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Abstract

Asset-backed securities (ABSs) and covered bonds (CBs) are structured finance instruments that require a range of key services, which may be provided by many firms. However, despite the prevalence of structured finance instruments in Europe, the network between issuers and service providers has to date remained unexplored. This paper traces and describes these connections, using a new database covering the majority of public ABSs and CBs outstanding between August 2008 and March 2017. It appears that ABS and CB issuers are highly reliant on affiliated counterparties (“close links”) to provide the above-mentioned key services, especially when programmes are larger and/or are retained by the issuer for use as collateral with the Eurosystem. When only “non-close links” across banking groups are considered, instances of reliance on just a few service providers have gradually decreased in number, with a more balanced system developing over time. The paper finds similar results for networks based on the use of securities as Eurosystem collateral. These findings help demonstrate the importance of the Eurosystem’s risk management framework for ABSs and CBs, and support the orientation of recent regulatory efforts at the European level.

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Executive summary

Structured finance instruments rely on many interacting parties, yet, despite the widespread use of these instruments in Europe, there is little information available on the networks between these (counter-) parties. This paper traces

and describes the interlinkages between key counterparties in European asset-backed securities (ABSs) and covered bonds (CBs). It is based on a new database covering roughly 1,500 ABSs and CBs that were eligible for regular Eurosystem monetary policy operations at any point between August 2008 and March 2017.

Structured finance instruments (ABSs and CBs) are a significant source of Eurosystem-eligible collateral, as well as a key component of the Eurosystem asset purchase programme (APP). ABSs and CBs both employ third parties

(“counterparties”) to mitigate specific risks associated with each instrument, to help avoid disruptions for investors in the event of issuer default, or of certain market or credit risk events. However, counterparty services are not free and, therefore, present issuers with a trade-off: issuers can either provide such services themselves, buy them from an entity within the same banking group, or purchase them from fully non-affiliated parties. This trade-off in turn has the potential either to create highly distributed and complex networks across the financial system or, instead, to lead to significant concentration, in the form of reliance on intragroup entities (or on issuers themselves) for these services.

This paper analyses the network of structured finance counterparties and finds that a few large providers supply a disproportionate share of services, especially at the beginning of the sample period. The paper examines a range of

counterparty services, which are distinguished by activity and by their importance for the smooth functioning of the ABS or CB. Moreover, each service category (or “role”) is classified based on its importance to the functioning of the securitisation programme and on whether the role should ideally be performed by providers not affiliated to the issuer. The paper focuses in particular on services that are of high importance for the functioning of the programme and those which should be provided by non-affiliated entities – the chief focus lies on the network arising between issuers and structured finance firms supplying this subset of services.

The network also reveals a surprising result: more than half of all structured finance issuers either supply these important services themselves to their own programmes or rely on closely linked entities. Such widespread reliance may

raise concerns about the continuity of these issuers’ programmes in the event of issuer default. When focusing on specific counterparty services, issuers’ self- or intragroup reliance appears to be especially high for services relating to account banks¹ and protection provision (such as swaps). In contrast, issuers appear to rely relatively more on non-affiliated entities for roles relating to agency services and

¹ An account bank receives all payments from the underlying exposures in the ABS or (in some situations) the CB.

back-up servicing. This perhaps also reflects the natural economies of scope associated with providing the latter services, for example due to the need for specialised IT and collection procedures. At the same time, centralised data on the network of structured finance counterparty services has not been readily available, which may mean that both banks and investors have themselves been unaware of the extent of close links across this area of the financial system.

From a time series perspective, the extent of close links in important ABS and CB counterparty services appears relatively stable over time, despite the large changes in issuances and amounts outstanding of these instruments since 2008. This suggests a largely time-invariant preference among issuers for obtaining certain important services either from themselves or from entities within their banking group. In order to benchmark these findings, the structured finance counterparty network is compared (using weekly data) with the network of ABS and CB collateral pledged by eligible counterparties in Eurosystem credit operations from 29 August 2008 to 16 March 2017. This collateral network contains both the identity of the bank borrowing from the Eurosystem and the identity of the bank that has issued the ABS or CB collateral being pledged by the borrowing bank. The collateral network thus enables a further examination of close links – which are understood here as a bank pledging as collateral either instruments that it has issued itself or instruments that have been issued by an entity in the same banking group. The paper thus compares the extent of close links in the collateral network (between issuers and pledgers) with the extent of close links in the structured finance counterparty network (between issuers and counterparties). As regards the collateral network, the greatest extent of close links is consistently found where ABSs are used as collateral. In addition there are consistently high degrees of close links over time between service providers and both ABS and covered bond issuers, when the services that are most important to the functioning of the ABS or covered bond are considered.

The paper also illustrates a different form of concentration: the tendency to rely on a few non-affiliated firms, when ABSs or CB issuers contract structured finance services from entities outside their banking group. This tendency is most apparent from 2008 to 2012, when ABS and CB issuers that hired non-affiliated service providers tended to rely on a relatively concentrated set of non-affiliated firms. This trend has declined over time, and more recently has stabilised, suggesting that there is now less reliance on a “clique” of entities. In other words, among those structured finance counterparty relationships that were not between closely linked entities, an increasingly wide array of counterparties has been providing these services. In contrast, the network of eligible ABS and CB collateral was relatively specialised throughout much of 2008-2010: banks issuing relatively less popular collateral themselves pledged collateral that was issued by widely sought-after banks. This tendency subsequently declined steadily and the supply of ABS and CB collateral has tended to come from a wider range of issuers. One possible explanation for this can be found in the measures taken by the Eurosystem to increase the amount of available eligible collateral while at the same time providing extensive amounts of liquidity to eligible borrowing banks.

Larger structured finance programmes are more commonly retained for use by their issuer as Eurosystem collateral. This paper examines the tendency of issuers to retain their own instruments for use as collateral, and compares this with issuers' decisions to rely on themselves or intragroup entities (both of which are counted as "close links") or on non-affiliated entities for the provision of key structured finance counterparty services. The results suggest that issuers of programmes that are highly retained rely more frequently either on themselves or on entities within their own banking group for high-importance ABS and CB counterparty services.

These findings help justify the Eurosystem's available tools to mitigate the risks presented by ABSs and CBs, whether in the form of collateral pledged with the Eurosystem or of instruments considered for purchase under the respective purchase programmes. The Eurosystem has at its disposal a wide range of tools, which include deciding on valuation measures, setting limits, explicitly ruling out certain types of close links, and exercising discretion when accepting certain instruments as collateral. Beyond the Eurosystem's own tools, however, ongoing EU regulatory efforts to provide clarity and reassurance on these linkages, such as the forthcoming Securitisation Regulation, are to be welcomed.

1 Introduction

Structured finance instruments rely on many interacting parties, yet, despite the widespread use of these instruments in Europe, there is little information available on the networks between these (counter-) parties. This paper traces and describes the interlinkages between firms providing key services to European asset-backed security (ABS) or covered bond (CB) programmes. It is based on data from a new database covering ABSs and CBs that were eligible for regular Eurosystem monetary policy operations at any point between August 2008 and March 2017.

Structured finance instruments (ABSs and CBs) are an important component of collateral that can be pledged against Eurosystem credit, and can also be purchased as part of the Eurosystem’s asset purchase programme (APP). Indeed, as of end March 2017, outstanding eligible ABS and CB collateral together totalled around EUR 2 trillion, against just under EUR 14 trillion of eligible marketable assets. However, not all assets that are eligible as collateral are actually pledged with the Eurosystem. When actual use is considered, the importance of ABSs and CBs becomes even clearer: roughly EUR 700 billion worth of ABSs and CBs are actually pledged as collateral, accounting for about 40% of all pledged collateral and making structured finance assets the largest eligible asset group when combined. In addition, as of end March 2017, EUR 240 billion of ABSs and CBs had been purchased by the Eurosystem as part of the APP.

In view of their importance and complexity, the Eurosystem closely monitors ABSs and CBs. As a result, and as further detailed in European Central Bank (2015a), the Eurosystem has repeatedly adjusted its ABS and CB eligibility criteria. In particular, the Eurosystem has aimed to steadily increase the transparency of ABSs, while limiting and protecting itself from unnecessary complexity, notwithstanding the Eurosystem’s prevailing monetary stance. Furthermore, the option for an issuer to pledge its own CBs as collateral has been restricted largely to CBs that comply with specific requirements in the Capital Requirements Regulation (or have equivalent legal safeguards). In addition, in September 2013 valuation markdowns were introduced for such “own-use” covered bonds as an additional risk control measure. Although many eligible ABSs and CBs are of high quality, as demonstrated by their strong performance during the global financial and euro area crises since 2007-08, these instruments represent a significant share of the Eurosystem’s collateral operations as well as the APP universe. It is therefore important to monitor and, where appropriate, mitigate the risks stemming from these asset classes. Box 1 provides further background on ABSs and CBs.

Box 1

Basic features of ABSs and CBs

Asset-backed securities

ABSs are created by a bank seeking to transform illiquid exposures (such as loans or leases) into tradable securities, thereby either obtaining funding or, by virtue of the method used to convert these exposures into tradable instruments, transferring the risk to another party (and thus reducing the bank's capital requirements). ABSs essentially pass the cash flows from a pool of underlying exposures from a lender (often called the "originator") to investors, according to a pre-defined priority of payments. In Europe, the loans or leases that constitute the pool of exposures (i.e. the "underlying exposures") are most often composed of homogeneous – in terms of loan/lease type and location of borrower/collateral – residential mortgages and loans to small or medium-sized enterprises (SMEs), as well as auto loans/leases, commercial mortgages, equipment leases, and consumer and credit card loans. To distinguish between ABSs with these different underlying exposures, the paper refers to ABS "asset classes".

