

Sovereign CDS Primer

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Devilish details

We provide an overview of the key attributes of Western European Sovereign CDS. As well as the technical details, we explore the large uncertainties and the need to consider contingent probabilities consistently. We think these cause large risk premiums and volatility. The only antidote that we see is to better understand the details with which sovereign CDS are fraught and the factors driving them.

Some key points:

- In Western European sovereign CDS, relative to corporates, bankruptcy is replaced with a moratorium/repudiation.
- There is room for confusion, and great need for attention to detail, in determining reference entity Obligations and Deliverable Obligations. Stark differences exist in apparently similar situations, and some questions remain.
- Currency issues and sovereign CDS are intimately related. Currency redenomination might or might not be a sovereign credit event, and in a credit event, which might be correlated with currency moves, the currencies of the CDS contract and deliverables are important.
- Interpreting default probabilities from sovereign CDS must be done with extreme caution for several reasons; the risk premium can be considerable.
- Recovery is a little more determinate than default probability; we explore some history and drivers.
- We discuss government bond markets versus sovereign CDS and the factors to take into account when looking to put on sovereign basis trades.
- SovX¹ vs. other index trades need to be treated with caution due to the technicals of index construction.
- We examine how sovereign CDS spreads impact corporate CDS pricing, and outline a framework to interpret relative value between corporates and sovereigns.
- We examine trade flow data for sovereigns and the SovX index, and discuss how it has evolved over the past year.

¹ SovX is a trademark of the International Index Co Ltd

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This primer is set out in distinct sections: we start with a detailed examination of the legal and technical framework of sovereign CDS and discuss implications before focusing on market issues – the relationship with government bonds, the nature of the sovereign indices, how sovereigns, corporates and financials relate. We finish with a discussion of market participants and flows. All sections are designed such they can be read in isolation – the legal section is fundamental to a full understanding of sovereign CDS, but in general does not need to be read ahead of more market focused areas.

A glossary of useful terms in the Appendix for reference: terms we define there are in italics where used in the main text. We capitalize ISDA-defined terms only where doing so helps clarify. Exhibit 33 in the Appendix is an excerpt of the ISDA Settlement Matrix and summarizes the main characteristics of Western European Sovereign CDS compared to standardized North American and European corporate contracts. Throughout this document, we use the Matrix as the reference point (readers should be aware that settlement details may differ for non-standard trades) and unless stated otherwise, when we refer to sovereign CDS, we mean Western European Sovereign CDS.

Legal and technical considerations

We start by summarizing in some detail the most important characteristics of a sovereign CDS contract: how it can be triggered, what the reference entity and its deliverables are, and where currency exposure comes into play. Using this as a basis, we then examine the implications for valuation, cheapest-to-deliver optionality and recovery rates.

As is the case for all standardized corporate contracts, standardized sovereign credit events are auction settled under the 2009 ISDA Credit Derivatives Determinations Committees, Auction Settlement and Restructuring supplement and are governed by decisions of the Determinations Committees. Both cash and physical settlement through the auction are possible².

What is a sovereign?

We can obviously define our universe of Western European sovereigns as a list, or for CDS purposes, use the ISDA 2003 definition: "Sovereign means any state, political subdivision or government, or any agency, instrumentality, ministry, department or other authority (including... the central bank) thereof." Or we can simply define it to be anything we choose to trade under the relevant terms of the ISDA Credit Derivatives Physical Settlement Matrix and Confirmation. Note that the United States is included in all cases.

But in our view, that wastes a key insight, particularly given that Europe is rapidly evolving in this area, a fact that drives many of the phenomena seen in the CDS market. For our purposes, a sovereign nation is one that has sole unfettered control over its monetary arrangements as part of an independent legal system and corpus juris. The euro is the currency of Italy, and can cease to be so, at the sole discretion of the government in Rome. The Treaty of Lisbon has an impact, but keeps Italy explicitly sovereign subject to manageable constraints. Under ISDA definitions, Michigan is a Sovereign, but not in an important respect. The dollar is the currency of Michigan, and cannot cease to be so at the sole discretion of the government in Lansing; the constitution and US law explicitly remove the possibility. Italy is sovereign and Michigan is not, despite the shared ability to tax and borrow. So, for example, we consider the credit of Italy as important in considering the credit of Telecom Italia, but not Michigan in considering Ford. They are both Sovereign CDS, but Italy's CDS is on a true sovereign; that of Michigan is not. This concept of sovereign legal systems becomes central when considering the currency issues we describe below.

Credit Events

The main difference between a sovereign CDS and a corporate CDS, from an ISDA contractual point of view, is the definition of what constitutes a Credit Event. For a corporate, as outlined in Exhibit 33, a credit event is either a bankruptcy, a failure-to-pay or, if covered³, a restructuring. For Western European sovereigns, bankruptcy is replaced with a moratorium/repudiation. The three possible credit events are as follows:

Failure to Pay

This event is the same for both sovereigns and corporates, and is exactly as it says: if the reference entity fails to make a payment when and where due on one or more of its Obligations in an amount at least as large as the *Payment Requirement*, then once any applicable grace period has passed, a failure to pay event occurs.

² Please see our publication, CDS Market Developments: A discussion of recent changes to the CDS markets, 22 June 2009, for more information on CDS conventions, the Determinations Committees and the Big and Small Bang Protocols.

³ Standard US contracts now trade without restructuring; standard European contracts trade with modified-modified-restructuring. For European corporates, this means that there is a maturity limitation on deliverables in a restructuring credit event, and contracts are bucketed by maturity for the auction.

Repudiation/Moratorium

This is specific to sovereign (and emerging market corporate) CDS and is not a credit event for standard North American and European corporate CDS contracts. Both of the following must occur:

1. For an aggregate amount of at least the *Default Requirement*, an authorized officer of the reference entity either a) disclaims, repudiates, rejects or challenges the validity of one or more Obligations or b) imposes a moratorium, standstill, roll-over or deferral with respect to one or more Obligations.
2. A Failure to Pay (determined without regard to the *Payment Requirement*) or a Restructuring (determined without regard to the *Default Requirement*) occurs with respect to any such Obligation on or prior to the Repudiation/Moratorium Evaluation Date.

The occurrence of 1. is referred to as a Potential Repudiation/Moratorium and if it occurs on or prior to the *Scheduled Termination Date*, the Repudiation/Moratorium Evaluation Date that determines 2. is effectively the later of:

- The date 60 days following the Potential Repudiation/Moratorium date.
- The first payment date after the Potential Repudiation/Moratorium date of one of the bonds impacted by the Repudiation/Moratorium (if the impacted Obligations include bonds).

If a Potential Repudiation/Moratorium occurs (on or after the *Effective Date* and on or prior to the *Scheduled Termination Date*) but 2. above does not occur prior to the *Scheduled Termination Date*, then the CDS can be extended to the Repudiation/Moratorium Evaluation Date by delivery of a Repudiation/Moratorium Extension Notice from one party to the other. Effectively, what this means is that if a Potential Repudiation/Moratorium occurs in the period covered by the CDS contract, if this subsequently becomes a full Repudiation/Moratorium, it will be covered by the CDS contract even if part 2. above only happened after the *Scheduled Termination Date*.

Restructuring

This event is in common with standard European Corporate Contracts, with the difference between the two being that corporates trade Modified Modified Restructuring whilst sovereigns just trade as Restructuring. This means that there is no maturity limitation on Deliverable Obligations (beyond the usual 30 years) in the event of a restructuring credit event for sovereigns, whilst there is for corporates. There is also no conditionally transferable Obligation limitation for sovereign restructurings, unlike for corporates.

In practice, this means that once a sovereign restructuring credit event has occurred, auction settlement is the same as for any other credit event, the only difference being that triggering the credit event is optional for both parties: if neither protection buyer nor protection seller triggers the contract, it will continue until maturity or a future credit event.

To qualify as a restructuring credit event, one of the following must occur in a form that binds all holders to one or more Obligations in an amount of at least the *Default Requirement*:

- A reduction, postponement or deferral of Obligation principal or contractually agreed interest payments are not permitted by the original terms of the Obligation.
- A change in priority ranking causing subordination to another Obligation.
- A change in currency or composition of interest or principal payments to any currency which is not a *Permitted Currency*.

It must further:

- Arise directly or indirectly from a deterioration in the creditworthiness or financial condition of the reference entity.
- Satisfy the *Multiple Holder Obligation*: the Obligation that triggers the restructuring credit event must be held by more than three holders and at least 2/3 of holders must be required to consent to the event.

A much discussed specific subset of restructuring that pertains particularly to sovereigns is currency redenomination. We discuss this in detail in the section on currency below.

Reference Entities and Obligations

We list the Reference Entities for a number of sovereigns in Exhibit 1. Determining the relevant pool of Obligations in each case is not always as straightforward as might be assumed. We are interested in two sets of Obligations:

- Obligations of a Reference Entity
- Deliverable Obligations

Exhibit 1: Sovereign Reference Entities

Country	Reference Entity	Country	Reference Entity
Austria	Republic of Austria	Ireland	Ireland
Belgium	Kingdom of Belgium	Italy	Republic of Italy
Cyprus	Republic of Cyprus	Malta	Republic of Malta
Denmark	Kingdom of Denmark	The Netherlands	Kingdom of the Netherlands
Finland	Republic of Finland	Norway	Kingdom of Norway
France	French Republic	Portugal	Portuguese Republic
Germany	Federal Republic of Germany	Spain	Kingdom of Spain
Greece	Hellenic Republic	Sweden	Kingdom of Sweden
Iceland	Republic of Iceland	UK	United Kingdom of Great Britain & Northern Ireland

Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service, Markit

A CDS credit event would be triggered by a failure to pay, repudiation/moratorium or restructuring on one or more of the Obligations (subject to the conditions outlined above and if in sufficient size). Protection buyers are then entitled to deliver any of the specified Deliverable Obligations to settle the contract; it will be the value of these that determines the cash recovery value for the CDS through the auction.

As outlined in Exhibit 33, there are no restrictions on Obligations for Western European sovereign CDS contracts beyond the fact they must fall under the *Borrowed Money* category. An Obligation of a Reference Entity therefore arises as either a direct Obligation or as a result of a Qualifying Guarantee. We consider each in turn before considering the restrictions on Deliverable Obligations in the following sections.

Direct Obligations

The direct Obligations of a Reference Entity should be the easiest to determine, but even here, we believe there are some grey areas that make it difficult to be certain in some cases.

For example, the UK has only GBP debt, in the form of treasury bills, gilts (regular and inflation-linked) and strips (principal and coupon). It seems fairly clear that the first two are Obligations of the Reference Entity, and, therefore, any failure to pay, repudiation/moratorium or restructuring related to them could trigger a credit event. They are also Deliverable Obligations and satisfy the conditions below. Strips are not as clear-cut, but based on the precedent set by the credit events of Fannie Mae and Freddie Mac, it seems unlikely that principal-only or coupon-only instruments would be deliverable. It

would be a decision for the Determinations Committee, however, whether a failure to pay, repudiation/moratorium or restructuring related to them could trigger a credit event or not.

In the case of Sweden, there are two sets of government bonds. The CDS Reference Entity is the Kingdom of Sweden, which has debt outstanding in USD, GBP, JPY, AUD, NZD and EUR. However, there are also fifteen outstanding Swedish Government Bonds, issued by the Government of Sweden, and denominated in SEK. The latter are clearly not deliverable, being in a non-*Specified Currency* (see currency section below; the AUD and NZD Kingdom of Sweden bonds would not be deliverable either), but are they Obligations for the purposes of the Kingdom of Sweden CDS contract? Our belief is that they probably are, as both sets of bonds are issued by the Swedish National Debt Office and we believe they would be viewed as originating from the same entity, but the detail is important and ultimately it would be for the Determinations Committee to make a final decision.

The UK and Sweden are two of the simpler countries to consider. The situation is similar or more complicated for many others.

Qualifying Guarantees

A Qualifying Guarantee means a written arrangement pursuant to which a Reference Entity irrevocably agrees (by guarantee of payment or equivalent legal arrangement) to pay all amounts due under an Obligation for which another party is the obligor. It must be *transferable* and excludes any arrangement:

- Structured as a surety bond, financial guarantee insurance policy, letter of credit or equivalent legal arrangement.
- In which the payment Obligations of the Reference Entity can be discharged, reduced, assigned or otherwise altered as a result of the occurrence or non-occurrence of an event or circumstance (other than payment).

The main points are that a Qualifying Guarantee must be written, irrevocable, *transferable* and non-dischargeable other than by payment. If there is a Qualifying Guarantee between a sovereign, S, and a guaranteed company, C, then :

1. If S has a credit event, C's Obligations may be deliverable (subject to the regular deliverability criteria).
2. If C has a credit event, and S does not honour the guarantee within the mandated time-frame, this would lead to a credit event on S.

In the context of sovereign CDS, the question is then which sovereigns guarantee the debt of other entities, and which of these guarantees represents a Qualifying Guarantee. Again, it is far from straightforward – either identifying the extent of existing guarantees for a given country or ascertaining which would be Qualifying for the purposes of a CDS contract. The only certainties are that there are many entities carrying government guarantees on all or some of their debt, and that the rigour of these guarantees is highly variable. We list a few in Exhibit 2, making an attempt to separate them into those that may be Qualifying and those that are probably not. Ultimately, however, any decision on this front would be made by the Determinations Committee with appropriate legal advice.

N.B.: the views expressed here are not based on legal opinion and are provided by way of example only. As we repeatedly seek to highlight, the devil is definitely in the detail when it comes to sovereign CDS, and a detailed legal analysis of specific guarantees is beyond the scope here, but we look at examples.

Exhibit 2: Sovereign “Guarantees”

Country	Likely to be Qualifying Guarantee	Unlikely to be Qualifying Guarantee
Germany	KfW Bankengruppe	
France		SNCF, SFEF
Spain	Instituto de Crédito Oficial (ICO)	
Belgium		SNCB Holding
Austria	OEBB Infrastruktur AG Oesterreichische Kontrollbank Aktiengesellschaft (OKB) ASFINAG	
UK		Government guaranteed bank debt Network rail
Greece	Hellenic Railways	
Malta	Freeport Terminal Malta	

Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service, Markit

The situations with KfW Bankengruppe in Germany and SNCF in France are illustrative, in our opinion.

KfW is a promotional bank under the ownership of the Federal Republic of Germany, providing, among other things, support in investment, export and project finance. It operates with a statutory government guarantee that is written, *transferable* and irrevocable. Widely viewed as quasi-government debt, the guarantee is worded robustly enough, in our opinion, that we believe it likely to be a Qualifying Guarantee.

SNCF, on the other hand, is a rather different situation. SNCF (Société Nationale des Chemins de Fer Français) manages the French railway system and is a public entity with autonomous management established under the special status of an Etablissement Public Industriel et Commercial (EPIC). It is fully owned by the French Republic and by way of its EPIC status, it carries an implicit automatic guarantee from the Republic based on the opinion issued by the 31 August 1995 Conseil d'Etat. The Conseil d'Etat considers that should the établissement public be defaulting, the authority from which it was spun off would take charge of its rights and obligations. Therefore, the statutory provisions creating an établissement public do not need to provide for an explicit guarantee to its benefit. This would appear to be sufficient for the guarantee to fail to be a Qualifying Guarantee, but it is further possible for the status of an EPIC to be changed (albeit by a change in law) so that it becomes a regular company, in which case the implicit state guarantee would fall away. An example where this has happened is EDF (Electricité de France), which lost its EPIC status in 2004.

