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**Using financial market instruments to assess (aggregated) credit  
default risk of non-financial corporations and households**

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# Using financial market instruments to assess (aggregated) credit default risk of non-financial corporations and households<sup>1</sup>

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## 1. Introduction

At its meeting on 28 and 29 March 2011, the members of the European FISIM Task Force have agreed that, on conceptual grounds, compensation for credit default risk incurred by MFIs and other financial intermediaries<sup>4</sup> when providing loans should not be considered as a service and, as a consequence, should not be taken into account when deriving FISIM measures.

One possible approach to estimate such a credit default risk component (which is indistinguishably included in interest receivable/payable) relies on the availability of data on loan loss provisions or loan write-offs/write-downs. The main limitations of this approach relate to the availability of data with the necessary level of breakdown and, especially in the case of write-off/write-downs, on the relevance of such data on conceptual grounds<sup>5</sup>. In the context of the work of the European FISIM Task Force, Eurostat has recently launched a questionnaire aimed at surveying the availability of these data at national level and their conceptual soundness to derive proxies for credit default risk on loan portfolios, predominantly of MFIs. While no clear-cut conclusions can be drawn at this stage regarding the possible use of these data in the context of FISIM measurement, it is stressed that especially loan loss provisions may prove to be very useful, also in light of recent trends in

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<sup>1</sup> The work has benefited from useful comments and suggestions by Henning Ahnert, Björn Fischer, Jean-Marc Israël and Reimund Mink.

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<sup>4</sup> By convention financial intermediation services indirectly measured are provided by deposit-taking corporations (S.122) and by other financial intermediaries, except insurance corporations and pension funds (S.125). See draft ESA 2010, Chapter 14 on FISIM.

<sup>5</sup> Detailed statistics on loans write-offs/write-downs are available monthly in the EU in the context of the collection framework for MFI balance sheet statistics (Regulation ECB/2008/32). These data are collected to correct changes in the outstanding amounts of loans for the impact of non-transactions related effects such as write-offs/write-downs. These effects should be recorded only to the extent that the action is reflected in the reported loan outstanding amounts. As such, the statistically recorded write-offs/write-downs cannot be interpreted as a proxy for developments in non-performing loans as the criteria for the associated partial or total loan derecognition are subject to national GAAPs. It does not matter whether the reporting MFI records write-offs/write-downs continuously or only at intervals, nor whether a final court judgment is pending, provided national accounting practice supports a reduction in the carrying amount of the loans due to impairment

the supervisory area aimed at improving the collection framework for this type of statistical information. Still, other avenues can be investigated.

A possible alternative approach could rely on financial markets instruments to gather timely and relevant information on the creditworthiness of individual counterparties. For example, the yield spread of a corporate bond over a (risk-free) government bond with the same residual maturity is typically seen as a proxy of the credit default risk of the issuer over the time-to-maturity of the bond. Similarly, credit default swaps (CDS) represent an insurance against the default of individual corporations over a specified time horizon. A natural generalisation of this approach leads to considering financial market instruments based on pools of assets related to specific institutional sectors to gather information on the sector as a whole.

This note provides a short overview of the feasibility of this method for the non-financial corporation and households sectors, considering both methodological aspects and the availability of data (in the case of the euro area). In particular, for the case of non-financial corporations, we analyse CDS and bond indices. On conceptual grounds these approaches have drawbacks both in terms of theoretical linkages between the market prices of indices and the credit risk of the underlying pool of corporations, and in terms of representativeness and availability of the indices for the reference sector. As regards households, the approach is (even) more difficult as households do not directly issue traded financial assets. Two possible alternatives are discussed, respectively based on asset-backed securities and covered bonds indices, but they pose further limitations as these instruments have features which break the relationship between the household's risk profile and the price of the index.

Despite these shortcomings, this approach may still provide a broad indication of the developments in the credit default of individual institutional sectors. This is especially true in those cases where data on provisions or write-offs/write-downs might not fit the purpose either on conceptual grounds or due to data unavailability. Another important aspect is the poor harmonisation of accounting/supervisory data across countries. Hence, further empirical work needs to be done to assess in more detail the appropriateness of financial market indicators, appropriately weighting pros and cons of this approach against those of the available alternatives.