The specific method used to create tradable securities from these illiquid exposures involves, most commonly, the sale of the underlying exposures to a bankruptcy-remote special purpose entity (SPE) – a process known as a "true sale". The SPE raises funds to purchase these exposures by issuing securities to investors, who effectively now own the underlying exposures. Alternatively, the underlying exposures are not sold to the SPE but, instead, investors provide credit protection to the loan/lease originator using instruments such as credit default swaps, guarantees or credit-linked notes. Such "synthetic" securitisations are not covered in the database used for this paper, because the Eurosystem does not accept these instruments as collateral for its credit operations, nor does it purchase them in the APP. Moreover, publicly listed synthetic securitisations have significantly declined in popularity since 2007-08.

Once tradable securities have been issued, investors holding these securities have a claim on the cash flows resulting from the underlying exposures. These cash flows are paid to investors according to a pre-defined priority of payments ("waterfall"), which is one of the distinctive features of ABSs. This is because different classes of ABSs are issued, which have different rankings in the priority of payments. In the most common arrangement (sequential priority of payments), cash received from the underlying exposures is distributed first to investors holding notes of the highest credit quality (the "senior tranche"), then to investors holding the next-highest-ranking notes (the "mezzanine tranche"), and so on. Conversely, losses on the underlying exposures, due to defaults, dilutions and other adverse events, are distributed in the opposite direction: investors holding notes of the lowest credit quality (the "junior tranche") are allocated the first losses. When losses exceed the size of the junior tranche, these are in turn allocated to the next-lowest-ranking tranche (which is often the above-mentioned mezzanine tranche). Investors are compensated for the ranking of their tranche in the priority of payments/loss allocation by a risk premium corresponding to the interest rate paid on the notes: notes of lower priority and greater proximity to the first losses in the underlying pool will therefore feature a higher coupon than higher-ranking tranches.

Covered bonds

In contrast, covered bonds rely primarily on the issuing bank to reimburse the securities, making use of the cover pool to reimburse claims only in the event of issuer default. Note that there are differences in the terminology used for ABSs and for covered bonds: for ABSs, the lending bank is

often referred to as the originator, while the ABS issuer is a special purpose entity with little activity in practice. In contrast, a covered bond issuer is often the same entity as an ABS originator (although there may also be an SPE, depending on specific legislative arrangements in EU Member States). For simplicity, this paper uses the term “issuer” to refer to both CB-issuing banks and ABS originators.

The underlying loans or leases that are referenced by the covered bond in the event of an issuer default are called the “cover pool”. Typically, cover pools in EU covered bonds are composed of residential or commercial mortgages, or loans to public-sector entities, although it is possible that loans to SMEs may become more prevalent in the future. In contrast to ABSs, covered bonds’ cover pools tend to be less homogeneous, for example containing a combination of residential and commercial mortgages, as well as exposures to public-sector entities. In addition, covered bonds are not “tranching” in the same way as ABSs – a single class of securities is issued (which may have different maturity dates).

A further difference between covered bonds and ABSs is that the “cover pool” can be substituted by the issuer (subject to certain criteria set out in the programme documentation and/or regulatory requirements). In contrast, the majority of ABSs are backed by a static pool of exposures that generally cannot be adjusted by the originator during the life of the ABS. This divergence has implications for the type of structured finance counterparty services that can be found in covered bonds as opposed to ABSs. For example, a covered bond may have less need to use interest rate and foreign exchange swaps, insofar as adverse interest rate and foreign currency developments can be managed by substituting individual exposures within the cover pool – an option generally not available to ABSs.

Moreover, a covered bond may also have less need for a dedicated account bank provider than an ABS, insofar as the exposures in the cover pool remain on the balance sheet of the covered bond issuer. This stands in contrast to the ABS pool of underlying exposures, which has been sold to an SPE and therefore requires an entity to be designated to host payments. For this reason, designated account banks may be less prevalent for covered bonds than for ABSs.

From a regulatory perspective, covered bonds are often covered by national frameworks, which has led to a number of different structures emerging in past years. A useful overview of European covered bond frameworks and practices can be found in European Banking Authority (2014) and European Banking Authority (2016).

Counterparties involved in ABSs and CBs

ABSs’ and CBs’ underlying exposure pools can be substantial, containing hundreds of thousands or even millions of loans/leases. Handling and maintaining so many exposures, distributing the proceeds to investors, and managing the risks stemming from divergences (e.g. in currencies or maturities) between the exposures and the ABS tranches or CB notes requires effort and expertise. Therefore, ABS and CB structures provide for a number of different roles in order to address these specific tasks and risks. While the description and number of roles and counterparties involved in each programme can vary widely across the ABS and CB landscape, some of the most common and important counterparty roles are the servicer, the account bank, the protection provider and agency services.

Servicers collect payments and monitor the underlying exposures on behalf of the SPE, enforcing claims and generally managing the loans/leases. Account bank providers operate the accounts in which payments from the underlying exposures are received and from which they are subsequently transferred to investors (or to the SPE, if present, which then pays investors). In addition, the account bank holds cash used to fund any reserve accounts for the issuer, such as funded accounts used as a line of defence against pool losses (known as “cash reserves”). Protection providers such as guarantors help mitigate losses on tranches and/or on underlying exposures. Elsewhere, liquidity facility providers can make up temporary shortfalls in cash flows from the underlying exposures, to avoid missed payments to investors (which would generally constitute an event of default and thus lead to a forced sale of the underlying exposures). Lastly, swap providers can also mitigate adverse currency and/or interest rate movements from the perspective of investors (especially in ABSs). Agency services cover a variety of additional services related to the handling of funds. For example, a custodian acts as a legal intermediary to minimise the risk of theft or loss of the ABS or CB notes. Elsewhere, the cash manager receives information on the available funds from the servicer and calculates the amounts to be disbursed according to the guidelines set out in the ABS or CB transaction documents (and may also produce an investor report).

Third parties (counterparties) act to mitigate specific risks associated with ABSs and CBs. For example, swap arrangements are often used to hedge interest rate and foreign exchange rate risks arising due to mismatches between underlying exposures and the outstanding notes of the ABS or CB securities. Commingling risks can arise when collected loan proceeds are trapped, upon default of the originating bank, in an account in that bank (and thus form part of its insolvency estate). These risks can be mitigated by holding loan proceeds in an account that does not belong to the issuer (or by making use of a funded commingling reserve). The identity of the account bank is thus crucial in this regard. Lastly, servicing continuity risks can materialise if a defaulting originating institution was also the servicer (i.e. managing collections and administering the exposures in the pool). Back-up servicers or back-up servicer facilitators can help mitigate such servicing continuity risks. In an ideal scenario from a risk mitigation perspective, each of these (and other) roles in the ABS or CB would be assumed by a counterparty with no ties to any other counterparty in the same transaction.

Yet services provided by third parties are not free and, therefore, ABS and CB issuers face a trade-off: save money and perform services in-house, or pay for services and reassure investors (and rating agencies). On the one hand, having more services provided in-house (or by entities in the issuer’s banking group) is cheaper and facilitates the funding or capital reduction obtained from the transaction. On the other hand, the greater the “close links” between an ABS or CB issuer and its counterparties, the higher the risk of discontinuity of the instrument in the event of issuer default. Such risks would in turn be expected to be reflected in the market’s assessment of the quality of the instrument and, consequently, in the price. This analysis therefore aims to gauge where structured finance markets are positioned in terms of this trade-off.

In examining this trade-off, this paper explores the extent and shape of the structured finance service network, including the prevalence of issuer-

counterparty “close links” – defined as the ABS or CB issuer’s reliance on itself or on entities within its banking group to provide third-party services.

The paper examines this network from the perspective of a key concern for structured finance programmes: the orderly functioning and continuity of the ABS or CB in the event of issuer default. This stands in contrast to the more commonly taken perspective based on the credit quality of the exposures underlying the structured finance programme. Nevertheless, it is important to recall that many programmes contain provisions that trigger the sale of the underlying exposures *regardless of their credit quality*. For example, an inability to replace a servicer within a specified period of time following the default of the existing servicer (which is often the same as the originator/issuer) can lead to missed payments to investors and the obligation to sell off the underlying exposures (often referred to as an “acceleration event”). Such forced sell-offs or fire sales of assets can also lead to losses for investors, due to the heavily discounted prices at which the assets are sold.² The paper therefore considers network features that may suggest “hidden” risks to the survival of a structured finance programme upon default of its issuer.

As a result, the underlying perspective of this paper is related to but distinct from many financial network studies, which examine situations where networks are composed exclusively of relations between firms, as opposed to relations between and also within firms.

Nevertheless, this analysis is inspired by analyses of networks in securities holdings, as highlighted in European Central Bank (2015b) and Langfield et al. (2014), as well as trading in those securities (Adamic et al. (2017)). This paper also draws on the substantial literature on banking sector interconnectedness, for example Alves et al. (2013), Čihák et al. (2011), Liu et al. (2015), and Minoiu and Reyes (2013).³ Indeed, there has been a substantial increase in research on financial networks in the years following the global financial crisis of 2007-08, thanks in part to a combination of increased academic interest, enhanced data sets, and improved tools and computing power which have allowed for the handling and modelling of large matrices. This paper also aims to contribute some findings on a hitherto unstudied corner of financial networks.