The Belgian national rail-road company, SNCB Holding, operates with a similar legal framework to SNCF, and as such, we also regard its guarantee as unlikely to be a Qualifying Guarantee. The Austrian entities listed, on the other hand, have apparently solid guarantees, as does the Spanish Instituto de Crédito Oficial (ICO). Network Rail is an interesting example of a situation likely requiring detailed legal opinion: it is guaranteed (irrevocably and unconditionally) by a Financial Indemnity of The United Kingdom. The guarantee is there, it is written and seems water-tight to the extent note-holders should be paid by the government in the event that Network Rail is unable to pay for whatever reason. However, the Financial Indemnity is via a Security Trustee rather than direct to note-holders, making it unclear whether it would actually be a Qualifying Guarantee.

Deliverable Obligation characteristics

As outlined in Exhibit 33, Deliverable Obligations for Western European Sovereigns must be *bonds*, or *loans* with all of the following characteristics:

- *Specified Currency*
- *Not Contingent*
- *Assignable Loan*
- *Consent Required Loan*
- *Transferable*
- *Maximum Maturity: 30 years*
- *Not Bearer*

With the exception of *Specified Currency*, which is discussed below, most of these are self-explanatory, and all are in line with Deliverable Obligation characteristics for standard corporate contracts⁴. Full definitions are provided in the Appendix for reference.

Currency questions

Currency is an important consideration for all CDS contracts, but particularly for sovereign CDS due to the potential for currency devaluation or even, in extreme, currency redenomination by the sovereign.

In our view, one central point in valuing sovereign CDS is the likelihood that a credit event, even if not in the form of a *non-Permitted Currency* redenomination, would coincide with a high degree of currency volatility and likely, weakness in the defaulting currency.

There are several aspects to bear in mind when working out currency exposure:

- Most Western European sovereign contracts trade in both USD and euros. With the exception of US sovereign CDS, the cost of USD protection is greater than euro protection, and the USD contract is the most liquid. This reflects expected weakness in the euro given a local credit event, with the degree of weakness depending on the country—see below. The spread between the USD and euro contracts can be traded directly in a quanto swap; the contingent correlations between the currency and sovereign spreads are a key feature of the market.
- If a credit event occurs, and if there are Deliverable Obligations in a currency other than that of the CDS contract, there are two relevant sets of exchange rates:
 - The exchange rates for the auction are set two days prior to the auction in Europe (one day in North America). These will impact the auction recovery rate, as will any fluctuation in exchange rates between the time they are set and the auction.
 - For those buyers settling physically, a Notice of Physical Settlement (NOPS) must be delivered to the seller the day after the auction with details of the Deliverable Obligation(s) being delivered. The exchange rates pertaining to the deliverables are then set at 4:00pm London time on the London Business day following the NOPS effective date. Similarly, for a NOPS amendment notice, the relevant currency rate is set the following business day. This is a change from the situation prior to Big Bang, when currency rates were set on the NOPS effective date. The rationale for the change is to minimize as far as possible the opportunity for the buyer to take advantage of currency fluctuations between the auction and settlement date to amend their NOPS to specify a cheaper deliverable to the detriment of the seller.

⁴ In addition, Standard North American and European Corporate contracts specify "Not Subordinated" as a deliverable obligation characteristic, meaning that either the obligation must not be Subordinated to the most senior Reference Obligation in priority of payment, or if none is specified, any unsubordinated Borrowed Money Obligation.

In other words, whether cash or physically settling, investors are potentially exposed to exchange rate fluctuations around the time of the auction that they may have limited ability to hedge, exactly when maximum unfavourable moves might be expected. The value and identity of the cheapest-to-deliver may change, as may the benefits of physical vs. cash settlement for a given investor.

Exhibit 3: Sovereigns and their currencies

Sovereign	Local Currency	Is current currency a <i>Specified Currency</i> ?	G7	OECD + AAA ⁵	Would a new local currency be a <i>Permitted Currency</i> ?	Would a new local currency be a <i>Specified Currency</i> ?	S&P LT local currency rating
Austria	EUR	Yes	No	Yes	Yes	No	AAA
Belgium	EUR	Yes	No	No	No	No	AA+
Cyprus	EUR	Yes	No	No	No	No	A+
Denmark	DKK	No	No	Yes	Yes	No	AAA
Finland	EUR	Yes	No	Yes	Yes	No	AAA
France	EUR	Yes	Yes	Yes	Yes	No	AAA
Germany	EUR	Yes	Yes	Yes	Yes	No	AAA
Greece	EUR	Yes	No	No	No	No	BBB+
Iceland	ISK	No	No	No	No	No	BBB+
Ireland	EUR	Yes	No	No	No	No	AA
Italy	EUR	Yes	Yes	No	Yes	No	A+
Luxembourg	EUR	Yes	No	Yes	Yes	No	AAA
Malta	EUR	Yes	No	No	No	No	A
Netherlands	EUR	Yes	No	Yes	Yes	No	AAA
Norway	NOK	No	No	Yes	Yes	No	AAA
Portugal	EUR	Yes	No	No	No	No	A+
Spain	EUR	Yes	No	Yes	Yes	No	AA+
Sweden	SEK	No	No	Yes	Yes	No	AAA
Switzerland	CHF	Yes	No	Yes	Yes	Yes	AAA
UK	GBP	Yes	Yes	Yes	Yes	Yes	AAA
USA	USD	Yes	Yes	Yes	Yes	Yes	AAA

Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

- In addition to the issue of exchange rate exposure, the currency of deliverables is important for another reason. As outlined in Exhibit 33, Deliverable Obligations must be in standard *Specified Currencies*: i.e., euros or the currencies of Canada, Japan, Switzerland, the UK, or the USA. If a portion of a country's debt Obligations is in other currencies (Swedish krona or Australian dollars, for example), it would not be deliverable. In the extreme, if a country had no Deliverable Obligations in any of the *Specified Currencies*, there would be no deliverables and the contract would be worthless. Exhibit 3 outlines the currency characteristics of the main traded sovereigns. Local currency Obligations of countries such as Denmark, Iceland, Norway and Sweden, for example, would not be deliverable: these currencies are not *Specified Currencies*.
- Currency can also play a role in triggering a credit event in the first place. As outlined above, a change in principal or interest payments to a currency that is not a *Permitted Currency* has the potential to trigger a restructuring credit event. *Permitted Currencies* are those of G7 or AAA-rated OECD countries.
- Note again the importance of the detail. For example, by definition (of being a G-7 member) Italy, the market's previous proxy for EMU breakdown, can re-denominate its government debt out of euros into a new currency without triggering a restructuring, whereas Spain cannot (except in the extremely unlikely event it can keep a AAA rating through the process).

⁵ The AAA rating condition requires the LT local currency rating of either Fitch, S&P or Moody's to be AAA. Hence, for example, Spain meets this criteria despite having an AA+ S&P rating.

If Greece or Ireland, for example, were to trigger a restructuring credit event via currency redenomination, the new debt would not be deliverable, and therefore if all debt were redenominated (which is unlikely, as it would require the absence of foreign debt⁶), there could be the situation of a restructuring credit event with no deliverables. Similarly, those countries that are currently AAA rated and in the OECD, but not in the G7, would most likely have been downgraded prior to a debt-redenomination, putting them in the same category as Greece and Ireland.

This discussion is fairly academic as realistically it is highly unlikely that these situations would be allowed to occur. Not impossible, however, highlighting the importance of understanding the details of the CDS agreements and the subtle differences between the various sovereign issuers.

An aside on the euro area

Clearly the situation for Spain, as part of the Eurozone, issuing debt in euros without control over monetary policy, is rather different than, for example, the UK in sterling. With only GBP debt, the UK can use the tools of monetary policy to avoid defaulting on its obligations whereas Spain is more limited in the tools at its disposal.

This naturally leads to the discussion of whether a country could or would ever leave EMU, by choice or otherwise. Clearly, the implications if it did could be severe, and as indicated above, vary dramatically by country. We examined the practical impossibility of leaving the euro back in 2000 in our publication, "[Leaving EMU is almost impossible.](#)"

The implicit assumption was that a sovereign state would take all steps to avoid the default costs of departure (which effectively destroys the financial system, for the reasons outlined in that piece). It did not address the possibility that "leaving EMU" might be a mechanism for sovereign default.

We continue to believe that this is a very expensive way for a sovereign to default, and we would tend to distinguish between an EMU member that has an unsupportable level of total debt and one that merely has an unsupportable level of government debt. In the former case, we see the costs of sovereign default via EMU "departure" as being prohibitive, on the grounds that it would create a generalized default environment with its extra costs.

We also think that "playing" the scenario of an EMU breakup via sovereign CDS is very inefficient. In our view, the most plausible scenario (in a very implausible field) is not for weak countries to default via departure, but for strong (competitive, low-inflation) countries to leave, leaving a euro "rump" with a monetary policy more tailored to high-debt, weak-currency conditions. We regard this as vanishingly implausible but in the end EU nations are still explicitly sovereign states that may multilaterally negotiate a change in monetary arrangements if the current ones become unworkable. We would expect such a change explicitly to avoid the need for defaults, and define the conditions leading to a default of Spain as by definition unworkable.

Overall, then, we stand by the analysis of ten years ago; unilaterally leaving the euro is not a realistic step. Using it as a mechanism for default is so inefficient that it would indicate failure of the whole monetary mechanism. The mechanism would therefore be modified more wholesale. Our conclusion is that the system is not in the end so rigid as to be the cause of defaults.

⁶ Note a key point from our 2000 "Leaving EMU" piece referenced below. Italy is sovereign over Italian law, but not over the whole euro, which has an existence beyond Italian law. So Italy can redenominate Italian law euro obligations into new lira but not German or English law ones, which survive as euro and can be delivered. This is fundamentally different from say the UK, where sterling globally is or becomes what the UK government says it is. This is a unique and poorly-understood feature of the euro.

A partial step down the same road, circulating a new currency in parallel, is not per se a credit event unless government debt is redenominated into a *Non-Permitted Currency* but:

- 1) It has implications for the tax base.
- 2) It is probably a breach of Treaty obligations to take an action not in the common interest; it is not clear what the sanction might be.
- 3) Arguably (as in, for example, the ECB paper Withdrawal and expulsion from the EU and EMU: some reflections), leaving EMU is tantamount to leaving the EU (and leaving the EU forces departure from EMU).
- 4) There is no known material adverse change clause in sovereign obligations.

One problem is that departure and sovereign default might in extremis not be a matter of laws and courts.

Counterparty risk, the risk premium and valuation

There is considerable discussion around the inherent “value” of a sovereign CDS and its relation to the elevated levels at which they trade. When interpreting sovereign implied default probabilities, a couple of points should be kept in mind.

The first is the role counterparty risk plays in sovereign CDS. All CDS contracts, unless cleared through a central counterparty⁷ (CCP), have counterparty risk making them in effect a basket product: the relevant default probability for valuation is the probability of default⁸ of the reference entity conditional on survival of the counterparty.

In the case of sovereign CDS, the ability of the financial institutions selling CDS protection to pay out is likely to be highly correlated with the fortunes of the sovereigns. The “survival of the counterparty” is therefore not only the pure survival of the institution, but also its ability to honour its CDS contracts. In an environment where, say, the UK was about to default, banking systems would be likely to have been nationalized and we think governments would be most unlikely to let a nationalized entity pay out on a sovereign CDS.

This clearly relates back to the concept we’ve raised many times before⁹:

“An asset’s price should reflect a premium for the co-variation of its payoff with priced states of nature”

What do we mean by this? Since a default payment on a CDS is conditional on both the default of the sovereign and the ability of the counterparty to pay (from credit and regulatory standpoints), it is important to bear in mind what the “state of the world” will be like in the event of a sovereign default. Clearly, some Western European sovereigns (Iceland springs to mind), were they to default, would do so as an exogenous event; with nothing else changing, their isolated default would not change the state of the world much. Greece, somewhat less so, Spain, very much less and Germany a cataclysmically endogenous event that would change the monetary regime of the world unrecognizably, in our view.

The posting of collateral goes some way to mitigate the exposure, but to the extent the counterparty refuses or is unable to pay, the same would likely hold leading up to the default. The likelihood of the protection holder receiving a (full) payment in the event of default, therefore, clearly varies significantly with the identity of the sovereign (and hence the likely world environment coincident with their default) and the identity of the counterparty. The net effect is to reduce the expected default value, which all things being equal, would reduce spreads.

⁷ Sovereign CDS (single name and index) do not currently clear through a CCP. This will change at some point, but until then, counterparty risk remains relevant.

⁸ Default in this section is taken to mean the occurrence of a credit event.

⁹ The quotation is from the Harvard paper: Economic Catastrophe Bonds, 13 July 2007. <http://hbswk.hbs.edu/item/5725.html>

Which leads us to the missing link between extremely low conditional default probabilities for Western European sovereigns on the one hand, and their spreads on the other (with the considerably higher implied default probabilities): the risk premium¹⁰. Greece trading at 420bps, for example, does not imply that the market is pricing in a 30% real-world probability of default over the next five years. This spread also incorporates a substantial risk premium, to compensate for uncertainty in the probability of default, spread volatility risk, liquidity risk, recovery risk and so on. As this primer aims to illustrate, there is a plethora of devilish details related to sovereign CDS, all of which ultimately increase uncertainty. Added to this, whilst a sovereign default is clearly an extreme tail event, we can only speculate on its likely impact, beyond the fact it would be very far-reaching. The greater the uncertainty, the greater the absence of facts and historical precedent, the greater the risk and hence the greater the risk premium and implied default probabilities.

When interpreting implied default probabilities for sovereign CDS, it is therefore essential to take into account any counterparty risk (which would lower spreads and therefore implied default probabilities) and the risk premium (which can substantially raise spreads and hence implied default probabilities). As a result, we think rather strongly that using implied default probabilities to directly infer the real-world probability of the sovereign defaulting is just not a useful exercise.

Into this mix, there is also obviously the issue of recovery risk, and the fact that actual recovery may vary dramatically from the 40% typically assumed in pricing. We discuss this in more detail below – first in the context of what recoveries may be expected, and secondly in terms of the inherent cheapest-to-deliver optionality.

Factors driving possible Western European sovereign recoveries

Making an assessment of expected default recoveries for CDS is notoriously difficult for corporates due to the small historical dataset and its wide dispersion on the one hand, and the large number of variables that contribute to the eventual recovery on the other. Sovereigns, let alone Western European sovereigns, are far more problematic. There are scant examples to draw from, and these are highly diverse, making it hard to draw too many conclusions.

We outline some recent examples in Exhibit 4. Pakistan, Ukraine and Uruguay's events took the form of restructurings while the others were failures to pay. We think the restructuring examples would be more typical of a Western European sovereign event, as opposed to say Argentina, which failed to pay and is often taken as something of a benchmark in sovereign defaults.

The only sovereign credit event that has been auction-settled is the recent Ecuadorian one, with a recovery of 31.4%. For the others, we display both the recovery value (the value of the bonds shortly after default) and the eventual restructured value. We note that the latter tends to be considerably higher, but can occur up to years later. From the point of view of sovereigns traded today, the recovery value is more relevant¹¹ as CDS auctions tend to occur within a couple of months of the credit event. Given the uncertainty and potential delay in receiving a restructuring payment, it makes sense for the recovery value to be at a discount.

¹⁰ The difference between real world default probabilities and risk-neutral pricing, for those who prefer to think in those terms.

¹¹ Apart from Ecuador in 2008, where we show the auction recovery value as the value at restructuring.