## **2. Non-financial corporations**

In the case of the euro area, the bond and CDS markets for non-financial corporations are rather developed, and several indices are available to make possible the derivation of proxies for the credit default riskiness of the sector. On conceptual grounds the use of CDS data seems the most promising since there is no clear theory which directly links the price of a bond index to the credit risk of the corresponding reference sector or pool of corporations

(e.g. all risk components are indistinguishably included in the spread). In addition, while CDS spreads isolate credit risk, bonds spreads also have embedded a liquidity premium. Still, both approaches suffer of many other limitations. First, the selection of companies that are included in the indices is biased towards global companies (which are more likely to have access to financial markets), so that they are not fully representative of the whole sector. Moreover, the availability of relevant bond or CDS indices actually priced on the market may also be unsatisfactory. For example, most families of indices do not cover individual financial sub-sectors. Similarly, indices only exist for large macro-areas or countries with developed markets (like the US and the euro area or the EU as a whole) and are not available for a broad spectrum of maturities. These limitations much hamper the possibility of using this approach in the context of FISIM measurement. Still such shortcomings might not be applicable in some cases (e.g. areas with developed markets) and analysts would thus need to weight them against pros and cons of other approaches such as using data on loan loss provisions or write-offs/write-downs. Furthermore, it needs to be taken into account that similar challenges exist in other areas of National Accounts where indirect estimation methods are used whenever no direct measurement can be pursued.

This section first reviews the features of CDS and bond indices, including data availability aspects, and then makes a comparison between the measures which can be derived under this framework and statistics on write-offs/write-downs on loans provided by euro area monetary financial institutions (MFIs) to domestic non-financial corporations (expressed as a percentage of outstanding amounts). While the latter are not good proxies for developments in non-performing loans, they offer at least a broad indication of the magnitude of the phenomenon.

### **CDS and related indices**

In order to protect themselves against future fluctuations in prices and reduce cash flow's volatility (i.e. hedging activities), many firms partly or mostly rely on credit derivatives. These are bilateral or multilateral contracts between a buyer and a seller regarding a transaction to be fulfilled at a future period of time. Among these instruments, credit default swaps (CDS) are widely used among banks, insurers and non-financial corporations. A CDS is a credit derivative in which one party buys protection (like with an insurance) by doing a series of payments (which are often called CDS spread) to the seller against the risk of default of an asset issued by a specified reference entity. In exchange, if a credit event occurs, the protection buyer receives a payoff from the seller intended to compensate the loss on the investment. The fee charged by the protection seller (i.e. the CDS spread) is typically expressed in basis points as a percentage of the notional amount of the underlying instrument. Therefore, it can be used as an indicator of credit default risk (on the reference instrument). One of the key features of a CDS is that it relies on real-time information and it is traded

constantly, and hence, its price reacts faster than standard credit ratings from agencies. In addition, unlike scoring models CDS prices are forward looking, since investors expectations are embedded into them.<sup>6</sup>

CDS structure allows market participants to trade the credit risk of an underlying asset and disentangle it from other associated risks (e.g. exchange rate, liquidity or interest rate risks). For this reason, the price of a CDS can be used to gauge the market's credit risk assessment of a given entity.<sup>7</sup>

Unlike individual CDS, CDS indices allow to hedge against a basket of reference entities. Hence, and analogously to individual CDS prices, CDS indices prices can serve as a measure for credit risk of a special basket or group of corporations (e.g. non-financial corporations).

<b>Maturity</b>	<b>3 yrs</b>	<b>5 yrs</b>	<b>7 yrs</b>	<b>10 yrs</b>
Europe	X	X	X	X
Hi-Volatility	X	X	X	X
Crossover	X	X	X	X
Non-financial		X		X
Financial - Senior		X		X
Financial - Subordinated		X		X
TMT		X		X
Industrials		X		X
Energy		X		X
Consumer		X		X
Auto		X		X