This analysis also contributes to the evidence base supporting ongoing regulatory initiatives in the European Union. For example, the advantages granted to structured finance instruments in legislation and in financial markets (relative to uncovered bank bonds) are largely premised on the belief that these instruments will continue to repay investors in the event of an issuer default. This perception is in turn based on the presence of underlying exposures and counterparties to separate the risk of the pool of exposures from the risk of the issuer. Recent regulatory efforts that touch on these issues include the Securitisation Regulation for ABSs and the European Commission’s recent consultation on covered bonds in the European Union, as well as the broader objective of a Capital Markets

² The development of conditional pass-through covered bond programmes, which allow the covered bond trustee to consider delaying sales of the exposures in the cover pool, can help mitigate such cliff effects for investors, although such programmes also involve additional complexities not covered by this paper. See European Central Bank (2016) for further discussion of conditional pass-through covered bonds.

³ See also Hüser (2015) for an extensive literature review.

Union. It is hoped that, by highlighting the features of a relatively opaque area of financial markets, a contribution can be made to the evidence base used for ongoing and future policymaking efforts, as well as for investor due diligence.

Following this introductory section, the second section of the paper presents further details of the database, as well as some summary statistics. The third section illustrates the overall network as well as its subcomponents. The fourth section attempts to benchmark the structured finance counterparty network with data on the use of Eurosystem-eligible collateral, while also exploring insights from measures used in the financial network literature. After a discussion (in the fifth section) of the Eurosystem's ability to mitigate its exposure to these risks and of ongoing regulatory efforts, the final section provides some conclusions.

2 Empirical methodology

This paper relies on a unique database containing the names and roles of structured finance service providers in ABSs and CBs which were eligible as Eurosystem collateral at any point between August 2008 and March 2017.⁴ This information is not centrally available; the database was constructed using a combination of rating agency reports, transaction documentation and information obtained from data providers such as Bloomberg and Intex. Data were collected in two waves: in December 2015 and (where not already obtained) in March 2017. Because data were not continuously collected between 2008 and 2017, the database suffers from the caveat that it does not reflect the evolution of service providers in the same programme over time. Indeed, service providers can be substituted if, for example, an existing provider's rating falls below the minimum level stipulated in the programme prospectus. However, in the authors' view, such substitutions and replacements are relatively infrequent and, given that this work is the first attempt to trace such a network, it can still yield some useful insights. Nevertheless, the database should be viewed as a "snapshot" of a network, albeit one reflecting instruments that have been issued or have matured at different dates. The time series dimension of this analysis is revisited in Section 4.

Having obtained the names of counterparties, it is useful to identify their wider banking group (using a "parent" identifier). This task was straightforward for most entities still in operation ("going concern" entities), based on consolidated financial statements, supervisory information and other disclosures. Entities that were no longer going concerns at the time the data were collected were attached to the same banking group to which they had belonged when previously in operation.⁵ Entities that underwent mergers at some point in the sample window (2008-2017) have also been added to the most recent parent group at the time of data collection. The alternative would have been to add another dimension to the database, and thus track all changes within the overall network over time, which would have been challenging given that the banking landscape in the various European jurisdictions covered by the database has been substantially reshaped by mergers and acquisitions over the sample window.

Substantial standardisation of numerous structured finance counterparty roles was vital, given the multiple sources used to construct the database and their respective naming conventions. Based on the ECB's experience in performing due diligence on hundreds of ABSs and CBs, consistent role groups were created, and expert judgement used to categorise those roles based on two considerations: (1) the role's importance to the functioning of the programme, and (2) the extent to which investors would desire the service to be provided by an entity not affiliated to

⁴ The choice to examine ABS and CB instruments that were eligible at any point in this time period reflects the availability of data in certain ECB databases.

⁵ "Banking group" refers to the banking group of the financial firm, as set out in the consolidated financial statements, supervisory information and other disclosures.

the ABS or CB issuer.⁶ Table 1 presents the individual roles and maps them according to these two dimensions.⁷ For example, the role of account banks in structured finance programmes is crucial to the smooth transmission of payments from the underlying exposures to investors. Similarly, entities such as swap counterparties and liquidity facility providers are critical in ensuring that events of default are avoided. Both sets of services can realistically be expected to be provided by entities that are not “closely linked”: neither the issuer itself nor an entity affiliated to the issuer via the same banking group. Obtaining such services from entities which are not closely linked implies paying a competitive fee, but in exchange provides greater reassurance of continuity of the ABS or CB in the event of the issuer’s default. In contrast, roles such as the servicer are also vital but cannot reasonably be expected to be provided by non-affiliated entities, given the high costs involved in transferring information on the underlying exposures to entities outside the issuer.⁸

Why is it reasonable to expect that, for certain crucial counterparty services, the provider should ideally be both different from the issuer and, furthermore, outside (not affiliated to) the issuer’s banking group? This is because the default risks of entities within the same banking group tend to be more correlated with the issuer’s default risk, compared with non-affiliated entities’ default risks (Anginer et al. (2016)). There are a variety of reasons for this, including common business practices across the group, complex interrelationships (e.g. liquidity lines or guarantees), and self-fulfilling investor expectations of similar weaknesses across affiliated entities (as well as reputational risk). This perspective is also in line with rating agency practices: for example, Moody’s covered bond rating methodology factors in the affiliated or non-affiliated nature of an issuer when considering the contribution of swap provisions to a covered bond rating (Moody’s Investor Service (2016)).

⁶ Particularly with ABSs, it may be the case that investors in lower-ranked tranches (e.g. junior tranches) have consistently different perspectives and risk-appetites from investors in higher-ranked tranches (e.g. senior tranches). This paper disregards these considerations and adopts the perspective of an investor who generally prefers the ABS to operate smoothly until the legal final maturity date of all tranches (regardless of performance and of any losses that may have arisen from the evolution of the underlying exposures by that date).

⁷ Table 1 (and the entire paper) considers SPEs to be purely legal entities with no material significance for the assessment of the network of third party services. As discussed in Box 1 above, the term “issuer” refers, for simplicity, to both ABS originators and CB-issuing banks.

⁸ For covered bonds, it may be the case that services related to the account bank can also naturally be carried out by the issuer, insofar as the cover pool is dynamic, continuously managed by the issuer and usually on the balance sheet of the issuer. At the same time, in the event of a covered bond issuer default, the lack of an external account bank service provider could lead to risks of delayed payments and of funds being trapped in the issuer’s insolvency estate (“commingling risk”).

Table 1

Service categories and detailed roles in the structured finance counterparty database

SERVICE CATEGORY	DETAILED ROLE NAME (USING DIFFERENT COMMON TERMINOLOGIES)	IMPORTANCE	SHOULD PROVIDER BE NON-AFFILIATED TO ISSUER?
ACCOUNT BANK	ACCOUNT BANK	4 = Very important	YES
ACCOUNT BANK	COLLECTION ACCOUNT BANK	4 = Very important	YES
AGENCY SERVICES	CUSTODIAN	4 = Very important	YES
PROTECTION PROVIDER	LIQUIDITY PROVIDER	4 = Very important	YES
PROTECTION PROVIDER	LOSS RESERVE PROVIDER	4 = Very important	YES
PROTECTION PROVIDER	SWAP PROVIDER	4 = Very important	YES
SERVICER	SERVICER	4 = Very important	NO
ISSUER	ISSUER (NOT SPE)	4 = Very important	NO
ISSUER	ORIGINATOR	4 = Very important	NO
SPE	ISSUER	4 = Very important	NO
SPE	SPECIAL PURPOSE VEHICLE	4 = Very important	NO
AGENCY SERVICES	COVER POOL MONITOR	3 = Important	YES
PROTECTION PROVIDER	COLLATERAL PROVIDER	3 = Important	YES
PROTECTION PROVIDER	CONTINGENT SWAP PROVIDER	3 = Important	YES
PROTECTION PROVIDER	GUARANTOR	3 = Important	YES
SERVICER	BACK-UP SERVICER	3 = Important	YES
SERVICER	BACK-UP SERVICER FACILITATOR	3 = Important	YES
AGENCY SERVICES	BACK-UP ADMINISTRATOR	2 = Somewhat important	YES
AGENCY SERVICES	CALCULATION AGENT	2 = Somewhat important	NO
AGENCY SERVICES	CASH MANAGER	2 = Somewhat important	NO
AGENCY SERVICES	COLLATERAL AGENT	2 = Somewhat important	NO
AGENCY SERVICES	PAYING AGENT	2 = Somewhat important	NO
OTHER SERVICES	TRUSTEE	1 = Less important	YES
OTHER SERVICES	ARRANGER	1 = Less important	NO
OTHER SERVICES	CONSULTANT	1 = Less important	NO
OTHER SERVICES	LEGAL SERVICES	1 = Less important	NO

Sources: Moody's, Standard & Poor's, Fitch Ratings, DBRS, Bloomberg, Intex, transaction documents, authors' calculations.