Exhibit 4: Recovery values in some recent sovereign defaults

Country	Bond	Nominal USD mm	Date of Default	Recovery Value ¹	Lowest Price ²	Date of Restructuring	Value at Restructuring
Russia	PRINs	20,172	Dec-98	6	5	Aug-00	35
	Minfin Ills	1,322	May-99	35	16	Feb-00	43
	IANs	6,416	Jun-99	12	6	Aug-00	36
Ecuador	11.25 '02	350	Oct-99	30	27	Aug-00	53
	IE	124	Nov-99	38	35	Aug-00	62
	PDI	2,857	Dec-99	22	17	Aug-00	33
Pakistan ³	FRN 00	300	Dec-99	65	46	Dec-99	65
Ukraine ³	16 '01 DEM	~1,000	Feb-00	61	40	Feb-00	61
Ivory Coast	FLIRBs	829	Oct-00	15	11	na	na
	PDIs	426	Oct-00	15	12	na	na
Argentina	FRB	1,379	Dec-01	27	19	Jun-05	32
	12.25 '18	7,463	Dec-01	24	17	Jun-05	34
	12 '31	8,521	Dec-01	20	17	Jun-05	33
Uruguay ³	'06	97.5	Apr-03	59	48	May-03	88
	'27	510	Apr-03	50	39	May-03	67
Dominican Rep. ⁴	'06	500	Feb-05	97.5	74	Apr-05	102
	'13	600	Feb-05	90	65	Apr-05	95
Ecuador ⁵	9.375 '15	650	Dec-08	25	23	Jan-09	31

Source: Credit Suisse

1 The "recovery value" is the market price as a % of nominal of the bonds just after default has occurred. The "restructured value" is the market value of new bonds and cash received in the restructuring per 100 nominal of the defaulted bonds.

2 "Lowest price" is the lowest price from six months prior to the date of default to the restructuring date or to present if a restructuring has not yet taken place.

3 Pakistan, Ukraine and Uruguay never missed any payments on their Eurobond debt, but the restructuring implied a loss of value for investors.

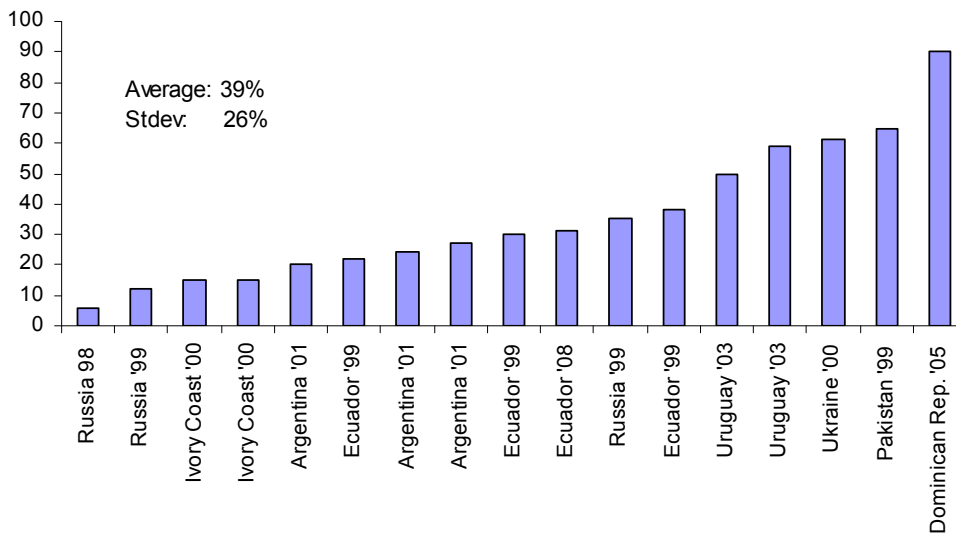
4 Dominican Republic was declared to be in selective default by S&P after missing interest payments.

5 Ecuador 2008 is the only sovereign credit event we're aware of that has been auction settled. The restructuring value and date in this case therefore refer to the auction value and date.

As illustrated in Exhibit 5, from our limited dataset, it is clear that recovery values for sovereign defaults can be extremely variable. We would suggest there should be some upside on these levels if an auction occurred, so 39% is likely to be rather low as an average. However, with a standard deviation of 26%, this implies that each case needs to be considered very much on its own merits.

Exhibit 5: Recoveries are highly dispersed

Recoveries in recent sovereign credit events



Source: Credit Suisse

Other historical points of reference suggest possible upside risk to sovereign recoveries

In cases of a technical default (the Dominican Rep. above is an example), recoveries can be very high. The UK's history in a previous crisis is illustrative, in our eyes. In 1934, the coupon on the War Loan perpetual was legislated down from 5% to 3.5%. This was a selective restructuring with a 70% recovery to holders, which we think would have triggered CDS. But the event was seen as isolated and cannot be detected in histories of gilt yields. The FX rate had adjusted beforehand. Applying the counterfactual of a CDS market existing at the time, it would, in our view, have had very high recoveries, driven mainly by the value of delivery options applying to any gilts contract. (Not 70, as the War Loan would not have been deliverable.)

The UK is not alone; the popular memory of the 1930s as a mass Western European default with no recoveries is not accurate. In aggregate, restructurings protected creditors' interests respectably. Professors Eichengreen and Portes (Settling Defaults in the Era of Bond Finance, IBRD, 1989) have presented results showing that, for a UK investor in sterling sovereign loans, defaults only reduced portfolio returns from 5.8% (on the un-defaulted sample) to 5.4% (on average) weighted by loans outstanding in 1929. For dollar loans, results were worse at 6.7% and 3.3%, respectively. In the specific case of Germany, which accounted for a substantial part of the difference, foreign loans issued in the 1920s offered ex-post returns of 1.12% in dollars, and 3.61% in sterling. Other Western European nations in aggregate had returns of 4.8% in both. It is hard to extract specific restructuring recoveries from these data. The authors report in a separate paper: "Rather than a sharp, dichotomous variable, default in the 1930s was often partial and intermittent." But we think the history is broadly consistent with relatively high recoveries, and in fact, principal write-downs were not the norm.

Using the US as a prototype of the EU, we are only aware of one default since the Civil War on a direct state obligation: Arkansas in 1932. (See our recent publication [Investment Themes: Greece - Debt financing and a strategy for recovery](#) for a fuller history). But we suggest some caution in comparing the euro area with the US; the pooling of sovereignty issues in the euro area is unique). As in the case of the UK, we think that given the counterfactual of a CDS market existing at the time, it would have been treated as a restructuring, although as is usual, a failure to pay was not far behind. According to a contemporaneous Time article, holders were given the option of taking 25-year bonds at 3% interest or holding existing bonds with coupons missed. (We understand that the substitute bonds were eventually paid in full, partly under pressure from peer state creditors, since states are sovereign to the extent they cannot unwillingly be sued by their citizens. There are some interesting parallels to today.) So the CDS would have had value to the protection holder, as we understand it, but we think it would have had a high recovery: Arkansas was solvent at the time and the default was essentially voluntary.

Given the limited availability of historical data points to draw from, another approach is obviously to attempt to estimate likely recoveries from anticipated situations leading to a credit event. In the case of Greece, for example, Greece's stated government debt-GDP ratio is reported at 98pct, and rising. Some academic research (see, for example, "Fiscal Solvency and Fiscal Forecasting in Europe", Artis and Marcellino, 1998) suggests that this is above a tipping point. One approach, conditional on a restructuring, might be to slice the debt to Maastricht levels at 60pct, a 40% haircut and 60% recovery. Any restructuring would externalize costs onto euro-area and other investors; the key would be to create a subsequently-sustainable situation.

The cheapest-to-deliver option

CDS investors can settle their CDS in two ways if there is a Credit Event: either physically by delivering or receiving an underlying (Deliverable) Obligation or through cash settlement of $(1 - \text{Recovery}) \times \text{Notional}$. While it is possible to settle outside the auction process, the auction is now the market standard, so we use that as the basis for discussion here.

The issue of there being a cheapest-to-deliver is relevant for both cash or physical settlement: all Deliverable Obligations are deliverable (by definition!) into the auction. If physically settling, you therefore either want to deliver the cheapest (if short CDS, i.e., bought protection) or risk being delivered the cheapest (if long CDS, i.e., sold protection). The value of the cheapest-to-deliver will therefore drive the auction recovery price to a greater or lesser extent depending on its size relative to the net open interest in the auction and aggregate notional outstanding.

This issue can become more pertinent in a restructuring credit event. Leading up to a failure-to-pay, all bonds should trade down to their recovery value, which should be fairly uniform. In a restructuring, however, depending on how many Obligations were restructured, there exists the real possibility that restructured and non-restructured bonds trade at very different levels, both leading up to the auction and afterwards, thereby introducing a significant element of recovery risk. A good example is if there is a very steep yield curve (for reasons of interest rate and/or credit risk): a long bond might be deeply discounted, substantially lowering the effective recovery from that implied by a shorter, restructured Obligation¹².

In working out the value of the cheapest-to-deliver option, it is therefore important to take into account the nature of the credit event and the full profile of the Deliverable Obligations: in terms of maturity, currency, coupon and any other features that may impact their value.

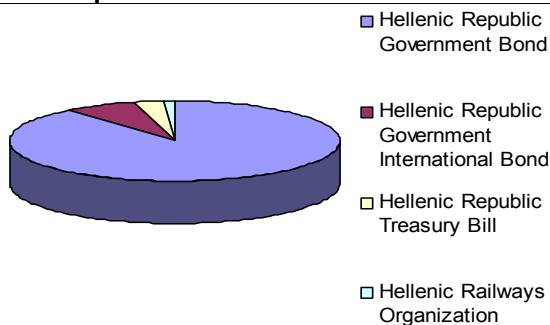
Examples

To illustrate some of the ideas introduced above, we discuss a few of the (many) issues arising with Greece and Spain when looking at deliverability of Obligations and the value of the cheapest-to-deliver option.

Greece

Exhibit 6 shows the breakdown of debt issuance for the Hellenic Republic: 99% is issued by the government with a further 1% issued by the Hellenic Railways Organization, which we are assuming for the purposes of this analysis to have a Qualifying Guarantee. We are further assuming that Treasury bills would be deliverable – we are not aware of a definitive precedent to say for sure that they are, but under the ISDA definitions, we see no real reason why they should not be.

Exhibit 6: Hellenic Republic debt issuers

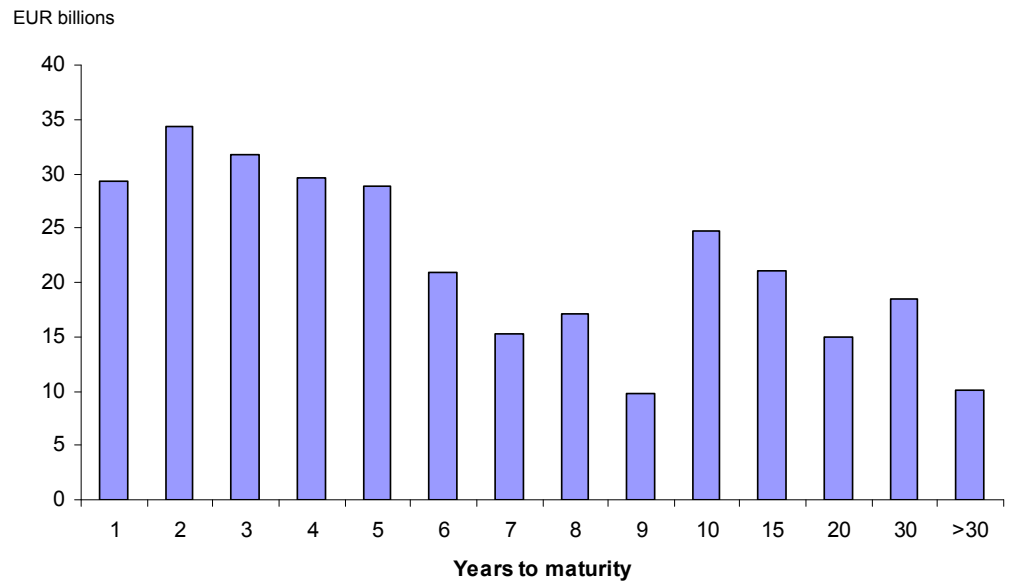


Source: Credit Suisse

¹² This possibility is what prompted the corporate market to trade on a modified restructuring basis in the first place, whereby there is a maturity limitation on deliverables in a restructuring credit event.

The debt is issued in four currencies: EUR, USD, CHF and JPY. 98% is euro denominated, so currency does not play a large role and since all four currencies are *Specified Currencies*, all Obligations would be deliverable from a currency standpoint, (unless Greece had triggered a Credit Event by redenominating the currency, in which case any redenominated domestic debt would not be deliverable).

Exhibit 7: Maturity profile of Greek government debt



Source: Credit Suisse

In total, there is approximately EUR 300 billion of Greek government debt outstanding, with the maturity profile shown in Exhibit 7. Of note, since the maximum maturity of a Deliverable Obligation is 30 years, there is EUR 10 billion of debt that is not deliverable for this reason. There are also a couple of zero-coupon bonds outstanding – these should be deliverable at their accreted¹³, rather than their face value, amount.

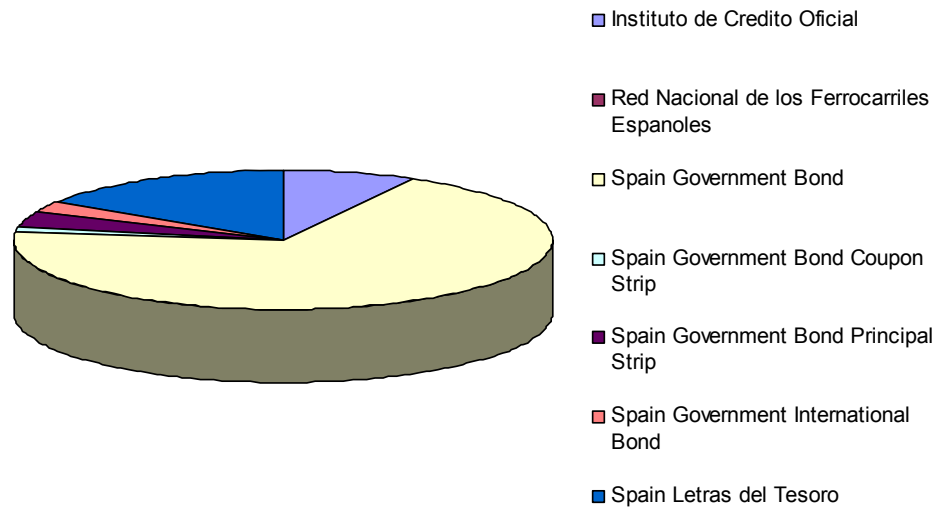
On current valuations, there is a fairly wide divergence in pricing, with 90 being roughly the median, but some of the floating rate notes, in particular, trading up to 20 points lower. The value of the cheapest-to-deliver option clearly depends considerably on the type of a potential credit event and the situation surrounding its occurrence – approaching the event, prices are likely to react considerably – however, current prices indicate that there is room for it to be meaningful.

Spain

Exhibit 8 shows the breakdown of outstanding Spanish debt, including Instituto de Credito Oficial, which we believe likely to have a Qualifying Guarantee as discussed above, and Red Nacional de los Ferrocarriles Espanoles, which may have. In addition to the entities shown, there are a number of other government-related issuers in Spain: Cores, the Fund for Ordered Bank Restructuring and Radio Television Espanola, to name a couple. We exclude these as we believe it unlikely that they have Qualifying Guarantees, although this is just our assumption here and not legal opinion.

¹³ The accreted amount is basically the original issue price + the amount of the discount to par that has already accreted according to the terms of the obligation. This ensures that zeros should not automatically be the cheapest-to-deliver in all cases.