For the particular case of the euro area, there is no specific CDS index. However, Markit currently offers the iTraxx Europe index which is composed by individual CDS traded across Europe. This index is currently available with a maturity breakdown of 3, 7, 5 and 10 years. The main index is composed of 125 companies and is rolled every 6 months.<sup>8</sup> For each new series rollout, the individual CDS coupons are equally weighted to create a new index, which is maintained until the underlying individual CDS mature.<sup>9</sup> Similarly to individual CDS, buyers of a CDS index pay a coupon rate which can be viewed as the price (expressed in basis points) for insuring a notional amount of debt of 100 units issued by the reference sector. As

<sup>6</sup> Notably, this argues in favor of using CDS (or other financial market) data in the context of FISIM measurement against write-offs/write-downs, which are by definition ex-post measures.

<sup>7</sup> Partly due to its rapid growth; the CDS market became a standardized one (in terms of credit event definition, legal documentation, reference entity, level of seniority, etc). It should also be stressed that CDS prices also include a counterparty risk premium related to the cash flow exchanges. Such premium does not relate to the underlying corporation whose default risk is being priced, but to the risk that the CDS seller will not fulfill its obligations in case of default.

<sup>8</sup> The category non-financials is composed by the top 100 individual CDS in term of liquidity. Markit collects CDS information on approximately 2,800 individual entities.

<sup>9</sup> Bloomberg publishes generic iTraxx indices. These series contain the information of the first 6 months of each individual series.

most of the companies included in CDS indices for Europe are usually from the euro zone, they can thus be used as indicators of credit default risk in the euro zone.<sup>10</sup>

For each category, Markit provides two types of prices, namely, composite and theoretical. The former is the price at which the index is currently being traded and the latter is calculated by Markit using the coupon prices of the underlying components of the index. The table above shows the available indices:

### Corporate bonds indices

The difference in yield (i.e. yield spread) between two financial securities with a similar residual maturity is used as a main indicator of their different credit quality and is referred as the credit spread. In conceptual terms, the credit spread represents the marginal net yield that an investor can earn from a riskier financial security. For instance, the credit spread of a particular bond is typically calculated in relation to the yield on a “risk-free” benchmark bond. In the euro zone, the risk-free benchmark securities are bonds issued by the German federal government.

In terms of availability of indices for European non-financial corporations, the benchmark is the Bank of America Merrill Lynch Euro Corporate Index. This index tracks the performance of investment grade corporate euro denominated debt publicly issued in a euro member domestic market. Qualifying securities must have an investment grade rating (based on an average of Moody’s, S&P and Fitch) and an investment grade rated country of risk (based on an average of Moody’s, S&P and Fitch foreign currency long term sovereign debt ratings). In addition, qualifying securities must have at least one year remaining term to final maturity, a fixed coupon schedule and a minimum amount outstanding of EUR 250 million. Table 2 gives an overview of the availability by maturity and credit rating.