The dataset was enriched using additional information and measures available to the ECB on structured finance programmes. In particular, a time series of outstanding amounts per programme was created.⁹ Information on the amount of each programme pledged as collateral with the Eurosystem (and by which institution) was included. In addition, the nominal amount of each programme that is retained by the issuer for its own use as collateral against Eurosystem credit was incorporated.

⁹ For ABSs, only senior tranches are eligible as Eurosystem collateral. This implies that ABS programme-related exposures in the network will underestimate actual ABS exposures. However, senior tranches are by far the largest share (at issuance) of outstanding tranches. Furthermore, for deeply amortised senior tranches, issuers will often exercise "clean-up" call options and close the programme. Therefore, the fact that only senior tranches are included in this paper's measure of ABS programme exposures is not deemed to pose a major issue in terms of the representativeness of the network.

Table 2 illustrates the number of programmes covered by this database. ABSs make up more than three-quarters of the programmes in the database. This also reflects a key difference between ABSs and CBs: investors in the former can rely only on a (generally static) pool of cash-flow-generating assets for repayment. Thus, an ABS originator seeking to issue new ABSs will often need to identify and isolate a new pool of underlying exposures, set up a new SPE, and contract for a new set of structured finance services.¹⁰ In contrast, covered bond issuers can adjust their cover pool as necessary and issue new securities as part of the same CB programme (usually up to a pre-specified maximum amount). Therefore, there will appear to be more ABS programmes than CBs, but the average nominal amount of a CB programme is often higher than an individual ABS “programme”.

Interestingly, nearly one-third of the covered bond programmes considered did not disclose any information on the entities providing third-party services. This could be due to the simple fact that no counterparties were involved in those programmes. For example, the German Pfandbriefe Act requires that asset-liability mismatches be mitigated via “natural” matching (i.e. without the use of swaps or other hedges) of the cover pool exposures with the profiles of the issued CB liabilities. However, it was not possible to explicitly confirm this from the data sources consulted. Furthermore, it is also noted that information could be found for at least some programmes in all jurisdictions.

Table 2
Number of structured finance programmes considered

(number of programmes)

Structured finance type	Number of programmes disclosing roles	Number of programmes disclosing no role information besides issuer	Total
Asset-backed securities	1,075	0	1,075
Covered bonds	261	124	385
Total	1,336	124	1,460

Sources: Moody's, Standard & Poor's, Fitch Ratings, DBRS, Bloomberg, Intex, transaction documents, authors' calculations.

Chart 1 illustrates the number and availability of programmes grouped by the location of the underlying exposures.¹¹ The largest jurisdictions, in terms of the number of programmes, are Spain, Germany, Italy and the Netherlands. In addition to non-euro-area countries in the European Union, the database also captures to some extent non-EU countries, such as Canada, Norway and Switzerland, although these have fewer programmes eligible as Eurosystem collateral, which also reflects the fact that covered bonds are less frequently found outside the EU. For the majority of jurisdictions, all the programmes detected disclosed information on the identity of firms involved in the programme and their roles. However, some countries,

¹⁰ Certain master trust ABSs are an exception to this, but these are relatively less frequent in Europe (except in a few jurisdictions such as the Netherlands and the United Kingdom). This type of ABS is also included in the database.

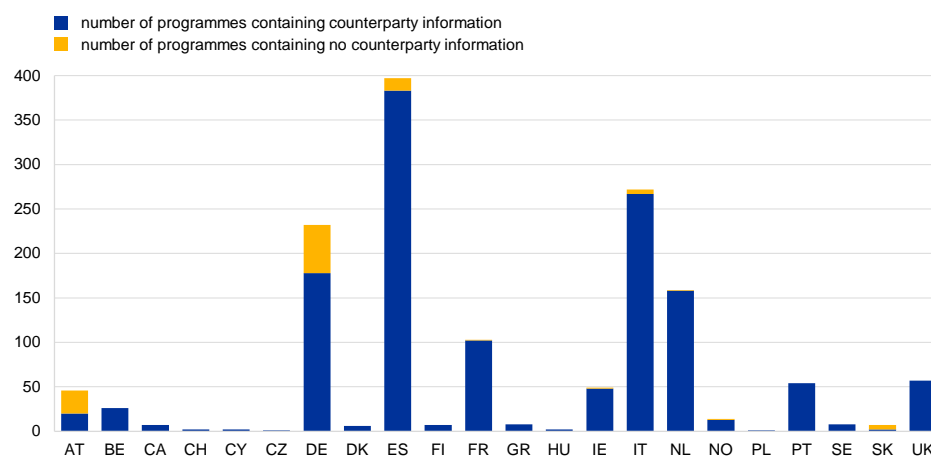
¹¹ As further discussed in Box 1, most ABS pools are homogeneous and refer to a single jurisdiction. CB cover pools are less homogeneous in terms of type of underlying exposure, but are often (though in some cases expert judgement is required based on the location and business operations of the issuer) geographically limited to a single jurisdiction.

namely Austria and Germany, contained programmes where no information was available. There were also a few programmes with underlying exposures in the Slovak Republic, Spain and Italy where no information was available. Nevertheless, the sample appears to be representative overall and for each jurisdiction (with the exception of the Slovak Republic and perhaps Austria). This is because, first, the majority of publicly listed ABSs and CBs are eligible for Eurosystem collateral operations (and are thus captured in the paper’s database). Second, as shown in Chart 1, complete or near-complete coverage, in terms of disclosure of the identity and role of firms participating as structured finance counterparties, was achieved for the programmes captured in each jurisdiction, with the aforementioned exception of the Slovak Republic and Austria.

Chart 1

Number of structured finance programmes considered and available

(number of programmes by country of exposures)



Sources: Moody’s, Standard & Poor’s, Fitch Ratings, DBRS, Bloomberg, Intex, transaction documents, authors’ calculations.

Table 3 displays, at three snapshot dates, the outstanding amounts of the Eurosystem-eligible portions¹² of structured finance programmes included in the database, by the location of the underlying exposures. The largest euro area countries, led by Spain, account for the greatest outstanding amounts on average throughout this period. The coverage of the database matches the sharp increase in issuance of structured finance instruments during this time period, which rose to a peak of EUR 1.8 trillion in early 2013. In addition, although the largest country in terms of the eligible value of structured finance programmes is Spain, the greatest absolute increases in coverage from 2009 to 2017 can be found in France, Italy and the Netherlands, in contrast to the declines observed in Germany, Spain, Austria, Greece, Cyprus and Ireland.

¹² Covered bond notes and senior tranches of ABSs.

Table 3

Eligible outstanding amounts of structured finance programmes captured in the database, over time

(EUR billions; covered bond notes and senior tranches of ABSs)

Country of exposures	Outstanding (March 2009)	Outstanding (March 2013)	Outstanding (March 2017)
ES	469.0	521.2	362.3
DE	317.3	186.1	185.1
FR	91.0	287.8	227.0
IT	56.6	232.1	194.0
IE	53.0	53.0	39.5
NL	52.1	243.4	192.8
BE	34.6	65.7	59.3
PT	27.1	40.8	32.9
NO	3.7	11.9	11.4
AT	3.6	0.1	0.3
SE	3.4	6.5	9.1
DK	2.5	28.4	20.2
GR	2.0	0.0	0.0
FI	1.0	5.3	11.8
CY	1.0	0.0	0.7
SK	0.3	0.5	1.1
UK	0.0	83.8	54.2
CH	0.0	11.5	6.1
CA	0.0	1.3	48.4
Total	1,118	1,779	1,456

Sources: Moody's, Standard & Poor's, Fitch Ratings, DBRS, Bloomberg, Intex, internal ECB databases, authors' calculations.

3 Visualising EU structured finance counterparty networks

This section presents some initial visualisations of the structure of the structured finance third-party network, beginning with Chart 2. The chart counts the links across the roles mentioned in Table 1 above at the local level (i.e. not at the banking group level), but includes only those roles which are deemed “important” (with an importance score of three or above) and which can reasonably be expected to be provided by a different entity to the issuer (and, ideally, an entity outside the issuer’s banking group). Each node in the graph represents a financial market participant that is either an ABS and/or CB issuer, a third party providing one or more of the services being examined, or both (since issuers can also provide services to other issuers). The lines represent a connection between two entities, and the arrows indicate that a firm is providing a service to the issuer towards which the arrow is pointed. The aim of this is to capture the direction of the risk to the ABS or CB in the event that a third party must be replaced (due to default, a rating downgrade, a breach of contractual terms, or other reasons). To facilitate visualisation, parallel arrows (i.e. multiple links between the same two entities in the same direction) are combined in a single arrow, the thickness of which indicates the number of connections (in the same direction) between the firm and the issuer.¹³ The size of each node represents the number of services provided by that firm to all other issuers of ABSs or CBs – a measure called the “weighted out-degree”. This is considered “weighted” because the measure takes into account how many times the entity provides services to each issuer.¹⁴ Overall, a total of 6,658 connections are captured when all of the different structured finance services and importance levels are included (see also Table 1 above).

Chart 2 illustrates the tendency of European structured finance service markets to be concentrated among a few large service providers. In this respect, the network appears to resemble a “scale-free” network, in which the distribution of connections between counterparties (degree) is highly skewed and tends to follow a power law (Newman (2010)). In other words, the average connection between all structured finance counterparties and issuers is relatively small, but this can mask the existence of a few key providers of counterparty services.¹⁵ This is discussed further in Section 4.2.