Exhibit 8: Breakdown of Spanish government debt



Source: Credit Suisse

As for Greece, we are assuming that Treasury Bills (Spain Letras del Tesoro) are deliverable. Unlike Greece, Spain has Coupon and Principal strips, which as discussed above in the case of the UK, we believe are unlikely to be deliverable, but may be Obligations that could trigger a credit event. All are EUR denominated, and we exclude them from subsequent analysis.

Spanish Government Bonds are all denominated in euros; the international bonds are denominated in GBP, USD, JPY and FRF (which we take to be equivalent to euros, at the defined exchange rate). Since all are *Specified Currencies*, all would be deliverable. As shown in Exhibit 9, however, if the Instituto de Credito Oficial does indeed have a Qualifying Guarantee, it has bonds outstanding in a range of currencies, some of which (AUD, NOK, NZD, TRY, SEK, BRL) would not be deliverable.

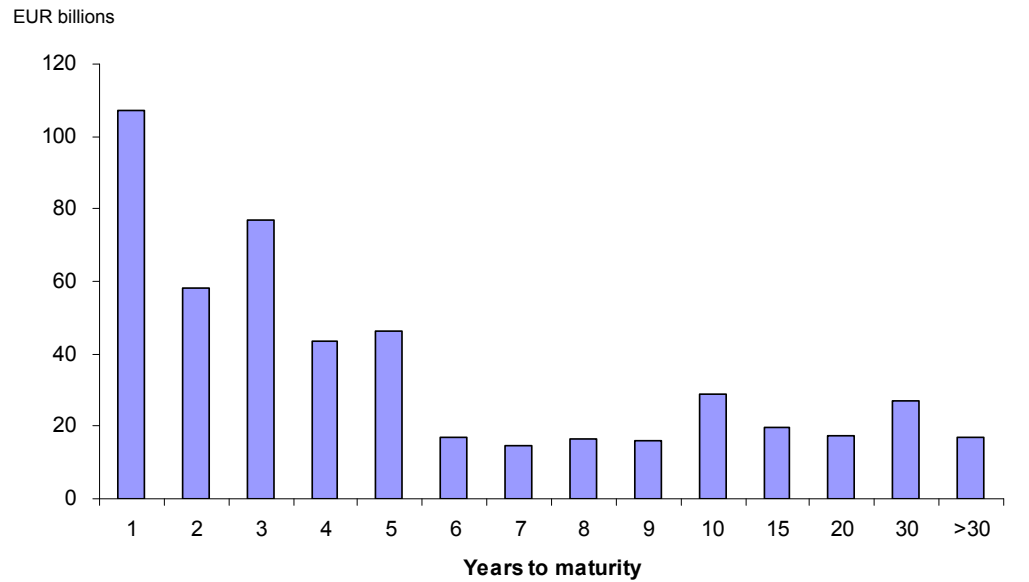
Exhibit 9: Currency profile of Spanish government debt

Currency	Outstanding, EUR Billions	% of total
EUR	472.54	93.36%
USD	20.95	4.14%
GBP	4.17	0.82%
AUD	2.27	0.45%
CHF	1.75	0.35%
JPY	1.33	0.26%
NOK	1.20	0.24%
CAD	0.92	0.18%
FRF	0.61	0.12%
NZD	0.19	0.04%
TRY	0.14	0.03%
SEK	0.05	0.01%
BRL	0.03	0.01%

Source: Credit Suisse

Exhibit 10 shows the maturity profile of government debt. As was the case for Greece, there is EUR 17 billion of debt with maturity of greater than 30 years, which would not be deliverable. On current pricing, there is also around a 20 point difference between the higher-priced and cheaper Obligations. Again, this will change if there is a credit event, particularly if it's a failure-to-pay, but as in the case of Greece, it indicates the potential for the cheapest-to-deliver option to have value.

Exhibit 10: Maturity profile of Spanish government debt



Source: Credit Suisse

Sovereign CDS vs. government bonds

As in other fixed income markets, the pricing discrepancy between cash bonds and CDS is referred to as the basis. In this context, a direct comparison is made between CDS and the asset swap spread of an underlying deliverable cash bond. Although the actual replicating portfolio of a CDS is a financed position in the asset swap spread of the deliverable bond, in common practice, the asset swap spread is not corrected for the funding spread and hence funding is reflected in the basis "residual."

Basis positions involve offsetting positions in CDS and the underlying security, via an asset swap spread. For example, the offsetting position for a long protection position in CDS is a long in the underlying bond. This is because CDS widen as default risk increases, and bonds grow cheaper as their credit spreads widen.

From this perspective, the basis itself can reflect funding and other factors. For example, Exhibit 11 illustrates the basis of the SPGB 4.4% of January 2015. The issue's basis settled at 84.3 bp on 9 February 2010. The 5-year CDS spread was 138.1 bp, and the issue's asset swap spread (Z-spread) was 53.8 bp.

This particular bond can be financed in the repo market at 0.24%, which is Euribor – 42 bp. Hence, the economic replicating portfolio approach to approximating the CDS value would suggest that CDS should trade at 53.8 bp (the asset swap spread), minus -42 bp (the funding spread), or in other words, $53.8 + 42 = 95.8$ bp, indicating a positive carry trade of $138.1 - 95.8 = 42.3$ bp.

However, there are a number of other risks that need to be priced in, including any maturity differences between the bond and the CDS, liquidity differences, and the value of the cheapest-to-deliver. The positive carry of 42.3bp is only true in the case when there is a single deliverable issue into the CDS contract given a credit event and a perfect maturity match between the bond and the CDS maturity. This is unlikely to be the case in practice. Put differently, a long basis position that appears to have positive carry could, after accounting for funding and other costs, have flat, or potentially even negative carry.

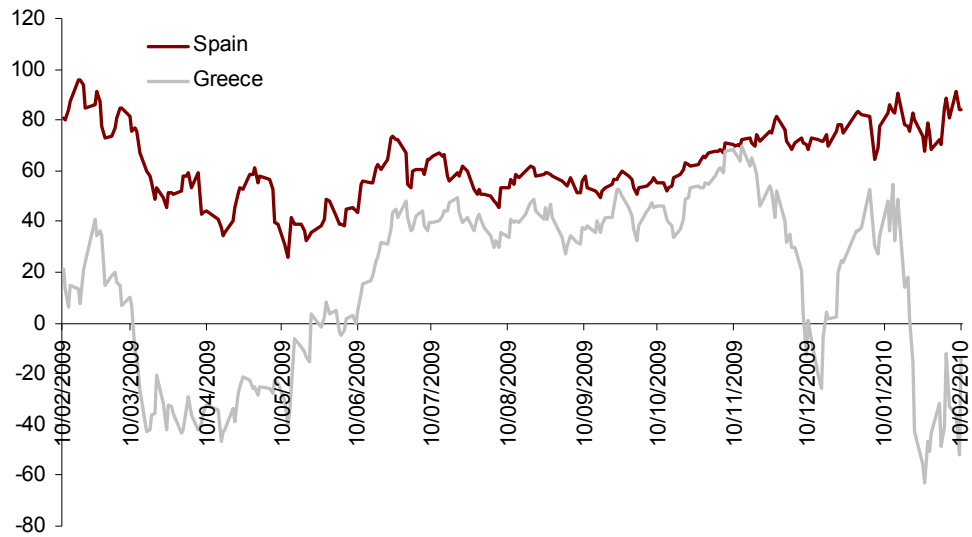
The value of the cheapest-to-deliver option, in particular, is important to factor in. As discussed earlier, in a credit event, the protection buyer has the right to choose the bonds to deliver to the protection seller when CDS contracts are settled, and is likely to choose the cheapest available. If the value of the cheapest Obligation differs significantly from the value of that shorted in the basis package, the holder faces a large potential loss. This risk is likely to be greatest in a restructuring, in our opinion, but needs to be considered on a case by case basis.

There is also the risk that the funding costs could change significantly over time – the rate of Euribor – 42bp is not fixed to bond maturity. The bond could start trading special and the investor could end up short squeezed. Finally, there will be additional pricing discrepancies arising from temporary supply and demand imbalances, investor preferences for one particular vehicle to express certain risks, and so on.

The conclusion, therefore: comparisons between the sovereign CDS and government bond markets need to be made with caution and before trading one versus the other, it is important to have a full understanding of the inherent risks. In addition to suggesting basis trades, analysis of the cash and CDS markets for different sovereigns can be valuable in highlighting potential inconsistencies between sovereigns as illustrated in Exhibit 11. The 42bps of apparent positive carry that make CDS look cheap for Spain is explained by the need to account for a variety of other risks. For Greece, the basis is flat, suggesting that Greek government bonds may currently be rather cheap to CDS.

Exhibit 11: Spanish & Greek CDS – cash basis

CDS spread – bond z-spread, bps



Source: Credit Suisse

A more rigorous way to analyse the actual spread differential, before taking into account funding and other factors, is to use the whole CDS curve to value the bond, rather than just one point as is done in a comparison of CDS with bond asset swap spread. The idea is to calculate the present value of all bonds' cash flows, discounting them using the survival probabilities priced into the CDS market. We have a whole curve of CDS spreads and therefore survival probabilities, which we can use to derive a CDS-implied bond price taking into account the shape of the CDS curve. Our Arbitrage Pricing Spread (APS) model does exactly this. A full discussion is beyond the scope of this piece; the reader is referred to our publication, "Understanding the Negative Basis: The need to distinguish between carry and relative value," 6 March 2009 for further information.

The SovX indices

Four iTraxx¹⁴ SovX indices were launched by Markit in July 2009 to cover the sovereign space. Series 1 of each was purely theoretical; the Western Europe and CEEMEA indices now trade actively while the other two remain theoretical for the time being.

- **Markit iTraxx SovX Western Europe:** 15 Western European sovereigns
- **Markit iTraxx SovX G7:** up to 7 sovereigns from the G7
- **Markit iTraxx SovX Global Liquid IG:** 11-27 sovereigns from Asia Pacific, Eastern Europe, Latin America, Middle East & Africa, North America and Western Europe.
- **Markit iTraxx SovX CEEMEA:** 15 CEEMEA sovereigns

The roll to Series 2 was on 28 September 2009, with all except SovX Western Europe remaining theoretical. SovX CEEMEA went live and began trading as Series 3 on 20 January 2010¹⁵.

All indices are owned, managed and compiled by Markit Group, and are equally weighted and denominated in USD. 5-year and 10-year maturities trade (or are calculated for theoretical indices) and each index rolls on March 20 and September 20 each year.

SovX Western Europe

Since it began trading at the end of September 2009, the SovX Western Europe has provided market participants a further product with which to take a view on systematic risk.

The 15 constituents of the SovX Western Europe index are selected from a universe of a possible 18: Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Norway, Portugal, Spain, Sweden and the United Kingdom. Each series is comprised of the 15 sovereigns with the largest net amount outstanding in the DTCC Trade Information Warehouse on the Friday prior to 30 days before the roll date.

Current constituents, along with their three-month trading ranges and latest spreads, are shown in Exhibit 12. In Exhibit 13, we illustrate the difference in the index fair value (as implied by constituent spreads) and the traded level since the index began trading¹⁶. As the index has widened, we see that the skew has generally been negative, highlighting the role single-name sovereigns have had in dragging the index wider: negative skew implies that fair value is greater than the market level, and so single names have widened first, with the index following. As can be seen, pockets of value have often existed, particularly in December, and trading the skew has been a popular trade.

With the added interest and liquidity in the sovereign space and indices of late, a nascent SovX swaption market has begun to develop, but has limited liquidity so far.

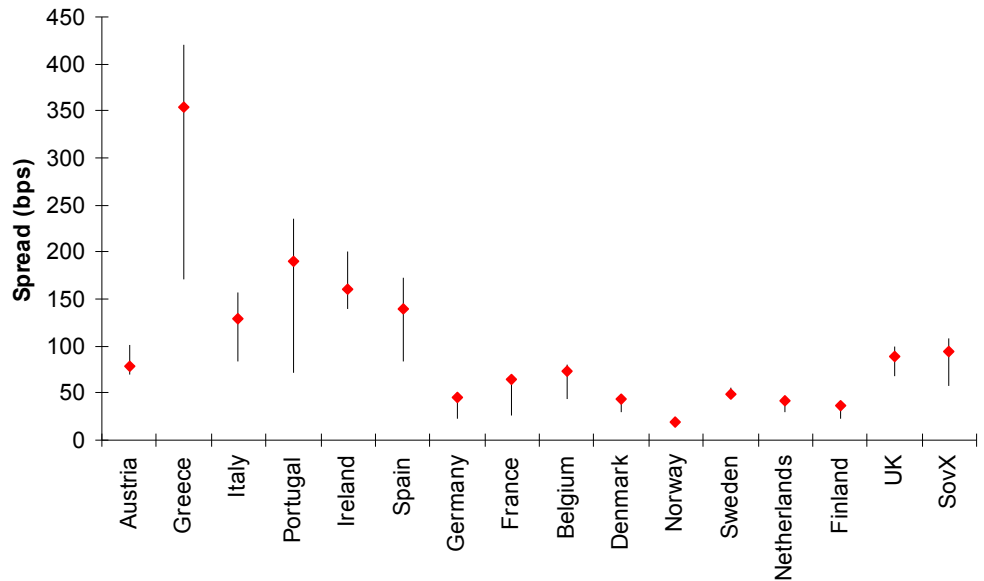
¹⁴ iTraxx is a trademark of the International Index Co Ltd

¹⁵ The next roll for the SovX CEEMEA will be September 2010, whilst the other indices will roll to series 3 in March 2010.

¹⁶ Prior to this, by definition, the theoretical level was the constituent-implied fair value.