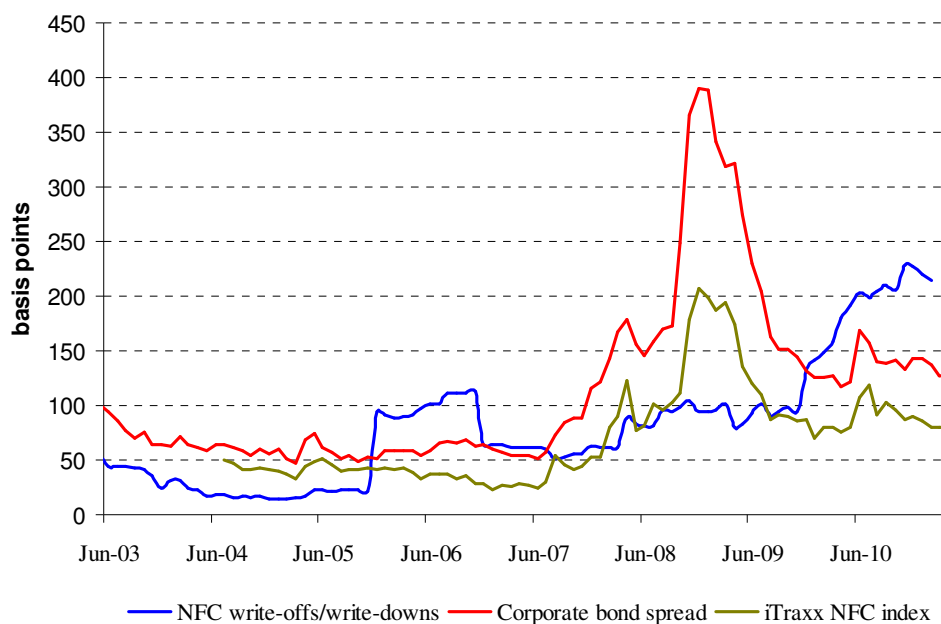
<b>MATURITY</b>	<b>GENERAL</b>	EMU Corporates Non-Financial Index
	<b>1 TO 3</b>	EMU Corporates Non-Financial 1-3 Yr
	<b>3 TO 5</b>	EMU Corporates Non-Financial 3-5 Yr
	<b>5 TO 7</b>	EMU Corporates Non-Financial 5-7 Yr
	<b>7 TO 10</b>	EMU Corporates Non-Financial 7-10 Yr
	<b>PLUS 10</b>	EMU Corporates Non-Financial 10+ Yr
<b>RATING</b>	<b>AAA</b>	EMU Corporates Non-Financial AAA Rated
	<b>AA</b>	EMU Corporates Non-Financial AA Rated
	<b>A</b>	EMU Corporates Non-Financial A Rated
	<b>BBB</b>	EMU Corporates Non-Financial BBB Rated

<sup>10</sup> The complete list of companies included in the index composition can be downloaded from <http://www.markit.com/en/products/data/indices/credit-and-loan-indices/itraxx/matrix.page?#>

## Comparing CDS with bond indices spreads

Some disparities need to be taken into consideration when considering CDS and bonds indices spreads to measure credit risk. The most straightforward difference is that they do not give a measure of the same type of risk. As it was stated before, CDS spreads isolate credit risk, where bonds spreads also have embedded a liquidity premium.<sup>11</sup> As regards availability of instruments, CDS indices allow for economic sub-sector discrimination, whereas bond indices do not. However, the maturity breakdown for bond indices issued by non-financial corporations in the euro area is more complete than the iTraxx (e.g. there is an index for corporate bonds with maturity longer than 10 years). On top of this, it is important to remember that composite prices for the iTraxx family index are not always available due to a limited number of transactions<sup>12</sup>.

### Non-financial corporations



Sources: Bloomberg (iTraxx), Bank of America Merrill Lynch (Corporate bond), ECB (write-offs/write-downs) and ECB calculations.

Notes: (Annual) write-offs/write-downs are expressed as a percentage of outstanding amounts and refers to loans to non-financial corporations with an original maturity of more than one year and up to five years. The iTraxx index relates to the five-year maturity. The corporate bond series represents the option-adjusted yield spread of the 5-7 year corporate bond index on the government bond.

The chart above compares annual write-offs/write-downs (as a percentage of outstanding amounts) for loans to non-financial in the euro area with original maturity between one and

<sup>11</sup> It can be argued that both CDS and bond spreads have embedded also a “systemic risk” component.

<sup>12</sup> For instance, if a particular day the number of transactions does not reach a minimum predefined level, composite prices are not calculated and only theoretical prices are disseminated.

five years, the five-year iTraxx Europe for the non-financial sector (as published by Bloomberg based on Markit data) and the Merrill Lynch corporate bonds index (option-adjusted spreads) for the maturity bracket five to seven years. As expected, CDS and bond indices with similar maturities (and underlying reference entities) behave in a similar way, with a correlation over the period from July 2004 to April 2011 of 97.4%.