¹³ Note that there is no “netting” of lines between two firms in the network. In other words, lines that go in the opposite direction (i.e. firm A provides three services to firm B and firm B provides two services to firm A) would show as two separate lines overlaying each other (with different thicknesses), with arrows pointing in each direction from A to B and B to A.

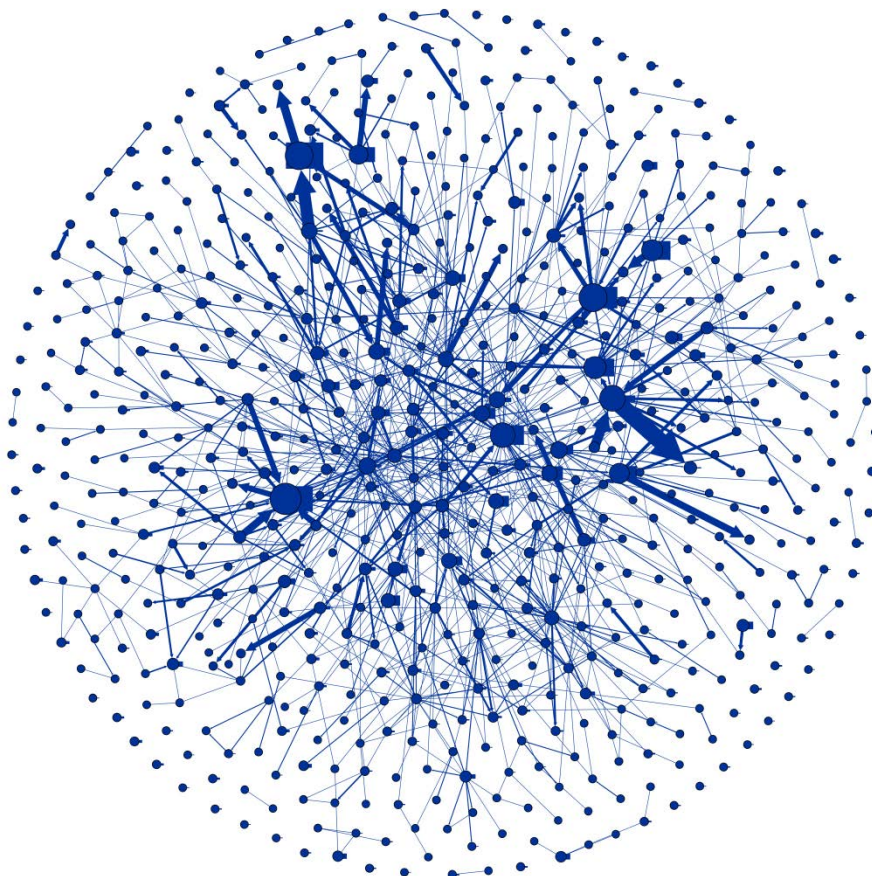
¹⁴ To repeat: the “out-degree” defines only how many individual firms are receiving services from a particular firm. The “weighting” reflects the number of such services provided. For example, a structured finance service provider that provides one service each to two different issuers will have a smaller node size than a different provider that supplies ten services to each of those two issuers.

¹⁵ See Newman (2010) and Rosvall (2006) for useful overviews of different network types.

Chart 2

European structured finance counterparty network

(line width: number of services provided; node size: degree (weighted by number of links))



Sources: Moody's, Standard & Poor's, Fitch Ratings, DBRS, Bloomberg, Intex, transaction documents, authors' calculations.
Notes: each node represents a participant in the network (i.e. either an ABS and/or CB issuer, or a structured finance service provider), and the lines represent a connection between two participants. Only services which have an importance score of three or higher and should be provided by a non-affiliated entity (see Table 1 above) are counted. The arrows indicate that a counterparty is providing a service to the issuer towards which the arrow is pointed. The size of each node corresponds to the number of services it provides to other nodes in the graph (i.e. the "weighted out-degree" of the firm).

Furthermore, as shown in Chart 3, structured finance issuers appear to obtain many important structured finance services either from themselves or from firms within the same banking group. The chart illustrates the same network as in the previous image (i.e. showing only important services that should be provided by non-affiliated counterparties), but now overlaying ownership links. Note that if an issuer is not part of a larger banking group, then that issuer also appears as a single node in Chart 3. The colours in Chart 3 denote the following information:

- Blue nodes (and blue lines) indicate that issuers in the banking group receive structured finance services only from non-affiliated entities (alternatively, where applicable, services provided by entities in the banking group are provided only to non-affiliated issuers).

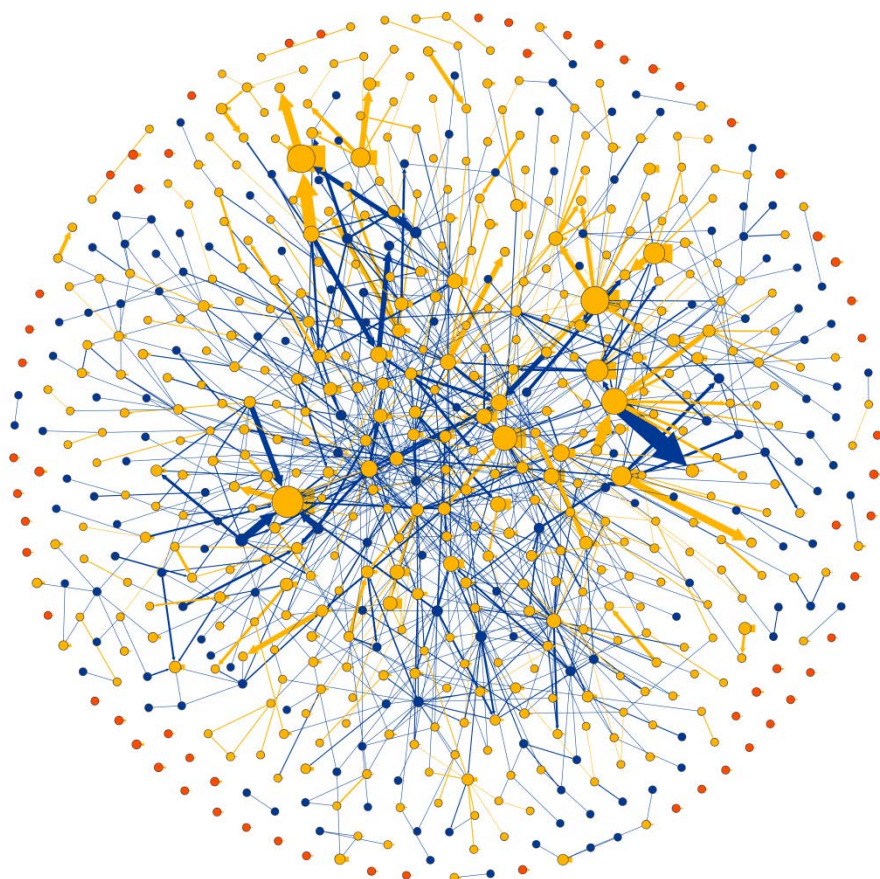
- Yellow nodes (and yellow lines) indicate that at least one issuer in the banking group receives services from an affiliated entity or that at least one service provider provides services to an issuer in the same banking group.
- Finally, orange nodes designate issuers that fulfil all important counterparty roles themselves, when these would normally be expected to be provided by external non-affiliated firms. By construction, there are no lines connecting these orange nodes to any other node in the graph.

All in all, the majority of important structured finance services appear to be provided at least partially between closely linked entities, and on numerous occasions are even provided by the issuer itself. Interestingly, according to Chart 3, there appears to be a positive correlation between more extensive links between two entities and whether the two entities belong to the same banking group (i.e. thicker arrows tend to be yellow). This is discussed further in Section 4.4.

Chart 3

European structured finance counterparty network – focus on linkages within banking groups

(line width: number of services provided; node size: out-degree (weighted by number of links); blue nodes and lines: link is to an entity which is not part of the same banking group; yellow lines: link is to an entity in the same banking group; yellow nodes: contains at least one link to an entity in the same banking group; orange nodes: the issuer's important structured finance services are provided exclusively by the issuer itself in its ABSs and/or CBs)



Sources: Moody's, Standard & Poor's, Fitch Ratings, DBRS, Bloomberg, Intex, SNL Financial, ECB databases, authors' calculations. Notes: each node represents a participant in the network (i.e. either an ABS and/or CB issuer, or a structured finance service provider), and the lines represent a connection between two participants. Only structured finance services which have an importance score of three or higher and should be provided by a non-affiliated entity (see Table 1 above) are counted. The arrows indicate that a counterparty is providing a service to the issuer towards which the arrow is pointed. The size of each node corresponds to the number of services it provides to other nodes in the graph (i.e. the "weighted out-degree" of the firm).

Chart 4 focuses on the linkages between protection providers, such as swap counterparties and guarantors, and issuers of structured finance programmes.