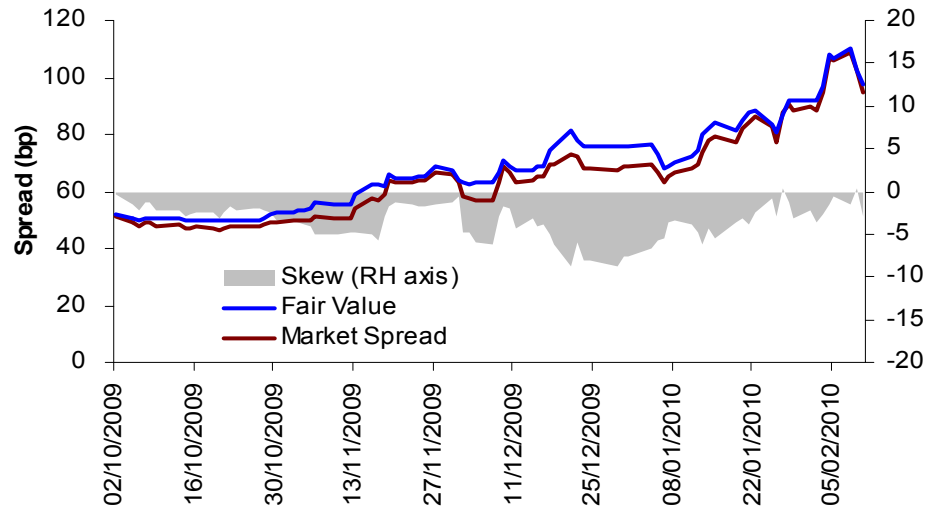
Exhibit 12: SovX Western Europe constituent three-month spread ranges

10 February 2010



Source: Credit Suisse

Exhibit 13: SovX Western European index fair value



Source: Credit Suisse

Sovereigns vs corporates and financials

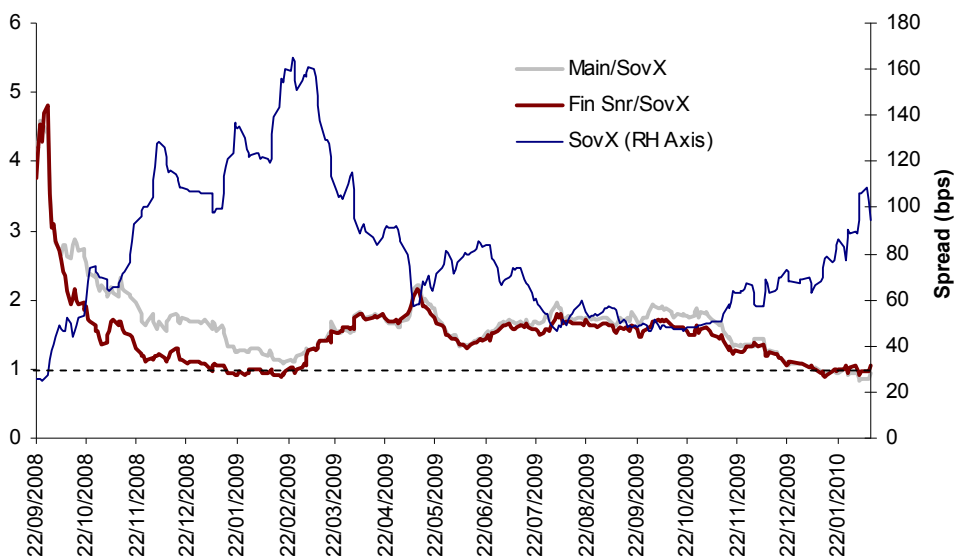
There has been significant focus on the relative value between sovereigns, corporates and financials, as market participants try to better understand the inherent value in sovereign CDS, and look for opportunities to take positions in one versus the other. The issues impacting analysis at the index level differ in some important respects from discussions at the individual issuer level, in our view. We consider each in turn below.

The nature of an index

We illustrate in Exhibit 14 iTraxx Main and Financial Senior index levels as a multiple of SovX levels. We see clearly the convergence towards parity, which we discuss in more detail later. Twice the iTraxx Financial Senior has dropped below SovX, to the situation today, where both Main and Financial Senior trade tighter. In both cases, the drop towards parity has been driven by widening in SovX.

Exhibit 14: Relative spread levels

Index spreads as a multiple of SovX Western Europe



Source: Credit Suisse

Much has been made of the spreads of first financials and then corporates trading through sovereigns as a result of the index moves, however, we would suggest that single names represent a far better product to trade on a relative valuation basis than indices. The moves illustrated in Exhibit 14 are misleading if thought of purely in terms of relative valuation between sovereigns and corporates or financials for the reason summarized in Exhibit 15. Investors in each index are exposing themselves to different universes and a different set of systematic risk factors.

If we consider iTraxx Main and SovX: both can be considered instruments to take a systematic view, either outright or as a hedge. By virtue of having 125 constituents rather than just 15, Main is far more diversified in general, although it is heavily overweight France, Germany, the Netherlands and the UK in relation to other countries. SovX, on the other hand, is equally weighted across its 15 constituent countries, so there is no overweight in the European heavyweights of Germany, France and the UK. Instead, it becomes highly levered towards the smaller constituents – Greece and Portugal to name two.

Exhibit 15: Relative index country weights

Sovereign	SovX S2	Main S12	Financial Senior S12
Austria	6.7%	0.8%	
Belgium	6.7%	0.8%	
Denmark	6.7%		
Finland	6.7%	0.8%	
France	6.7%	20.8%	16%
Germany	6.7%	16.0%	20%
Greece	6.7%	0.8%	
Ireland	6.7%		
Italy	6.7%	6.4%	16%
Luxembourg		0.8%	
Netherlands	6.7%	11.2%	
Norway	6.7%	0.8%	
Portugal	6.7%	1.6%	4%
Spain	6.7%	4.8%	8%
Sweden	6.7%	4.0%	
Switzerland		8.0%	16%
UK	6.7%	22.4%	16%

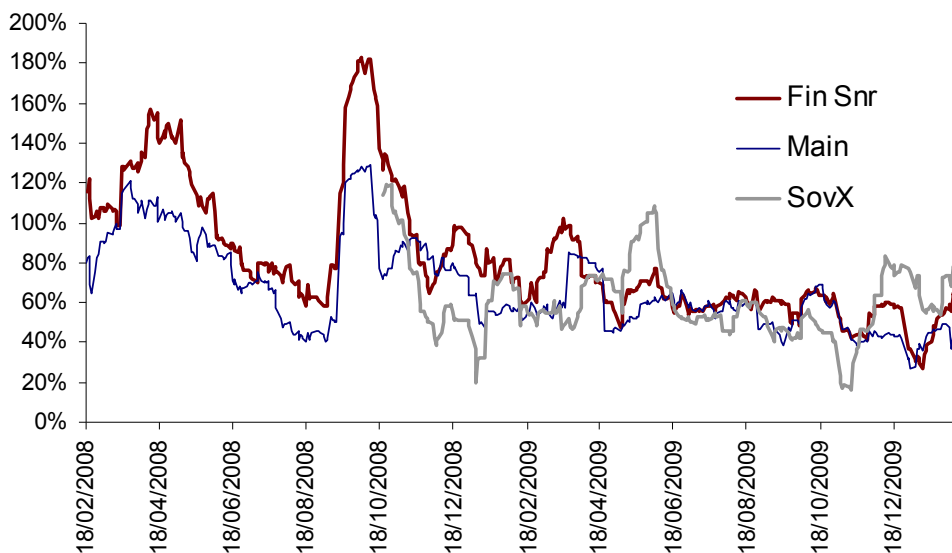
Source: Credit Suisse

The situation of SovX vs. Financials can be considered even more extreme, with only seven countries represented in the Financials index, and heavy overweights in Germany and Switzerland.

Comparing one with the other directly, therefore, misses the very different drivers and risks. All three indices allow the investor to take a systematic risk view, but it is important to realize the type of systematic exposure differs. Exposure to Greece, Portugal and Austria, for example, is far greater in SovX than Main or Financial Senior; Main provides broad-based corporate exposure while SovX offers a narrower exposure at the country level. The products are quite different.

It is possible to calculate constituent-implied fair value levels for the SovX using country weights from Main or Financials, and clearly due to the decrease in importance of the weaker countries vs. Germany etc., spreads are a lot tighter. However, from an investment point of view, we do not find the argument very useful – that product does not exist. Far better, if investors really want to play a sovereign “index” against a corporate or financial one on the basis of relative value between the sectors, would be to trade bespoke baskets accurately reflecting desired weights.

The different composition and resultant behaviour of the indices are also evident in their relative volatilities. Exhibit 16 illustrates 20-day realized volatilities for each. We see that while corporates and financials tend to have relatively similar realized vols (with the exception of March and October 2008, when financial stresses dominated), there are distinct periods when SovX volatility is much higher or lower. Higher volatility and a higher variability in the level of volatility imply higher mark-to-market risk for the SovX as compared to the other indices, which as discussed above, means a higher risk premium. This, in turn, is another reason why the sovereign index can trade wide to corporates or financials – the spread contains an enhanced risk premium to compensate investors for the increased level of mark-to-market risk (volatility).

Exhibit 16: 20-Day Realised Volatility

Source: Credit Suisse

Pricing sovereign default risk into corporate credit spreads

There has been considerable market focus on the relative pricing of certain single-name corporates and their domestic sovereigns, particularly where the sovereign trades wide to the corporate. We believe that single names represent the better product to trade on a relative valuation basis, rather than indices for the reasons discussed above. In this section, we propose a basic framework to address the question of how domestic sovereign risk should be priced into corporate credit spreads.

We believe such a framework is necessary in order to consider the relative value of debt securities of both companies relative to other companies, and companies relative to their domestic sovereigns. Our aim is to devise a method to analyse market pricing of corporate and sovereign credits, which we will apply to develop trading ideas in subsequent publications.

The underlying assumption in this analysis is that the credit risk of a corporate is distinct from that of its domestic sovereign. We do not believe that a sovereign default necessarily leads to the default of all companies domiciled in that sovereign's country. We believe this is supported by numerous historical examples of companies managing to avoid default despite a default of their sovereign. However, we do note that the default of a company's domestic sovereign is likely to cause a significant degree of stress on that company, which could result in its eventual default. Indeed, we assume that the default of a company's domestic sovereign increases the chance of that company defaulting.

Our analysis further assumes that the extent to which a company can withstand the stress of its domestic sovereign defaulting can be expressed as a conditional default probability – that is, it can be expressed as the probability of a company defaulting *given* that its domestic sovereign defaults. This is likely to change over time and differ markedly between different companies, depending on a number of critical factors including diversification, business mix, leverage and funding profile. But ultimately, we believe that, by assessing companies' credit profiles, we can say something meaningful about this conditional default probability. Essentially, we believe that a company's CDS pricing should incorporate an additional spread for the risk that its domestic sovereign defaults and that the principal drivers of this additional spread are the default probability of the company *given that* its domestic sovereign defaults and the default probability of the domestic sovereign.

The three basic assumptions that we are making are therefore:

- 1) The credit risk of a corporate is distinct and separable from that of its domestic sovereign.
- 2) The probability of a company defaulting is increased if its domestic sovereign defaults. The probability of a company defaulting is also therefore related to the probability of its domestic sovereign defaulting.
- 3) By analysing companies' credit profiles we can say something meaningful about the relationship in assumption (2).

We also make three simplifying assumptions:

- 4) CDS levels are a function of *only* the market's perception of the probability of default and the recovery rate for a particular credit¹⁷.
- 5) The recovery rate implicit in sovereign and corporate CDS is 40%, in line with market convention.

Since assumptions (4) and (5) mean that we can derive the market's perception of default probabilities directly from CDS levels (and vice versa), by analysing the relationship assumed in (2) we should be able to reach conclusions about the relative valuations of different CDS contracts.

To enable clearer discussion, it is helpful to define some notation as follows (since we are using probabilities to derive CDS spreads and vice versa, all probabilities refer to a five-year cumulative probability):

$p(A)$	=	The probability that company A will default
$p(S)$	=	The probability that company A's domestic sovereign will default.
$p(A S)$	=	The probability of company A defaulting given the domestic sovereign defaults.
$p(A \neg S)$	=	The probability of company A defaulting given that its domestic sovereign does <i>not</i> default.

The basic relationship behind our proposed framework is:

$$p(A) = p(A | S).p(S) + p(A | \neg S).(1 - p(S))$$

All this states is that the probability of company A defaulting can be expressed as a weighted probability of two different conditional probabilities. We are taking $p(S)$ as given (from the domestic sovereign CDS price), so if we can estimate $p(A|S)$ and $p(A|\neg S)$, then we can determine a fair value for $p(A)$ that can in turn be used to determine a fair value for company A's CDS.

There are several ways we could look for a value for $p(A|\neg S)$. For example, we could look at the rating of company A, or we could look at historical CDS spreads for company A. But we need to totally isolate the probability of default for A from that of its sovereign and both of these sources of information are likely to already incorporate some element of domestic sovereign risk. In fact, we believe it would be virtually impossible to directly determine a particular value for $p(A|\neg S)$ on its own. However, if we could posit an alternative scenario in which $p(A|\neg S)$ and $p(A|S)$ are unchanged but we can accurately estimate $p(S)$ and $p(A)$, then we could indirectly determine a value for $p(A|\neg S)$ in terms of $p(A|S)$ and $p(A)$. This would enable us to eliminate $p(A|\neg S)$ from the above equation - i.e., assuming scenario "x," we can rearrange the above equation to get:

¹⁷ While we note that CDS pricing actually incorporates a risk premium as discussed earlier, we do not believe that this simplifying assumption prevents us from making relative value comparisons.

$$p(A | \neg S) = \frac{p_x(A) - p(A | S) \cdot p_x(S)}{1 - p_x(S)}$$

We can then use this in place of $p(A | \neg S)$ in the first equation¹⁸ to estimate $p(A)$ and obtain a 'fair value' for company A CDS:

$$p(A) = p(A | S) \cdot p(S) + \frac{(p_x(A) - p(A | S) \cdot p_x(S)) \cdot (1 - p(S))}{1 - p_x(S)}$$

Assuming everything is essentially fixed except $p(A)$ and $p(S_A)$, we can rearrange this to express $p(A)$ as a linear function of $p(S_A)$:

$$p(A) = \frac{p_x(A) - p(A | S) \cdot p_x(S)}{1 - p_x(S)} + p(S) \left(p(A | S) - \frac{p_x(A) - p(A | S) \cdot p_x(S)}{1 - p_x(S)} \right)$$

A worked example

Assume that company A is Iberdrola and that its domestic sovereign is Spain. Can we imagine a scenario "x" in which we can accurately estimate both $p(A)$ and $p(S)$? Given that $p(A)$ and $p(S)$ can be derived directly from the CDS levels of Iberdrola and Spain, we can rephrase the question as "can we imagine a scenario in which we know Spain CDS and would be able to easily estimate a fair value for Iberdrola CDS?" We believe there is, and that it is a situation in which nothing else is different from today except that Spain CDS trades exactly in line with that of the domestic sovereign of a comparable peer for Iberdrola – e.g., if Spain CDS traded exactly in line with Germany CDS, we can sensibly assume a fair value for Iberdrola CDS, relative to, say, E.On CDS.

So if the probability of default was exactly the same for Spain as for Germany, we believe we could say with reasonable conviction, based on our judgement about the relative merits of Iberdrola and E.On's credit profiles, that Iberdrola CDS should trade, for example, about 10bps wider than E.On CDS (absent the *additional* risk presented to Iberdrola because Spain is more likely to default than Germany). Given that Germany CDS currently trades at around 50bps and E.On 5-year CDS trades at around 60bps, this would translate into the following:

$$p_x(S) = 4.22\% \text{ (corresponding to a 50bps 5-year CDS spread)}$$

$$p_x(A) = 5.86\% \text{ (corresponding to a 70bps 5-year CDS spread)}$$

We can then use these values to get a relationship between $p(A)$, $p(S)$ and $p(A|S)$:

$$p(A) = p(A | S) \cdot p(S) + \frac{(p_x(A) - p(A | S) \cdot p_x(S)) \cdot (1 - p(S))}{1 - p_x(S)}$$

$$p(A) = p(A | S) \cdot p(S) + \frac{(0.0586 - p(A | S) \cdot 0.0422) \cdot (1 - p(S))}{1 - 0.0422}$$

¹⁸ We should note that we are making a further assumption that the relationship between $p(A|S)$ and $p(A|\neg S)$ can be constant as $p(S)$ changes. But given that we are just supposing a counterfactual scenario in which the only thing which differs is the sovereign risk of Spain, this assumption seems consistent with our method.

