CDS AND THEIR RELATION WITH GOVERNMENT BONDS", European Central Bank Working Paper Series No. 1271, 2010, <http://www.ecb.int/pub/pdf/scpwps/ecbwp1271.pdf>, accessed December 2011.

**Exhibit 17: Average bid-ask spread for 10-year government bond and 5-year CDS in euro area**



**Exhibit 18: Daily Trading Frequency over a three month period (May-July 2010)**



Vertical lines in the chart designate the three categories of trade frequency classification, “actively traded,” “less actively traded,” and “infrequently traded”

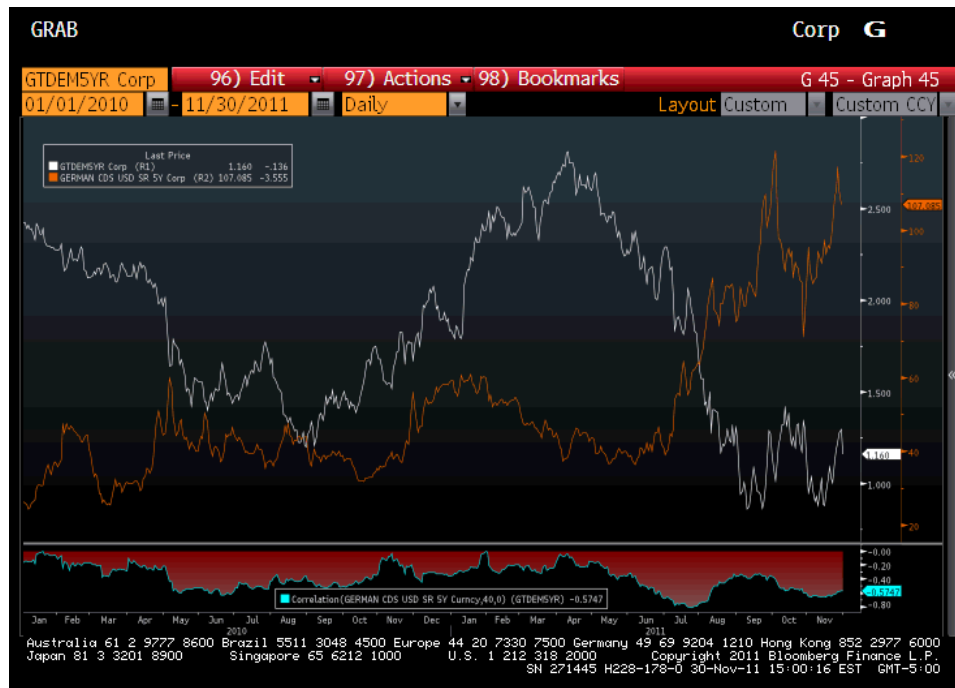
Source: Kathryn Chen, Michael Fleming, John Jackson, Ada Li and Asani Sarkar, “An Analysis of CDS Transactions: Implications for Public Reporting,” Federal Reserve Bank of New York Staff Reports No. 517, 2011, [http://www.newyorkfed.org/research/staff\\_reports/sr517.pdf](http://www.newyorkfed.org/research/staff_reports/sr517.pdf), accessed December 2011

**Exhibit 19: Estimations of daily volume of “actively traded” and “less actively traded” sovereign cds markets**

<b>Sovereign CDS - Notional</b>	
Total number of trades	29,915
Mean Trade (\$ million)	\$17
Median Trade (\$ million)	\$10
Mode Trade (\$ million)	\$5
<b>Number of trades per day of:</b>	
"actively traded"	30
"less actively traded"	15
<b>Estimated Daily Volume of: (based on Median)</b>	
"actively traded" (million)	\$300
"less actively traded" (million)	\$150

Source: Kathryn Chen, Michael Fleming, John Jackson, Ada Li and Asani Sarkar, “An Analysis of CDS Transactions: Implications for Public Reporting,” Federal Reserve Bank of New York Staff Reports No. 517, 2011, [http://www.newyorkfed.org/research/staff\\_reports/sr517.pdf](http://www.newyorkfed.org/research/staff_reports/sr517.pdf), accessed December 2011

**Exhibit 20: German Bond Yields in percentages (white) and CDS Price in basis points (orange)**



Source: Bloomberg

**Exhibit 21: Effect of ECB intervention**

Italian (blue) and Spanish (purple) spreads (over German bonds) and impact of ECB purchases



Source: Bloomberg

ECB purchases impact on Spanish Bond Yields (white) and CDS Price (orange)



Source: Bloomberg

**Exhibit 22: CDS Price for Italy and Spain and the 40 day correlation**



Source: Bloomberg

## ENDNOTES

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<sup>40</sup> Sovereign CDS do not trade in the same way as most securities, (a transfer of ownership of the underlying asset). Once a CDS contract is written between two parties, CDS can only trade “synthetically” through three different mechanisms, all of which involve payment by one party (party A) to the other (party B) of a transaction’s mark-to-market value. First, the parties can terminate the agreement, in which after all mark-to-market payments are made, the CDS is torn-up and the obligation removed. Second, an offsetting CDS can be written between the two parties which cancels out the CDS’s economic effects. Lastly, one party can enter into a novation, which is when, for example party A comes to an agreement with party C that party C will “step-into” into party A’s obligations and rights. If party B agrees, than party C and party B will enter into a new contract that is identical to the old contract between party A and B, and the old obligation becomes null.

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<sup>42</sup> These countries consist of Belgium, Germany, Greece, France, Italy, Netherlands, Portugal, and Spain.

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