A total of 970 protection services (as defined in Table 1 above) have been counted, which are then aggregated over each firm. The network is thus sparser than the overall network discussed in the two charts above (fewer nodes and fewer connections), because protection arrangements are not always deemed necessary for structured finance instruments. For example, many covered bond issuers simply choose their cover pool exposures to hedge interest rate and/or foreign exchange

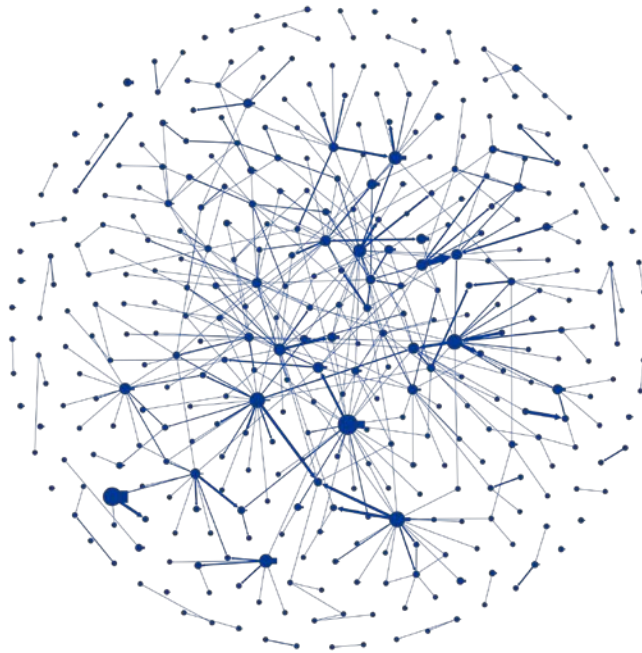
rate mismatches between the cover pool and the covered bonds.¹⁶ Nevertheless, a similar structure can be observed to that in the overall network in Chart 2: a few entities appear to provide the majority of structured finance protection services to the market.

In addition, as with the overall network shown in Chart 2, a number of entities have no links at all, meaning that the issuer provides a protection service to itself. These entities are represented more clearly – as orange nodes – in Chart 5. Furthermore, Chart 5 also illustrates – using yellow lines and nodes – the large extent to which protection services are provided by entities within the same banking group as the issuer.

Chart 4

European structured finance protection provider network

(line width: number of protection services provided; node size: out-degree (weighted by number of links))



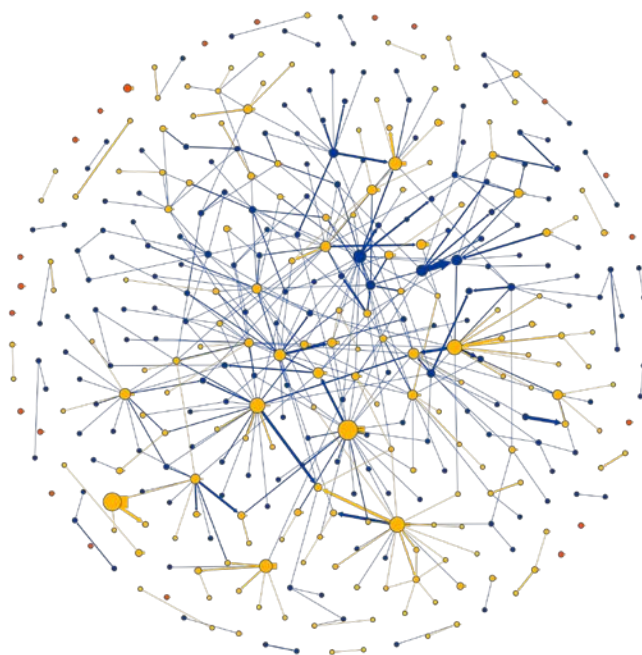
Sources: Moody's, Standard & Poor's, Fitch Ratings, DBRS, Bloomberg, Intex, transaction documents, authors' calculations.
Notes: each node represents a participant in the network (i.e. either an ABS and/or CB issuer, or a structured finance protection provider), and the lines represent a connection between two participants. The arrows indicate that a firm is providing a protection service (e.g. swap, guarantee) to the issuer towards which the arrow is pointed. The size of each node corresponds to the number of protection services it provides to other nodes (i.e. the "weighted out-degree" of the firm).

¹⁶ As regards swaps, certain jurisdictions permit covered bond issuers to include interest rate and/or foreign exchange swaps as cover pool assets. The network presented here does not count these instruments; only swaps provided at the programme level are counted.

Chart 5

European structured finance protection provider network – focus on linkages within banking groups

(line width: number of protection services provided; node size: out-degree (weighted by number of links); blue nodes and lines: link is to an entity not part of the same banking group; yellow lines: link is to an entity in the same banking group; yellow nodes: contains at least one link to an entity in the same banking group; orange nodes: the issuer's ABS and/or CB protection services are performed exclusively by the issuer itself)



Sources: Moody's, Standard & Poor's, Fitch Ratings, DBRS, Bloomberg, Intex, SNL Financial, ECB databases, authors' calculations. Notes: each node represents a participant in the network (i.e. either an ABS and/or CB issuer, or a structured finance protection provider), and the lines represent a connection between two participants. The arrows indicate that a firm is providing a protection service (e.g. swap, guarantee) to the issuer towards which the arrow is pointed. The size of each node corresponds to the number of protection services it provides to other nodes (i.e. the "weighted out-degree" of the firm).

The next network to be examined is that of back-up servicing arrangements.

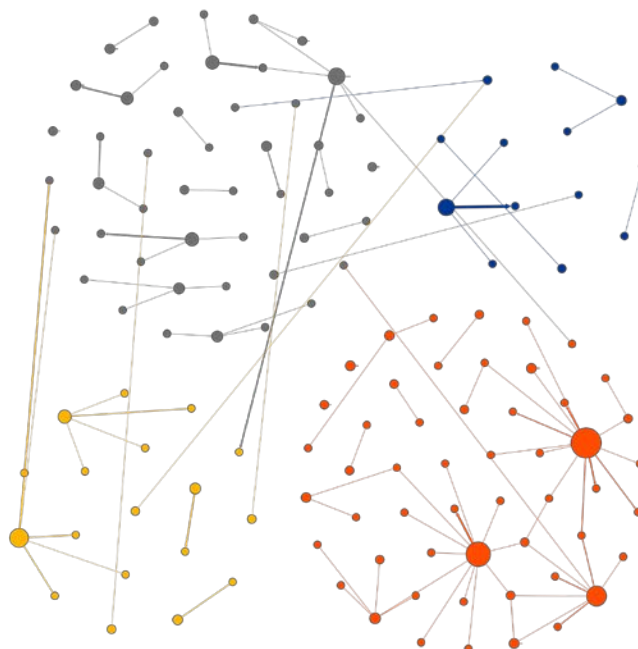
Such arrangements have become more common in recent years, in part due to the Eurosystem's requirements for ABSs seeking eligibility under the temporary collateral framework.¹⁷ More recently, the draft EU Securitisation Regulation has included such provisions for securitisations (i.e. ABSs plus asset-backed commercial paper) seeking to be designated as "simple, transparent, and standardised" (STS). These provisions require the securitisation to ensure that servicer default or insolvency does not result in the termination of servicing (European Commission (2015a)). The Securitisation Regulation is expected to enter into force on 1 January 2019 and, because of the reduced capital requirements for securitisations which obtain the STS designation, is expected to motivate many securitisation issuers to make the necessary adjustments. It is therefore instructive to examine the current network of providers and users of back-up servicing arrangements, as this may also provide a guide to the future evolution of this network once the Securitisation Regulation enters into force.

¹⁷ European Central Bank (2013).

Chart 6

European back-up servicer network – clustered by country of service provider

(line width: number of back-up servicer services provided to structured finance instruments; Country 1: blue nodes and lines; Country 2: yellow nodes and lines; Country 3: orange nodes and lines; all other countries: grey nodes and lines)



Sources: Moody's, Standard & Poor's, Fitch Ratings, DBRS, Bloomberg, Intex, transaction documents, authors' calculations.
Notes: each node represents either an ABS and/or CB issuer (at the group level) or a back-up servicer/back-up servicer facilitator (also at group level), and the arrows represent a connection between the two entities, with the arrow colour corresponding to the service provider (i.e. the "source" of the arrow). The arrows point towards the issuer to which a counterparty is providing a back-up servicer service.

Chart 6 illustrates the concentration of back-up servicers and issuers of programmes. Where present, the provision of these services is particularly concentrated within countries and among a small number of service providers in those countries. A total of 167 ABS programmes – chiefly across Italy, the United Kingdom and the Netherlands – contain back-up servicing arrangements, in the form either of an actual back-up servicing arrangement or of a back-up servicer facilitator arrangement.¹⁸ (None of the covered bonds in the underlying database appears to use a back-up servicer.) Chart 6 also illustrates the extensive reliance on a few key providers in Country 3 (orange nodes and lines), where three firms provide back-up servicing services to roughly 43% of the 54 structured finance programmes containing such arrangements. The percentage of concentration on a few entities then drops off sharply – the next most active back-up servicer in the underlying database is in Country 2, covering ten programmes (roughly 6% of the total number of programmes with back-up servicers). Lastly, the chart also demonstrates that, among the three largest countries to use back-up servicers (blue, yellow, and orange nodes and lines), issuers tend to hire back-up servicers established in the same

¹⁸ Back-up servicer facilitators help issuers of structured finance programmes to find alternative servicers following a trigger event, such as the default of the servicer of the programme. The facilitator does not usually provide the back-up servicing arrangement itself and, in this regard, acts as an intermediary between the issuer clients and potential replacement servicers until a suitable replacement is installed.