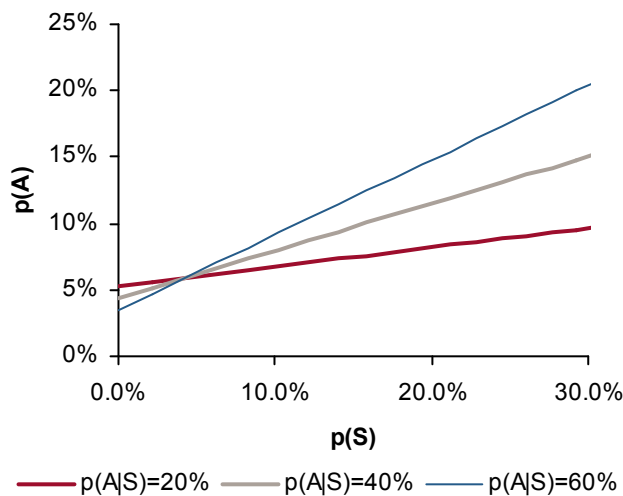
If we were to assume that $p(A|S)$ were 50% and Spain sovereign 5-year CDS traded at 150bps (implying $p(S)$ of 12.15%), then the 'fair value' for Iberdrola 5-year CDS would be:

$$p(A) = 0.5 \times 0.1215 + \frac{(0.0586 - 0.5 \times 0.0422) \cdot (1 - 0.1215)}{1 - 0.0422}$$

$p(A) = 9.5\%$ (corresponding to a 116bps 5-year CDS spread)

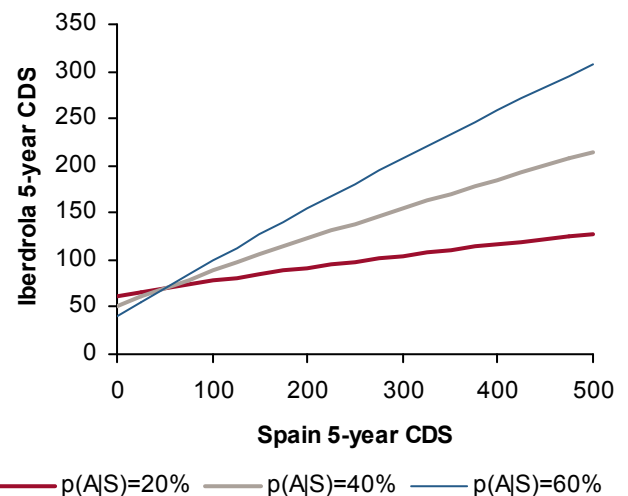
Exhibits 17 and 18 use the above example to chart $p(A)$ against $p(S)$ and also to chart the corresponding fair value for company A CDS against its domestic sovereign CDS price. The cases where $p(A|S)$ is 20%, 40% and 60% are shown.

Exhibit 17: Modeled $p(A)$ against $p(S)$



Source: Credit Suisse

Exhibit 18: Modeled Iberdrola against Spain CDS



Source: Credit Suisse

Conclusions about the pricing of sovereign risk into corporate credit spreads

Exhibits 17 and 18 suggest a few simple conclusions about the way corporates should trade relative to their sovereigns:

- i) At very low sovereign CDS spreads, corporate CDS should trade wide of their domestic sovereigns.
- ii) Assuming that $p(A|S)$ is not almost 100%, then there is a point at which it makes sense for sovereign CDS to trade wider than corporate CDS.
- iii) Once the sovereign CDS begins to trade fairly wide, changes to $p(A|S)$ can have a big impact on the fair value of company A CDS.
- iv) The ratio of company CDS to sovereign CDS is not constant, but the relationship between the two is almost linear (obviously this is a direct consequence of the way we have assumed that the relationship between the probabilities of default for the company and the sovereign is linear).

Relative value analysis

There are two main ways to use the above framework:

- i) To directly estimate 'fair value' levels for corporate CDS.

As the above example suggests, we can estimate a value for $p(A|S)$ and then use that in conjunction with the current sovereign CDS spread to obtain a fair value for company A's CDS.

ii) To estimate what value for $p(A|S)$ is being priced into corporate CDS.

We can use the current CDS pricing for company A and its domestic sovereign to obtain the $p(A|S)$ that is being priced in by the market.

Estimating a fair value for $p(A|S)$ is challenging, in our view. We also need to recognise that our assumption that CDS levels are based solely on default probabilities and recovery rates will tend to result in estimates for the market's perception of default probabilities that are above what the market actually believes – we are not accounting for the fact that a part of CDS spreads accounts for other items such as liquidity and other risk premia. Nevertheless, we also believe that it is possible to make relative value comparisons between companies – i.e., we can say whether we think $p(A|S)$ for company A should be greater or less than $p(B|S_B)$ for company B.

The table below shows our estimate for the market-implied $p(A|S)$ for the major Southern European utilities.

Exhibit 19: Current estimates of $p(A|S)$ for Southern European utilities

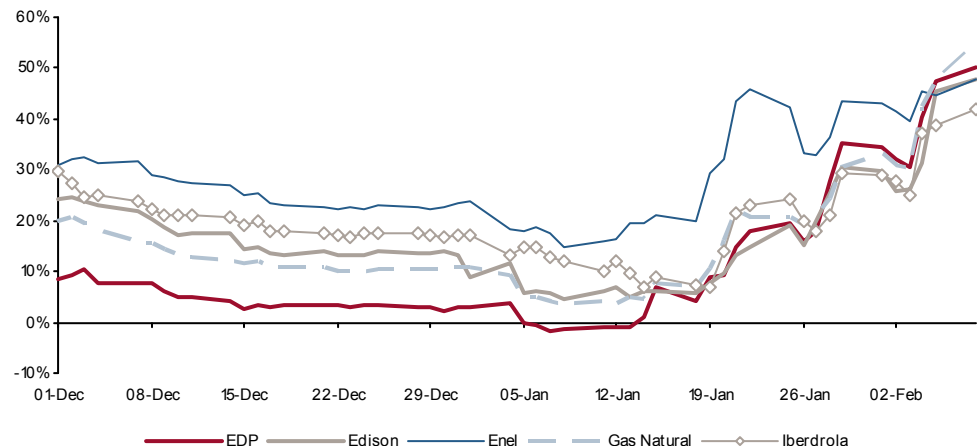
Company A	Sovereign 5-year CDS (bps)	Company A 5-year CDS (bps)	Germany 5-year CDS	E.On 5-year CDS	Fair value for company A CDS (absent additional risk from domestic sovereign)	Implied $p(A S)$
EDP	235	160	50	60	85	46%
Edison	165	118	50	60	90	31%
Enel	165	114	50	60	70	42%
Gas Natural	182	130	50	60	80	43%
Iberdrola	182	115	50	60	70	39%
Average	186	127			79	40%

Source: Credit Suisse

As can be seen, there is a fair amount of variation in $p(A|S)$, which we may be able to conclude is unjustified, following a closer comparative assessment of these companies' credit profiles. For example, if we believed that the vulnerability of Edison to a default of Italy is in fact greater than that for Enel, then the results would suggest Edison should be trading wider relative to Enel than it does currently.

We can also look at how the market implied $p(A|S)$ has evolved through time for these names. As Exhibit 20 shows, it has surged for all the companies in the past few weeks. This is what we would expect – as the market has become increasingly concerned about sovereign risk, it has begun to price more and more of this risk into corporate credit spreads.

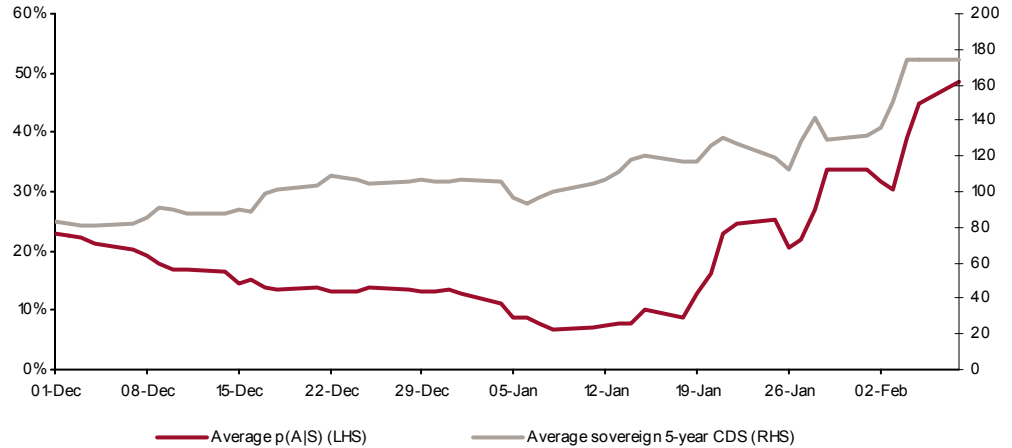
Exhibit 20: Historical market-implied $p(A|S)$ for Southern European utilities



Source: Credit Suisse

Exhibit 21 plots the average market-implied $p(A|S)$ for these five names against the average CDS level of their domestic sovereigns. This suggests that the market is not gradually pricing in more sovereign risk as sovereign risk CDS widens, but has suddenly started to price sovereign risk into corporate credit spreads over the past two to three weeks.

Exhibit 21: Market-implied $p(A|S)$ versus average sovereign 5-year CDS



Source: Credit Suisse

It is worth noting that the results for $p(A|S)$ that we show above in fact significantly understate the $p(A|S)$ that is really being priced into the market. As well as information about the market's perception of probability of default and recovery, sovereign CDS contains liquidity and other premia, so the $p(S)$ and $p(S)$ that we are using (having assumed away these additional premia) are probably way too high. Since the uncertainties that give rise to these additional spread premia are likely to be higher in sovereign CDS than corporate CDS, the value for $p(A|S)$ is understated. (We can show this by rearranging our model equation – for illustration, if there were no such additional premia in corporate CDS, but 25% of sovereign CDS spreads were accounted for by these premia, then the value for $p(A|S)$ for Iberdrola would increase from 39% to 55%.)

Trading $p(A|S)$

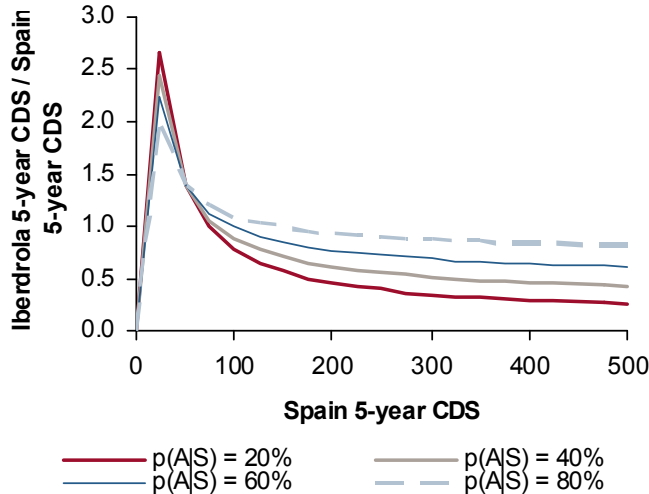
We should be able to use this framework to construct a trade that focuses on market-implied $p(A|S)$. This would have the advantage of focusing on a view about the robustness of a company's credit profile to a default of its domestic sovereign, rather than simply using the company's CDS as a proxy for that of its domestic sovereign. Ideally, the profits from such a trade should be highly sensitive to $p(A|S)$, but relatively insensitive to the level of sovereign CDS. We can use the above 'fair value' model for company A's CDS to check the sensitivities of various trades to these two factors.

For example, let's suppose we want to trade the view that the market-implied $p(A|S)$ for Iberdrola is going to fall in the future. What we want is a trade that generates profits that change with the market-implied $p(A|S)$, but are stable relative to the level of domestic sovereign CDS. By rearranging the model, we can try out different combinations of the various variables in order to achieve this.

The simplest way to gain positive exposure to a falling $p(A|S)$ for Iberdrola would be to sell Iberdrola CDS and buy Spain CDS. It is clear that as $p(A|S)$ falls, Iberdrola CDS should fall relative to Spain CDS. By sizing each leg of the trade so that the average spread (i.e., the carry) is zero, the % profit (in spread terms) of the trade will be the % change in the ratio of Iberdrola to Spain CDS. However, by rearranging the model and converting probabilities to spreads, we see in Exhibits 22 and 23 that the sensitivity of this ratio to the level of Spain CDS is just as high, if not higher, than it is for $p(A|S)$. This suggests that a pair trade of Iberdrola versus Spain will fail to isolate $p(A|S)$ and will instead be little more than a slightly imperfect proxy for the level of Spain CDS itself.

Exhibit 22: Sensitivity to Spain CDS

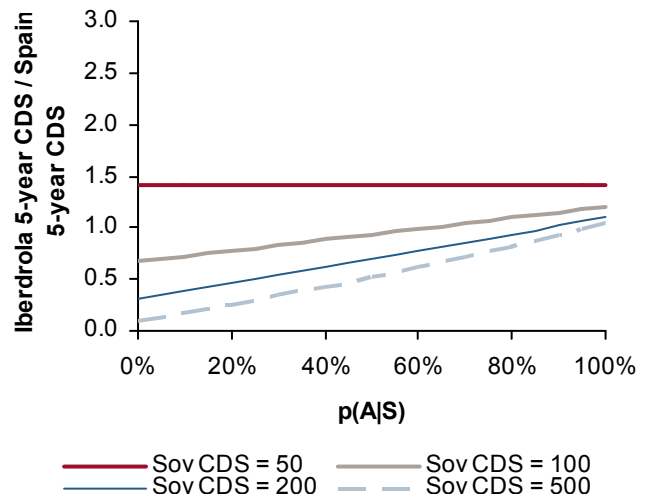
The ratio of Iberdrola 5-year CDS to Spain 5-year CDS



Source: Credit Suisse

Exhibit 23: Sensitivity to $p(A|S)$

The ratio of Iberdrola 5-year CDS to Spain 5-year CDS

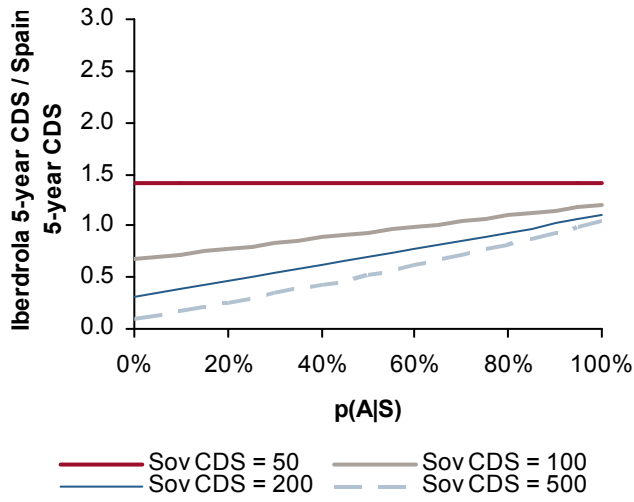


Source: Credit Suisse

Intuitively, a better way to trade $p(A|S)$ might be to try to trade the difference between where Iberdrola CDS trades now and its 'fair value' relative to E.On CDS, against the difference between Spain and Germany CDS. Again rearranging the model to get an expression for the ratio between the corporate leg of such a trade (which would just be selling Iberdrola CDS against buying E.On CDS) and the sovereign leg of this trade (buying Spain CDS against selling Germany CDS), we can chart how sensitive the profits of the trade should be to the level of Spain CDS and the $p(A|S)$ for Iberdrola. The results are of this exercise are shown in Exhibits 24 and 25 .

Exhibit 24: Sensitivity to Spain CDS

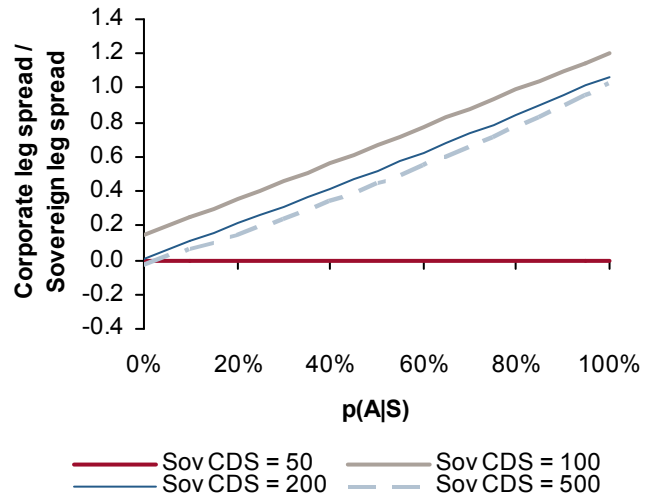
The ratio of (Iberdrola minus E.On CDS) to (Spain minus Germany CDS).