### **3. Households**

Households do not issue bonds or other financial assets traded on financial markets (no CDS contract can thus exist either, by definition). Hence, no instruments are directly available to gauge information on the credit worthiness of households. A possible alternative relies on looking instead at instruments issued by financial institutions which are backed by MFIs' financial assets vis-à-vis households, namely on asset/mortgage-backed securities and covered bonds. These instruments are briefly reviewed next, together with an overview of the major available families of indices applicable in the case of the euro area. Other than the general limitations of bond spreads (and related indices) discussed above, this approach is hampered even further by certain features of asset/mortgage-backed securities and covered bonds which break the relationship between the household's risk profile and the price of the index. In addition, while the covered bond market is rather well-functioning and liquid, after the start of turmoil in August 2006 the asset/mortgage-backed securities market suffered severe liquidity problems, reflected both in the spreads and in the limited data availability (especially in the case of the euro area). These limitations pose major issues to the use of this approach to address households' credit default risk in the context of FISIM measurement. Still these considerations must be weighted against pros and cons of other approaches such as using data on loan loss provisions or write-offs/write-downs.

A comparison between the measures derived from asset/mortgage-backed securities and covered bonds indices and statistics on write-offs/write-downs on MFI loans to domestic households (expressed as a percentage of outstanding amounts) is then discussed.

#### **Covered bond indices**

Covered bonds have existed in Europe for centuries, and have come to be used in recent years in an increasing number of EU countries. In Europe, they are an important source of funding for credit institutions. In fact, their purpose is to obtain long-term funding at a low credit risk. The European Covered Bond Council – the platform for covered bond market participants in Europe – has isolated the following essential features, which are achieved under special-law-based frameworks or general law based frameworks<sup>13</sup>:

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<sup>13</sup> See <http://ecbc.hypo.org/Content/Default.asp?PageID=367>.



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

Although the underlying assets used to “cover” bonds are usually mortgage loans, there are many drawbacks that break the relationship between the household’s risk profile and the price of the index. Perhaps one important reason is related to legal constraints. As it was stated before, these regulations might include a minimum level of credit quality and a given average maturity of loans. This means that when the credit condition of a given household are worsened, its mortgage loan is taken out from the basket of loans. Similarly, when the quality profile of the assets backing the covered bond deteriorates, the issuer is supposed to add new assets to the basket. As a result of this, the risk profile of the asset pool that covers these bonds does not really react to changes in the credit conditions (or at least these reactions are decreased). Nonetheless, the re-pooling of assets only takes place at regular intervals, so that short-term dynamics in credit worthiness of the underlying loan obligors should be reflected.

<b>Table 3 – EMTX family indices</b>	
<b>Index</b>	<b>Maturity breakdown</b>
EMTXc Aggregate	Aggregate
	3-5, 5-7 and 7-10 Yrs
EMTXc Germany <sup>14</sup>	Aggregate
	3-5 and 5-7 Yrs
EMTXc Germany Hypo (mortgages)	Aggregate
EMTXc France	Aggregate
EMTXc Ireland	Aggregate
EMTXc Spain	Aggregate
	7-10 Yrs

In the euro area, the major trading platform for debt securities is MTS. The Euro MTS Covered Bond Index is a family of 14 total return indices representing Euro-denominated covered bonds. Eligible bonds must have at least one year to maturity, and each issuer is represented by all their bonds meeting the eligibility criteria. Sub-indices include country and maturity breakdown (see table 3 above). Underlying bond prices for the indices (which are

<sup>14</sup> EMTXc Germany is an index composed by covered bonds which are not only backed by mortgages but also by public loans and other assets (aircrafts, ships, etc).

rebalanced on a monthly basis) are collected from around 1,000 participants representing over 200 financial institutions on the MTS.

In addition to MTS indices, Merrill Lynch provides other family indices for covered bonds. Although the trading volume might be lower in comparison to EMTXc instruments, the breakdowns by maturity and country are more complete. The information currently available at the ECB is shown in table 4.

**Table 4 - ML Covered Bond Indices**

<b>Area</b>	<b>type</b>	<b>breakdown</b>
<b>Euro area</b>	EMU Pfandbrief Index all maturities	General index
	EMU Pfandbriefe	1-3, 3-5, 5-7, 7-10 and 10+ Yr
	EMU Pfandbrief Large Cap Index	Sub-index
	IBOXX Euro College Covered all maturities	General index
	IBOXX Euro College Covered	1-3, 3-5, 5-7, 7-10 and 10+ Yr
<b>Spain</b>	IBOXX Euro College Covered	AAA, AA, A
	IBOXX Euro College Spain Covered	Sub-index
<b>Ireland</b>	IBOXX Euro College Ireland Covered	Sub-index
<b>France</b>	IBOXX Euro College France Covered All Maturities	Sub-index
<b>Austria</b>	IBOXX Euro Austria Covered	Sub-index
<b>Germany</b>	IBOXX Euro College BD Covered all maturities	Sub-index
	IBOXX Euro College BD Covered	1-3, 3-5, 5-7, 7-10 and 10+ Yr