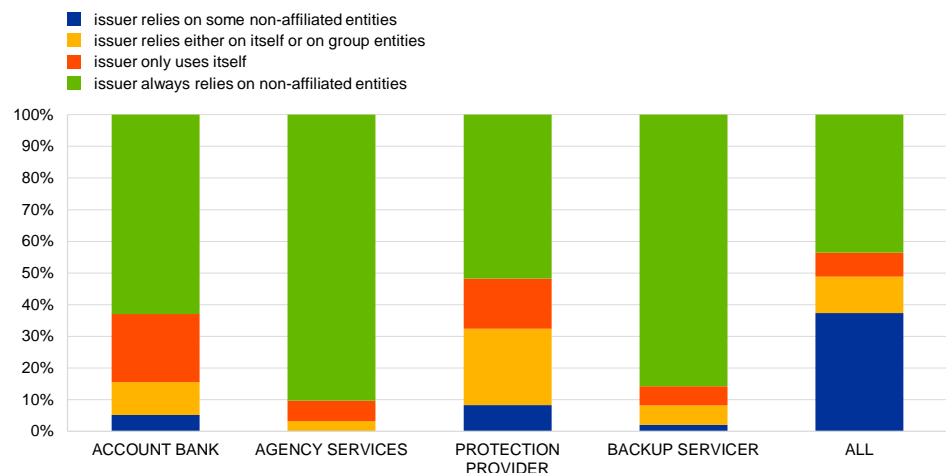
country as the underlying exposures (which is often where the issuer is established as well).

Chart 7 provides greater detail on issuers' relative reliance, by type of structured finance service, on themselves, on entities within their banking group and on non-affiliated entities. As above, the chart presents information only for the most crucial of the third-party services listed in Table 1 above, which should not be affiliated to the issuer. Several issuer categories are defined: the orange bars represent issuers that only provide the service themselves, while the yellow bars indicate issuers that sometimes rely on themselves or on other entities in the same group. The blue bars refer to issuers whose programmes contain at least some close links for the service in question, but not exclusively, or to issuers which provide some of the services themselves but also on other occasions have non-affiliated entities fulfil the role in question. Finally, the green bars count the issuers whose programmes use only non-affiliated structured finance counterparties for the role in question (i.e. the expected case).

Chart 7

Share of close links across different major structured finance service categories that should normally be provided by non-affiliated entities

(percentage of issuers with at least one programme containing the structured finance service category in question)



Sources: Moody's, Standard & Poor's, Fitch Ratings, DBRS, Bloomberg, Intex, transaction documents, authors' calculations.

Notes: Only structured finance services with an importance score of three or higher (see Table 1 above) are counted. The "ALL" column is not the sum of the individual columns, as all self, close, or non-affiliated links are considered at the same time, regardless of the service category.

As shown in Chart 7, more than half of all structured finance issuers either provide key services (which should be provided by non-affiliated providers) themselves to their own programmes or rely on closely linked entities, which may raise concerns about the continuity of these issuers' programmes in the event of issuer default. This surprisingly high percentage appears to be driven especially by account bank and protection services, where 33% and 43% of issuers respectively either play these roles exclusively themselves or rely on closely linked entities for these two role categories. The extent of close links for agency services and back-up servicing is less prominent in contrast, reflecting also the natural economies of scope associated with the provision of these services (e.g. custodians

for agency services and back-up servicing firms with specialised IT and collection procedures). Thus, in view of the trade-off mentioned at the start of this paper, it appears that many ABS and CB issuers have chosen arrangements that are relatively cheaper, by either providing key services themselves or using affiliated firms.¹⁹ Such practices may come at the expense of arrangements that would offer greater ex ante reassurance for investors in the event of an ABS- or CB-issuing bank default. In addition, as discussed above, the fact that centralised data on the network of structured finance counterparty services was not available until now may mean that both banks and investors have themselves been unaware of the extent of close links across this area of the financial system.

A key consideration is how to translate network links (which either exist or do not exist) into financial exposures. Working with exposure amounts helps gauge the financial impact of a structured finance counterparty default on a transaction (i.e. to provide a basic estimate of the replacement cost for that counterparty service). Unfortunately, obtaining this information for specific counterparty relationships within a programme is not straightforward. First, arrangements may be relatively complicated to quantify, as is often the case with swaps (e.g. due to clauses on fees, notional coverage, maturity, collateral requirements and replacement triggers). Second, issuers or third-party service providers may decide to make their arrangements confidential, which appears to be particularly the case for covered bonds (as shown in Table 2 above). Third, although some information on amounts due/received is available in ABS investor reports, the lack of harmonisation of this information is a challenge. Nevertheless, the amounts due to service providers in 138 ABS investor reports were reviewed across several European jurisdictions, in order to obtain a sense of the exposure/replacement cost amounts for the services mentioned in Table 1. As a result, a fixed factor of 0.5% was set as a rough estimate for every service provided to a programme. This factor is then applied to the outstanding amount of the senior tranches (for ABSs) or of the programme (for CBs), and will be used in the time series analysis in Section 4.²⁰ It is emphasised that this exposure estimation measure is imperfect, and is used sparingly in the paper (for example, the network graphs displayed above are weighted by number of links, not by exposure). However, it suffices as an initial illustration for the purpose of this paper, which is to provide a different perspective

¹⁹ This is not to suggest that intra-banking-group structured finance counterparty services are necessarily priced uncompetitively. It may also be the case that entities within the same banking group have economies of scope (for example arising from common accounting systems, harmonised data platforms, and fewer search and information costs) that translate into lower costs for the provision of the same service. However, the greater the issuer's reliance on either itself or entities within the same group, the less reassurance there is that suitable replacements can be found quickly. This situation is particularly problematic for large programmes where few financial firms may have the scale to provide certain replacement services (e.g. swaps). This is discussed further in Section 4.4 below.

²⁰ For example, if an ABS issuer (i.e. an ABS originating bank) hires a third-party firm to act as an account bank, and the senior tranche of that ABS is worth EUR 100 million, then the exposure of the account bank to the ABS issuer (in the event of bankruptcy) would be EUR 500,000. This EUR 500,000 figure constitutes a rough estimate of the net present value of fees to be paid by the ABS issuer to the account bank provider (i.e. the value of the contract). As previously mentioned, only senior ABS tranches are eligible for Eurosystem collateral, thus mezzanine and junior tranches are not included in the calculations of outstanding amounts in this paper. Although this is not ideal, it is also noted that senior ABS tranches are typically by far the largest class of tranches in an ABS programme (accounting for roughly 80-90% of the programme size on average).

from which to consider structured finance instruments. Developing more precise estimates of exposure/replacement costs is a job for future research.

4 Benchmarking EU structured finance counterparty networks

There is no benchmark which can be used to determine whether the extent of “close links”²¹ in structured finance counterparty services is “high” or not – beyond the expectation of which key roles should ideally be fulfilled by non-affiliated firms. The following sub-sections place the structured finance counterparty network in a broader context, in order to highlight the distinctive features of this set of relationships. Some measures commonly used in the financial network literature are also presented and discussed.

4.1 Evolution of close links

Chart 8 compares the structured finance network against the network of bank-issued ABS and CB collateral pledged by eligible counterparties in Eurosystem credit operations, using weekly data from 29 August 2008 to 16 March 2017. The chart reflects the corresponding share (in terms of value) of ABS and/or CB collateral issued by a bank and pledged to the Eurosystem either by that bank itself or by an entity in the same banking group. The chart uses this measure as a benchmark against the share (in terms of value) of close links between ABS and/or CB issuers and their structured finance service providers at the same date. Thus, for both series, each point on the line displays the total value of the close links (in terms of either counterparty services or collateral pledged) in the numerator, normalised by the total outstanding value of all high-importance ABS and CB services provided (for the counterparty services series) or structured finance collateral pledged (for the collateral line). As discussed at the end of Section 3, the EUR values used in the structured finance counterparty calculations are determined using an assumed factor for the exposures (0.5%) multiplied by the eligible outstanding amount of the ABS senior tranche or the covered bond at the date.

Chart 8 suggests that, until about December 2011, close links were more prevalent in ABS and CB structured finance services than in ABS and CB collateral pledged to the Eurosystem. There is a seemingly high share of close links in structured finance counterparty services (about 65-70% for the system). However, the share of closely linked ABS and CB collateral rose sharply during 2008-2011, and has since stabilised at an even greater percentage, about 75%. To

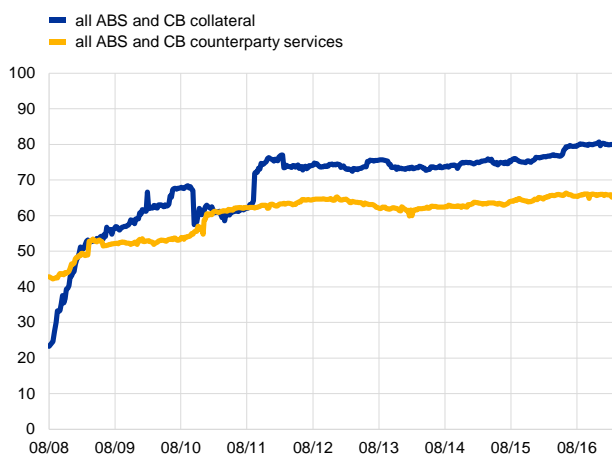
²¹ As discussed above, “close links” refers to a situation where an ABS or CB issuer relies either on itself or on entities within its banking group to provide structured finance services such as interest rate swaps and account bank services.

give a better idea of what is driving this evolution, disaggregated series are presented in the following chart.²²