Source: Credit Suisse

Exhibit 25: Sensitivity to $p(A|S)$

The ratio of (Iberdrola minus E.On CDS) to (Spain minus Germany CDS).



Source: Credit Suisse

The charts show that, assuming Spain CDS is above 100bps or so, the profits of this trade should be minimally sensitive to the level of Spain CDS, but very sensitive to the market's perception of $p(A|S)$ for Iberdrola. This is, therefore, the way we would suggest investors trade a view about whether the market is over- or under-pricing sovereign risk into corporate credit spreads.

It is a short step to a trade of one company's $p(A|S)$ against another's. To do this trade, one would simply put on the reverse positions for the company whose $p(A|S)$ is expected to rise in relative terms. This would have the effect of cancelling out the E.On and Germany CDS positions; and if both companies had the same domestic sovereign, then the remaining sovereign CDS position would also cancel, leaving a standard pair trade between the two credits.

The major risk to this trade is the possibility that an external factor drives both Spanish CDS and the market-implied $p(A|S)$ higher. Indeed this is exactly what seems to have happened in the past few weeks, as concerns over Greece have led to a rise in concerns about both the risk of Spanish default and the exposure of Iberdrola to such a default. This does not prevent one from taking a view on $p(A|S)$ as we have described above, but clearly this risk needs to be considered before putting on the trade – if the external factor is easily identifiable (e.g., Greece), then it would make sense to hedge against this risk.

Estimating $p(A|S)$

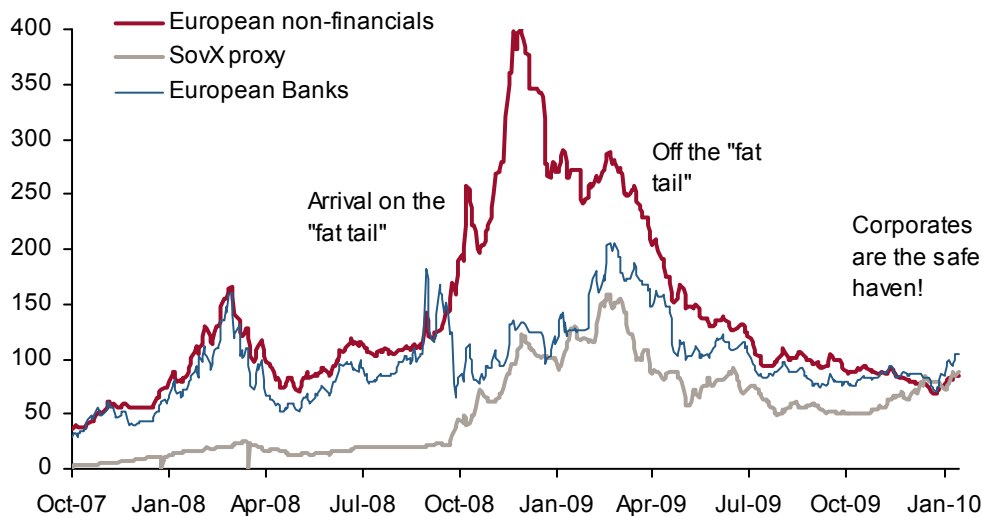
In order to get a handle on $p(A|S)$ so that we can form views on either its absolute level or how it should compare between different companies, we obviously need to consider how company A would weather the situation in which its domestic sovereign defaulted. We believe the clearest way in which to do this is to: a) posit a stress scenario in which company A's domestic sovereign defaults and b) assess company A's credit profile to determine how likely it is to stand up to this stress scenario. The stress scenario could take various forms and depends critically on one's view about how sovereign CDS is likely to be triggered in each case. However, we believe that this kind of analysis is one with which credit investors are comfortable and that it is possible to arrive at meaningful relative and absolute conclusions about $p(A|S)$. We intend to perform this analysis for the European Utilities sector in a forthcoming publication.

Sovereign CDS as an asset class during the crisis

As we have often noted, the 2007/2009 crisis contained a number of clear regime breaks. Using proxies for the indices, we construct Exhibit 26 to illustrate.

Exhibit 26: Financial senior and sovereign spreads converged in late September/early October 2008, completely changing the nature of the crisis

Average CDS of 15 SovX members, plus LUCI CDS indices non-financials and banks.



Source: Credit Suisse

Following the Lehman collapse, as financial CDS raced ahead of non-financial CDS and sovereigns, states had to nationalise the problem, as clearly visible in the chart. The result was a “run” on sovereigns, culminating in a top in sovereign CDS in mid-February 2009. Ironically, the top was signaled by a very sharp widening in financials as the problem was “denationalized,” which is equally clearly visible. At that point, pre-crisis relationships were more-or-less re-established, albeit at very wide levels. The subsequent rally was led by sovereigns and only aborted when sovereign fat-tail risk, driven by internal fiscal crises such as Greece’s, rather than the nationalization of bank problems, came to the fore in January. As pointed out above, it can be argued that some corporates are able to trade through their sovereigns and so form a kind of defense against sovereign issues. Again, this is visible in Exhibit 26.

Our view is that this, rather than being a sustainable long-term regime shift, is an illustration of the excessive risk premium on sovereigns.

Market characteristics

Market participants

One of the characteristics of the sovereign CDS market is the broad participant base. As all too apparent of late, the issues that impact the sovereign CDS market are of interest to almost every market participant and widely followed. This makes the product extremely useful to a wide range of investors, either for hedging existing exposures or for more speculative activity.

- Macro equity funds have been very active since the events surrounding Lehman's default, seeing sovereign CDS as a cheap means for hedging their tail risk.
- Real money investors are interested in both directional and relative value trades.
- Macro hedge funds tend to trade the market, speculating and taking advantage of apparent mis-pricings.
- Emerging market funds have recently begun focusing on the European sovereign space as spreads and activity there have become more relevant to their usual market. With spreads on some WE sovereigns wider than emerging market sovereigns, the overlap between these markets is extremely interesting at the moment.
- Bank CVA groups use sovereign CDS to hedge government exposures, in many cases driven by regulatory constraints, resulting in price insensitivity.
- Structured investors incorporate sovereign exposure within a broader structured product as a diversified way of increasing yield.
- General funds and prop desks are also involved, trading the skew, the indices and undertaking typical "alpha trades."

In general, the SovX index tends to be considerably less active than the single names, as indicated by the skew behaviour discussed in Exhibit 13 above. We see this very clearly from the flow data in the next section.

Flow data

Using Trade Information Warehouse (TIW) data from the Depository Trust and Clearing Corporation (DTCC), we are able to see the trends in three categories of sovereign data:

1. Net and gross notionals outstanding in single-name sovereigns (we consider the constituents of the SovX index here).
2. Gross notionals outstanding for the single name sovereign sector on aggregate, split into dealer and non-dealer and long- and short-protection positions. These data cover all sovereigns and state bodies, so are much broader than an aggregation of single SovX names. (Throughout 2009, gross notionals for SovX represented around 30% of total single-name sovereign gross notionals.)
3. Gross and net notionals outstanding in the SovX index. Gross index notionals are further available split into dealer and non-dealer and long- and short-protection positions. We consider these data in comparison to other indices – iTraxx Main, Financial Senior and CDX IG.

The first point to note, as mentioned earlier, is that the size of the SovX market is currently dwarfed by the single-name market. This is evident in Exhibit 27 on both a net and a gross notional basis. Since it began trading, however, SovX notionals have been increasing rapidly: gross notionals at the end of January represented nearly 10% of single names; net notionals 7%. These compare to 5% for each just a month earlier.

Exhibit 27: Sovereign notionals outstanding

USD, Billions

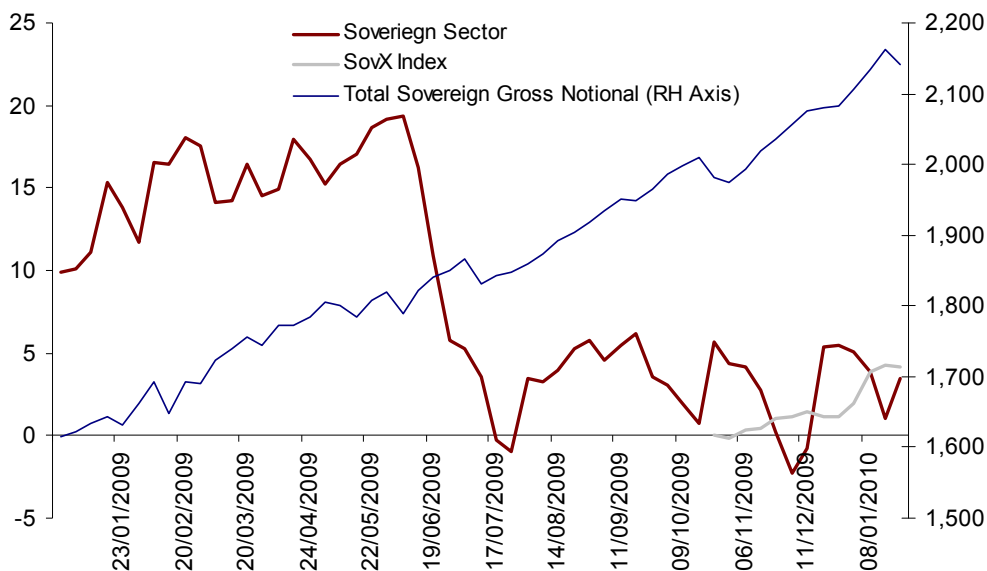
Date	Net Notional Outstanding			Gross Notional Outstanding		
	SovX index	Total SovX single names	Index as % of single names	SovX index	Total SovX single names	Index as % of single names
30/10/2009	1.36	107.12	1.27%	7.97	655.85	1.21%
27/11/2009	3.23	112.04	2.88%	20.96	691.33	3.03%
25/12/2009	5.31	112.90	4.71%	38.38	725.04	5.29%
29/01/2010	8.74	118.57	7.37%	71.31	745.98	9.56%

Source: Credit Suisse, DTCC

In Exhibit 28, we show how the dealer risk position (gross notional protection sold minus gross notional protection bought) has evolved over the last year for the single-name sovereign sector as a whole, and more recently for the SovX index. We also show as a dotted line the total gross notional outstanding in single name sovereigns (category 2. above). Having only recently begun trading, there is only a short history for the SovX, but dealer risk exposure has been gradually ticking up. We see clearly on an aggregate basis how dealers' sovereign risk exposure declined dramatically in the middle of 2009, possibly as a result of investors unwinding short-risk positions put on through the volatility at the end of 2008 and early 2009.

Exhibit 28: Dealer sovereign risk position (positive = long risk)

USD, Billions

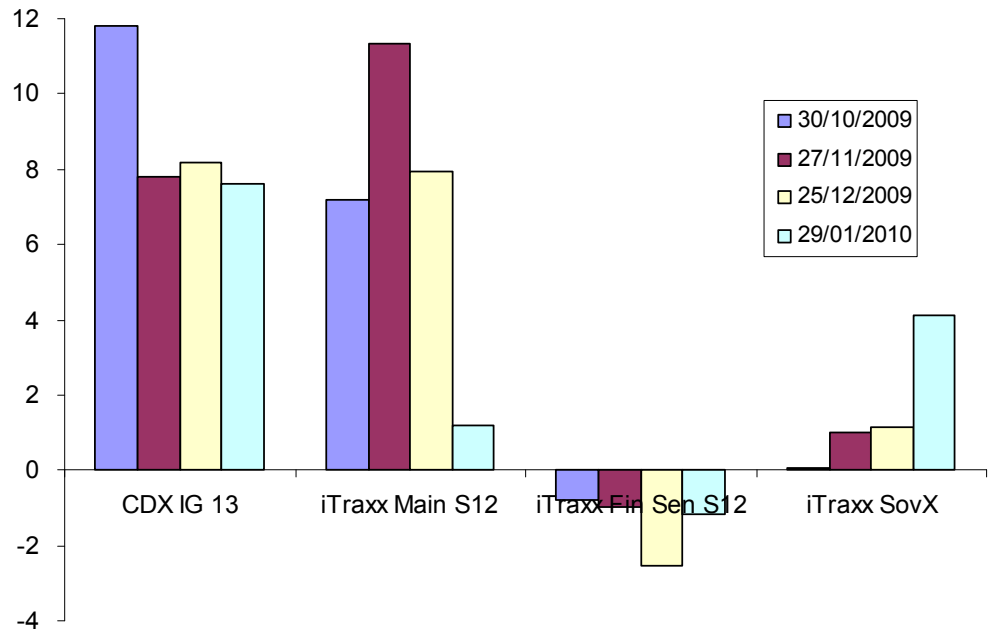


Source: Credit Suisse, DTCC

In Exhibit 29, we illustrate how dealer risk in the SovX compares to other on-the-run indices over the last four months, and see that in general, sovereign index risk has been increasing whilst Main and IG have been decreasing; dealers have been short Financial Senior over the last four months.

Exhibit 29: Dealer index risk position (positive = long risk)

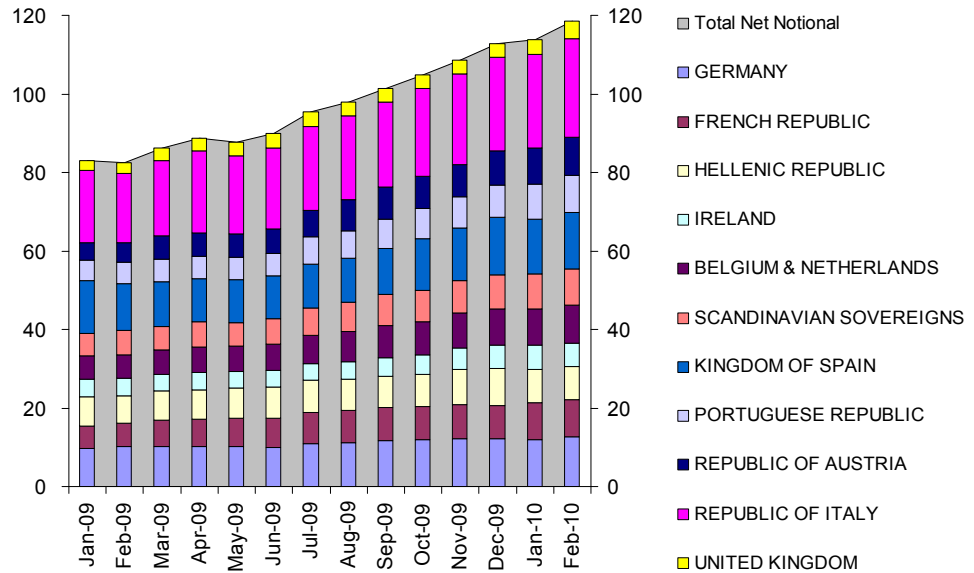
USD, Billions



Source: Credit Suisse, DTCC

Exhibit 30: Net single-name sovereign notional outstanding

Total in Billions USD; single names as proportion of total outstanding



Source: Credit Suisse, DTCC

In Exhibits 30 and 31, we show net notionals outstanding for the SovX constituents¹⁹. We clearly see that since the start of 2009, net notionals outstanding have increased (by just over 40% in total). As expected, the notional outstanding varies considerably by sovereign and the increase is not distributed evenly across entities. Italy consistently has had the greatest notional outstanding, followed by Spain, then Germany.