### **Asset/mortgage backed securities**

Additionally to covered bonds, financial institutions use asset/mortgage backed securities (ABS/MBS) as an alternative financing source. By pooling many contractual debts (e.g. mortgages loans, auto loans, etc) and selling it into one single bond (via a Special Purpose Vehicle, which issues the bonds and use the revenues to buy the loans from the originating bank), financial institutions can obtain funds at relatively low interest rates and thus free capital to enter in new transactions. The principal and interest payments made on individual loans are used to serve the payments to the bondholders of the new asset or mortgage backed security. One of the most important differences between these two types of securities is related to credit risk transfer. In the case of covered bonds, the double-recourse feature prevents the transfer of credit risk from the issuer to the pool of assets, and hence the investor does not bear all the risk. This, in turn, impacts the credit risk management incentives of a credit institution.

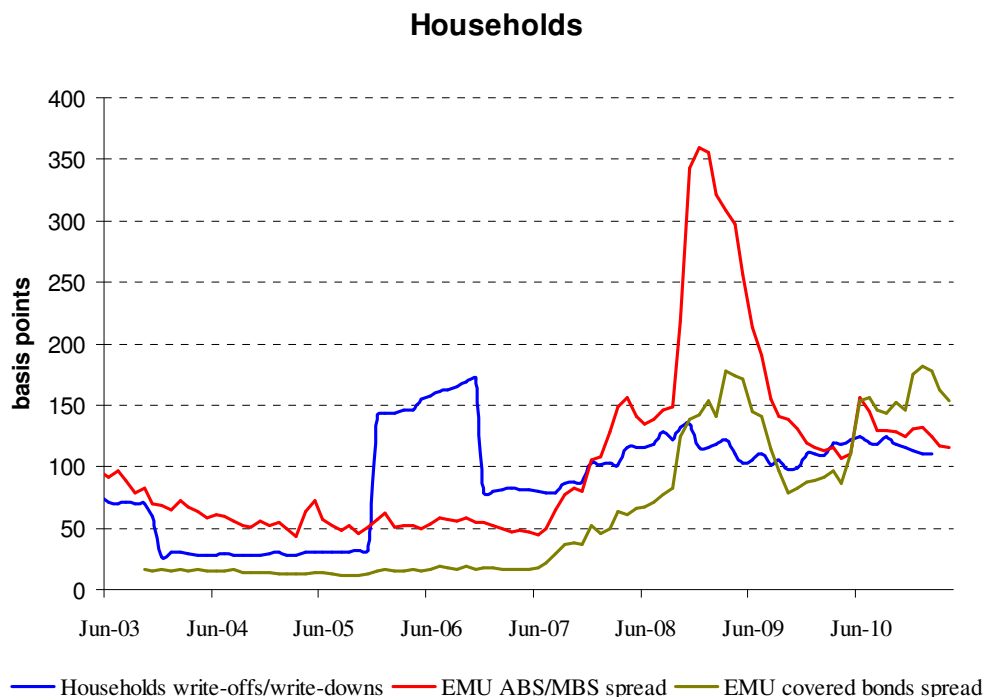
The argument of using ABS/MBS indices to assess the credit risk of households is similar to the one used with covered bonds. In particular, the price of securities that are backed by mortgages is expected to fall if the credit profile of a debtor's is worsened. Hence, changes in the yield spread (which is inversely related to prices) would suggest changes in household credit conditions. However, as with the case of covered bonds, there are shortcomings with

this methodology that blur the relationship between prices and credit risk. For example, as these securities are backed by thousands of individual loans, and on top of this an index of securities is composed, it is really difficult and cumbersome to assess its risk on a clear and transparent way. In addition, as the issuer does not bear the credit risk embedded in the ABS, there might be moral hazard issues (this was easy to see during the last financial turmoil). Still, this approach represents, by a conceptual perspective, an interesting approach to proxy households' credit default risk. On the other side though, limited data availability and, more importantly, the severe liquidity issues that affected the market after the start of turmoil in August 2006, make this approach difficult to implement in practice.