¹⁹ Unfortunately dealer positioning at the individual single-name level is not available.

Exhibit 31: Net sovereign single-name notionals outstanding

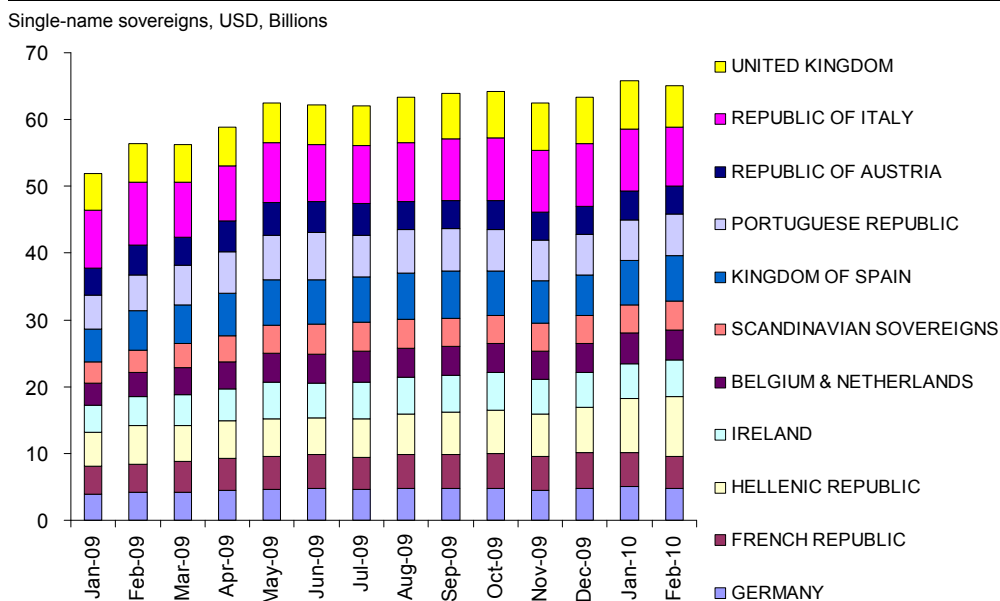
USD, Billions		
	Increase Jan 09 - Feb 10	Outstanding 01/02/2010
REPUBLIC OF AUSTRIA	113.0%	9.61
PORTUGUESE REPUBLIC	83.6%	9.38
UNITED KINGDOM	83.3%	4.60
FRENCH REPUBLIC	63.5%	9.30
BELGIUM & NETHERLANDS	63.4%	9.56
SCANDINAVIAN SOVEREIGNS	61.8%	9.28
REPUBLIC OF ITALY	37.0%	25.05
GERMANY	31.0%	12.72
IRELAND	30.6%	6.01
HELLENIC REPUBLIC	15.5%	8.54
KINGDOM OF SPAIN	7.6%	14.51
Total Net Notional	43.1%	118.57

Source: Credit Suisse, DTCC

In Exhibit 31, we illustrate that the biggest increases in sovereign CDS outstanding have been in Austria, Portugal, the UK and France. In part, this will have been driven by skew activity on the SovX – since these are all constituents of the SovX, the existence of the index will automatically have increased flows in the single names.

We note that the current market focus, Greece, has been very stable in terms of net notional, and indeed has declined of late. However, this does not show the entire story. In Exhibit 32, we display the ratio of gross to net notionals outstanding for the SovX constituents and here we see that while overall there has been only a very small increase in the ratio on aggregate, Greece has seen a relatively large increase over the last couple of months. While the net notional exposure has declined slightly, the gross notional has increased, indicating that while the total risk in the name has remained fairly constant, it has been trading more than previously. Over the last year, the increase in net notional outstanding for Greece was 15% (to USD 8.5 billion) while gross notional increased over 100% to USD 76.6 billion.

Exhibit 32: Ratio of gross to net notionals outstanding



Source: Credit Suisse, DTCC

The regulatory environment

In the current environment, no market analysis would be complete without a mention of the regulatory backdrop – along with the focus on sovereigns in 2010, this is another area that is going to be critically important for understanding market developments and performance. And of course, the possibility or reality of a sovereign default would be likely to have a large impact on the regulatory environment. For example, referring back to the above definition of sovereign, the ISDA protocols are specifically designed for English and New York law, and the vast majority of CDS are denominated in one or the other. Consider the state of the world in which the UK is approaching default. Private (non-gambling) contracts are generally held sacrosanct, but sovereign acts of the UK parliament that might precede default²⁰ would affect CDS under English law. The impact of this would vary depending on the jurisdiction of the parties as well as on the legal system chosen for the contract, but would raise different issues for English law contracts from those needing to be considered under New York law, over which the UK is not sovereign.

In sovereign CDS, perhaps more so than for any other area, understanding the precise nature of the contract and how it reacts to varying stressed scenarios is indispensable (and this primer can only provide general pointers).

²⁰ See as a possible indication the Banking (Special Provisions) Act of 2008 or the use of anti-terrorism legislation in the Icelandic banks' case.

Appendix

Glossary of useful terms²¹

Assignable Loan: A **Loan** that is capable of being assigned or novated to, at a minimum, commercial banks or financial institutions (irrespective of their jurisdiction or organization) that are not then a lender or a member of the relevant lending syndicate, without the consent of the relevant Reference Entity or the guarantor, if any, of such **Loan** or any agent.

Bond: Any obligation of a type included in the “**Borrowed Money**” Obligation Category that is in the form of, or represented by, a bond, note, certificated debt security or other debt security and shall not include any other type of Borrowed Money.

Borrowed Money: 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).

Confirmation: The document(s) exchanged between parties to a CDS transaction confirming the terms of the transaction.

Consent Required Loan: A **Loan** that is capable of being assigned or novated with the consent of the relevant Reference Entity or of the guarantor, if any, of such **Loan** or any agent.

Default Requirement: Usually USD 10,000,000 (or relevant currency equivalent) unless specified otherwise in the CDS **confirmation**.

Effective Date: The first day of the Term of the Credit Derivative transaction as specified in the **confirmation**.

Event Determination Date: The first date on which both the Credit Event Notice, and if applicable, the Notice of Publicly Available Information are effective.

Loan: 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.

Maximum Maturity: An obligation that has a remaining maturity from the Physical Settlement Date of not greater than the period specified.

Multiple Holder Obligation: An obligation that at the time of a restructuring credit event is held by more than three (non-affiliated) holders and for which at least two-thirds of holders are required to consent to the Restructuring Credit Event.

Not Bearer: Any obligation that is not a bearer instrument unless interests with respect to such bearer instrument are cleared via the Euroclear system, Clearstream International or any other internationally recognized clearing system.

Not Contingent: Any obligation with an outstanding principal balance as of the Delivery Date and thereafter, that may not be reduced as the result of the occurrence or nonoccurrence of an event or circumstance other than payment. Convertible, Exchangeable or Accreting Obligations usually satisfy this criteria provided that the right to convert/exchange/purchase/redeem the obligation has not been exercised on or before the Delivery Date.

²¹ These represent a summary only. For full, exact details, the reader is referred to the 2003 ISDA Credit Derivatives Definitions and supplements. A few key excerpts are listed for reference at the end of this document.

Payment Requirement: Usually USD 1,000,000 (or relevant currency equivalent) unless specified otherwise in the CDS **confirmation**.

Permitted Currency: The legal tender of either any Group of 7 (G7) country or any country that is a member of the Organization of Economic Cooperation and Development (OECD) and has a local currency long-term Triple A debt rating by S&P, Moody's or Fitch.

Scheduled Termination Date: Maturity date of the CDS contract as defined in the **confirmation**.

Specified Currency: The currency specified in the **Confirmation**, or if not specified and Specified Currency is specified in the **Confirmation**, any of the lawful currencies of Canada, Japan, Switzerland, the UK and the USA and the Euro and any successor currencies to these currencies.

Transferable: An obligation that is transferable to institutional investors without any contractual, statutory or regulatory restriction.

ISDA Credit Derivatives Physical Settlement Matrix

Exhibit 33: Key Standard Contract Details

Transaction Type	"STANDARD NORTH AMERICAN CORPORATE"	"STANDARD EUROPEAN CORPORATE"	"STANDARD WESTERN EUROPEAN SOVEREIGN"
Business Days:	"If the Floating Rate Payer Calculation Amount is denominated in USD: London & New York EUR: London, New York & TARGET GBP: London JPY: London & Tokyo CHF: London & Zurich CAD: London, New York & Toronto"	"If the Floating Rate Payer Calculation Amount is denominated in EUR: London & TARGET USD: London & New York GBP: London JPY: London & Tokyo CHF: London & Zurich CAD: London & Toronto"	"If the Floating Rate Payer Calculation Amount is denominated in USD: London & New York EUR: London & TARGET CAD: London & Toronto GBP: London"
Calculation Agent City:	New York	London	London
All Guarantees:	Not Applicable	Applicable	Applicable
Conditions to Settlement:	Notice of Publicly Available Information Applicable	Notice of Publicly Available Information Applicable	Notice of Publicly Available Information Applicable
Credit Events:	"Bankruptcy Failure to Pay Restructuring, if specified as applicable in the relevant Confirmation Restructuring Maturity Limitation and Conditionally Fully Transferable Obligation Applicable"	"Bankruptcy Failure to Pay Restructuring Modified Restructuring Maturity Limitation and Conditionally Transferable Obligation Applicable"	"Failure to Pay Repudiation/Moratorium Restructuring"
Obligation Category:	Borrowed Money	Borrowed Money	Borrowed Money
Obligation Characteristics:	None	None	None
Settlement Method:	Auction Settlement	Auction Settlement	Auction Settlement
Fallback Settlement Method:	Physical Settlement	Physical Settlement	Physical Settlement
Physical Settlement Period:	As per Section 8.6 of the Definitions ² capped at 30 Business Days	30 Business Days	30 Business Days
Deliverable Obligation Category:	Bond or Loan	Bond or Loan	Bond or Loan
Deliverable Obligation Characteristics:	"Not Subordinated Specified Currency Not Contingent Assignable Loan Consent Required Loan Transferable Maximum Maturity: 30 years Not Bearer"	"Not Subordinated Specified Currency Not Contingent Assignable Loan Consent Required Loan Transferable Maximum Maturity: 30 years Not Bearer"	"Specified Currency Not Contingent Assignable Loan Consent Required Loan Transferable Maximum Maturity: 30 years Not Bearer"
Escrow:	Applicable	Applicable	Applicable
60 Business Day Cap on Settlement	Not Applicable	Applicable	Applicable
2009 ISDA Credit Derivatives Determinations Committees, Auction Settlement and Restructuring Supplement to the 2003 ISDA Credit Derivatives Definitions (July 14, 2009)	Applicable	Applicable	Applicable
Fixed Rate Payer Payment Dates frequency	quarterly	quarterly	quarterly

Source: Credit Suisse, ISDA

ISDA definitions

For reference, we list here a few of the more important definitions, reprinted from the 2003 ISDA Credit Derivatives Definitions with permission of International Swaps and Derivatives Association, Inc © 2003 International Swaps and Derivatives Association, Inc. The reader is referred to the full document for further details and definitions.

"Restructuring" (Section 4.7(a)) 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 for 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.

(A) **"Permitted Currency"** means (1) the legal tender of any Group of 7 country (or any country that becomes a member of the Group of 7 if such Group of 7 expands its membership) or (2) the legal tender of any country which, as of the date of such change is a member of the Organization for Economic Cooperation and Development and has a local currency long-term debt rating of either AAA or higher assigned to it by Standard & Poor's, a division of The McGraw-Hill Companies, Inc. or any successor to the rating business thereof, Aaa or higher assigned to it by Moody's Investors Service, Inc. or any successor to the rating business thereof or AAA or higher assigned to it by Fitch Ratings or any successor to the rating business thereof.

(b) Notwithstanding the provisions of Section 4.7(a), none of the following shall constitute a Restructuring:

- (i) the payment in euros of interest or principal in relation to an Obligation denominated in a currency of a Member State of the European Union that adopts or has adopted the single currency in accordance with the Treaty establishing the European Community, as amended by the Treaty on European Union;
- (ii) the occurrence of, agreement to or announcement of any of the events described in Section 4.7(a)(i) to (v) due to an administrative adjustment, accounting adjustment or tax adjustment or other technical adjustment occurring in the ordinary course of business; and
- (iii) the occurrence of, agreement to or announcement of any of the events described in Section 4.7(a)(i) to (v) in circumstances where such event does not directly or indirectly result from a deterioration in the creditworthiness or financial condition of the Reference Entity.

(c) For purposes of Sections 4.7(a), 4.7(b) and 4.9, the term Obligation shall be deemed to include Underlying Obligations for which the Reference Entity is acting as provider of a Qualifying Affiliate Guarantee, or, if All Guarantees is specified as applicable in the related Confirmation, as provider of any Qualifying Guarantee. In the case of a Qualifying Guarantee and an Underlying Obligation, references to the Reference Entity in Section 4.7(a) shall be deemed to refer to the Underlying Obligor and the reference to the Reference Entity in Section 4.7(b) shall continue to refer to the Reference Entity.

“Currency Rate” (Section 8.10). "Currency Rate" means (a) the rate determined by the Calculation Agent equal to the rate of conversion of the currency of the Deliverable Obligation into the Settlement Currency by reference to (i) if the Settlement Currency is U.S. Dollars, the Federal Reserve Bank of New York 10:00 a.m. (New York time) mid-point rate as displayed on Reuters Page FEDSPOT on the date the Notice of Physical Settlement is effective (or, if the Notice of Physical Settlement is changed on or prior to the Physical Settlement Date, the date notice of the last such change is effective), or in such other commercially reasonable manner as it shall determine after consultation with the parties, or (ii) if the Settlement Currency is euros, the MEAN price as displayed on Reuters Page EUROFX/1 as of 12:00 p.m. (London time) on the date the Notice of Physical Settlement is effective (or, if the Notice of Physical Settlement is changed on or prior to the Physical Settlement Date, the date notice of the last such change is effective), or in such other commercially reasonable manner as it shall determine after consultation with the parties, or (b) if the Settlement Currency is not U.S. Dollars or euros, the rate determined by the Calculation Agent in a commercially reasonable manner after consultation with the parties. Corrections of errors or inconsistencies in the detailed description of the Deliverable Obligations specified in the Notice of Physical Settlement do not constitute changes for purposes of this Section 8.10.

“Specified Currency” (Section 2.19(b)(ii)) 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");

“Deliverable obligation” (Section 2.15) means

...(c) solely in relation to a Restructuring Credit Event applicable to a Sovereign Reference Entity, any Sovereign Restructured Deliverable Obligation (but excluding any Excluded Deliverable Obligation) that (i) is payable in an amount equal to its outstanding principal balance or Due and Payable Amount, as applicable, (ii) is not subject to any counterclaim, defense (other than a counterclaim or defense based on the factors set forth in Section 4.1(a)-(d)) or right of set off by or of a Reference Entity or, as applicable, an Underlying Obligor and (iii) in the case of a Qualifying Guarantee other than a Qualifying Affiliate Guarantee, is capable, at the Delivery Date, of immediate assertion or demand by or on behalf of the holder or holders against the Reference Entity for an amount at least equal to the outstanding principal balance or Due and Payable Amount being Delivered apart from the giving of any notice of nonpayment or similar procedural requirement, it being understood that acceleration of an Underlying Obligation shall not be considered a procedural requirement; and.....

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