As regards data availability for the euro area, Merrill Lynch publishes an aggregate index of returns on ABS/MBS denominated in euros. Unlike with previous indices, at the moment there are not available further breakdowns by country or maturity.<sup>15</sup>

### Comparing bond indices spreads

The chart below compares write-offs (as a percentage of outstanding amounts) for loans to households in the euro area with original maturity from 1 to 5 years and Bank of America Merrill Lynch EMU ABS/MBS and covered bond all maturities indices (option-adjusted yield spread).



Sources: Bank of America Merrill Lynch (ABS/MBS and covered bonds), ECB (write-offs/write-downs) and ECB calculations.

<sup>15</sup> J.P. Morgan Research also publishes a set of indices on ABS/MBS for the euro area.

Notes: (Annual) write-offs/write-downs are expressed as a percentage of outstanding amounts and refers to loans to households with an original maturity of more than one year and up to five years. The EMU ABS/MBS represents the option-adjusted yield spread for an all maturities index on the government bond. The EMU covered bond series expresses the option-adjusted yield spread of the all maturities covered bond index on the government bond.

The different characteristics of ABS/MBS and covered bonds are reflected in the historical developments of the indices. In particular, the covered bond spreads are systematically lower than the corresponding ones for ABS/MBS (with the exception of recent developments). In turn, the chart shows the liquidity problems which affected the ABS/MBS market after the start of the financial crisis (which intensified after the collapse of Lehman Brothers in 2008).

#### **4. Concluding remarks**

Apart from loan loss provisions that would constitute a promising manner to assess credit risk, despite current shortages in data availability, this note has identified various types of financial market instruments that could be used to assess the credit risk profile of non-financial corporation and households. For non-financial corporations, the focus has been on CDS and non-financial corporate bonds indices (Markit iTraxx and Bank of America Merrill Lynch EMU corporate bonds respectively). For households instead, the analysis has concentrated on covered bond and ABS/MBS indices (MTS EMTXc and Bank of America Merrill Lynch EMU covered bonds ABS/MBS indices).

As regards non-financial corporations, there are some minor methodological disparities between CDS and bonds indices (i.e. they do not measure exactly the same type of risk). While the available indices provide a broad indication of the credit conditions of the sector, there are many shortcomings that hamper the use of this approach to derive precise measures of credit default risk. These limitations mainly relate to the lack of linkages (on theoretical grounds) between the market prices of indices and the credit risk of the underlying pool of companies, and to the representativeness and availability of the indices. Practically, in the case of the euro area (as a whole) several families of CDS and bond indices are available, with a good level of breakdowns by maturity.

The assessment of household credit conditions is even more complex. Although two different sets of indices have been analysed, several shortcomings that could deteriorate the linkage between credit risk and instrument price have been identified (legal requirements, high complexity, poor valuation, etc). In addition, although the market of covered bond indices is very liquid and offers several indices with complete maturity and geographical breakdowns, ABS/MBS trading has been rather scarce since the beginning of the financial turmoil in August 2007 and, in addition, not many relevant indices are made available by commercial data providers for the euro area.

Fully taking into account the shortcomings identified in this note, available financial market data can still be used to derive proxies for the credit default risk of individual institutional sectors, as they provide a broad indication of the developments in the creditworthiness of the two sectors (NFCs and households). Hence, in the context of FISIM measurement, these limitations must be weighted against the pros and cons of the possible alternatives. For example, this might be the case whenever data on write-offs/write-downs or loan loss provisions do not fit the purpose either on conceptual grounds or due to current data unavailability.

Further empirical work needs to be done to assess in more detail the appropriateness of these indicators to measure credit risk. This would imply, for instance, to apply these measures in comparison to other indicators, and test their robustness also in relation to data sets for major EU countries (DE, FR, IT, ES, UK) and other OECD countries (USA, Japan, Canada, and Australia).