Chart 8

Close links in structured finance services and collateral networks

(y-axis: share of exposures at a given week that are to entities within the same banking group; x-axis: collateral submission date)

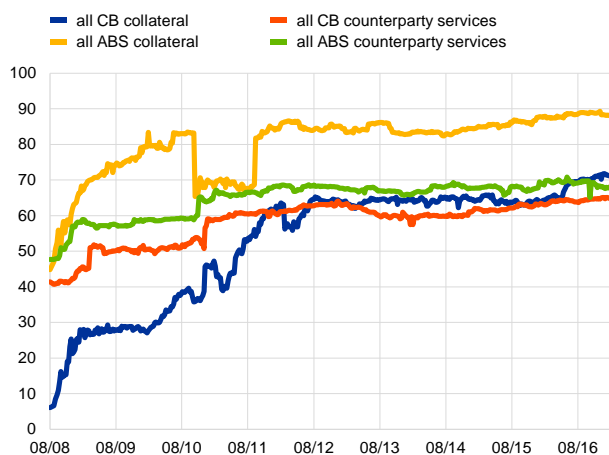


Sources: Moody's, Standard & Poor's, Fitch Ratings, DBRS, Bloomberg, Intex, transaction documents, authors' calculations.
Notes: the "all ABS and CB collateral" line represents the share of ABS and CB collateral that is pledged by closely linked entities relative to the total amount of ABS and CB collateral pledged at that date. Here, "close links" refers to a situation where either an ABS or CB issuer pledges its own collateral with the Eurosystem or an entity within the same banking group pledges that issuer's ABS or CB with the Eurosystem. The series represents weekly observations, starting from 29 August 2008 and running up to 16 March 2017. The "all ABS and CB counterparty services" line indicates the aggregate value of ABS and CB services provided to closely linked entities for structured finance services with an importance score of three or higher (see Table 1 above). This aggregate value is then normalised by the total outstanding value of all high-importance ABS and CB services provided to produce the line. The EUR values are determined using an assumed factor for the exposures (0.5%) multiplied by the eligible outstanding amount of the ABS senior tranche or the covered bond at the date.

Chart 9

Close links in structured finance services and collateral networks – by asset class

(y-axis: share of exposures at a given week that are to entities within the same banking group; x-axis: collateral submission date)



Sources: Moody's, Standard & Poor's, Fitch Ratings, DBRS, Bloomberg, Intex, SNL Financial, ECB databases, authors' calculations.
Notes: same interpretations as in Chart 8; here the "all ABS and CB collateral" line has been split into CB collateral and ABS collateral, while the "all ABS and CB counterparty services" line is split into CB and ABS counterparty services.

Chart 9 focuses on ABS and CB collateral, as well as on the corresponding ABS and CB counterparty services, at a disaggregated level. It is clear that the largest extent of close links has consistently come from ABS collateral, while CB collateral has mirrored the trend observed in Chart 8 for ABS and CB collateral. Against this background, ABS and CB counterparty services appear relatively stable over time as regards the financial amount of close links in the provision of important services, despite the large changes in issuances and amounts outstanding of these

²² Although it is not the primary focus of the paper, it is recalled that the ECB announced the first covered bond purchase programme (CBPP1) in May 2009, which is believed to have subsequently supported the development of several new covered bond markets in the euro area. Before 2009, fewer programmes are observed, with a greater reliance on a small set of service providers across the entire covered bond universe. From 2009 onwards, more local networks appear to have formed (though not necessarily within a single country). However, as shown in Chart 9, this evolution in the network following the introduction of CBPP1 does not appear to have significantly impacted the reliance of issuers on closely linked entities: this reliance remained at comparable levels before and after the announcement of CBPP1. Overall, these findings suggest some tentative evidence for CBPP1's impact on the composition of euro area covered bond markets. However, a more complete analysis of this point is beyond the scope of this paper. Graphs of these results are available from the authors on request.

instruments since 2008.²³ This suggests a structural (i.e. largely time-invariant) preference among issuers for certain important roles to be fulfilled either by themselves or by entities within their banking group. Moreover, unlike ABS and CB collateral (the yellow and blue lines, respectively), there does not appear to be a particular distinction between ABSs and CBs in terms of close links for crucial counterparty roles over time (i.e. the green and red lines move together), despite the fundamental differences between the two instrument types discussed in Box 1 above.

4.2 Degree distribution and close links

One common measure used to analyse financial networks is the number of connections between entities in the network, otherwise known as the degree.

Comparing the degree of each entity in the network yields a distribution of connections, which can be examined at different points in time for the structured finance service provider network. Chart 10 displays a snapshot of the degree distribution for all local connections (i.e. not aggregated at banking group level) as at 16 March 2017. As in previous charts, the figure only includes links representing services that should be externally provided and are crucial for the performance of structured finance programmes. Chart 10 illustrates the highly skewed distribution of connections that exist between firms in the network for structured finance services: a few firms seem to be active, while most are not very active or not active at all.²⁴ From the perspective of network analysis, this would seem to suggest that the health of a few large financial firms is vital to the smooth functioning of EU structured finance markets.

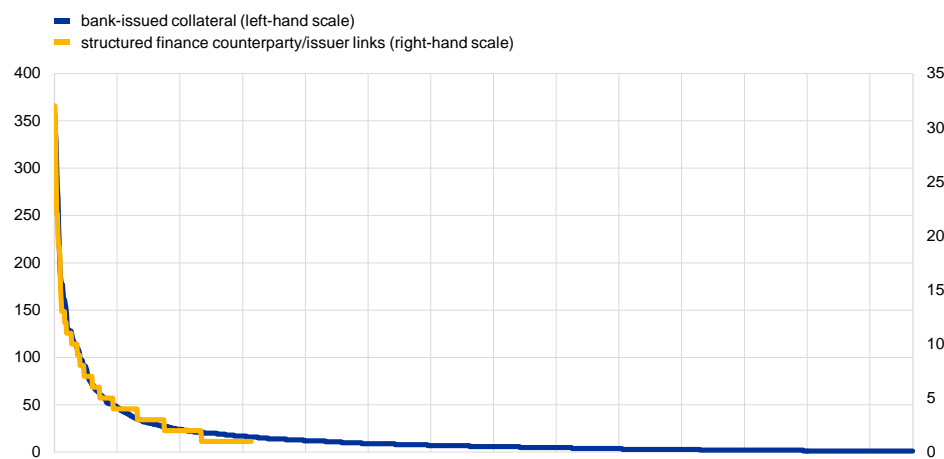
²³ As regards ABS collateral in Chart 9, the relatively sharp fall in close links in late 2010 and subsequent increase in late 2011 can also be traced to changes in the Eurosystem's collateral requirements. First, Guideline ECB/2010/1 of 4 March 2010 required that, as of March 2011, senior ABS tranches carry ratings from at least two accepted external credit assessment institutions, which should both be at "AAA"/"Aaa" level at issuance and at "single A" level over the life of the security. At a later stage, Decision ECB/2011/25 of 14 December 2011 expanded the set of eligible ABSs in order to ensure sufficient collateral availability to match the additional three-year longer-term refinancing operations decided on 8 December 2011 (while maintaining appropriate risk mitigation measures). It would therefore appear that lower-rated ABSs that could not comply with the minimum rating requirements set out in ECB/2010/1 had a higher share of close links. At the same time, the increased standardisation and transparency of ABSs, thanks in part to the ABS loan-level initiative, helped justify a reduction in haircuts and rating requirements for these instruments in July 2013, suggesting that haircuts remain an effective tool to mitigate risks associated with high close links in ABS collateral.

²⁴ In the financial networks literature, the degree distribution in Chart 10 represents a "scale-free" network.

Chart 10

Degree distribution for structured finance counterparty/issuer links and bank-issued collateral pledger/issuer links – as at 16 March 2017

(primary and secondary vertical axes: number of links; x-axis: entities (not shown))



Sources: Moody's, Standard & Poor's, Fitch Ratings, DBRS, Bloomberg, Intex, transaction documents, authors' calculations.

Notes: Degree measures all incoming and outgoing connections between issuers and counterparties. The measurement is at the local level (i.e. not at banking group level). As regards structured finance counterparties, only structured finance services with an importance score of three or higher (see Table 1 above) are counted as links. Bank-issued collateral refers to ABSs, CBs and Uncovered Bank Bonds (UBBs). Note that the horizontal axis is not shown as entities are numbered and this would have no meaning.

However, it is important to highlight that the degree distribution measure, though still informative, has less significance in this context than in other types of financial networks. This is because structured finance issuers have the potential to provide key counterparty services themselves, in contrast to networks of financial exposures that cannot be self-referenced (such as interbank markets or credit default swaps). Indeed, from the perspective of the riskiness of the structured finance network, the source of risk may well lie elsewhere than in the connections between counterparties.²⁵ For example, research on interbank markets has often focused on the vulnerability of banks to common shocks or idiosyncratic bank failures (see, for instance, Caccioli et al. (2013), Battiston et al. (2012), Cifuentes et al. (2005), Langfeld and Soramäki (2014) and Lenzu and Soramäki (2012)). Acemoğlu et al. (2015) consider the possibility that fewer connections may be preferable, from a systemic risk perspective, when shocks to the banking network are large (and that more inter-related networks resist better to smaller shocks). Inter-firm vulnerabilities may well also exist in EU structured finance counterparty markets. However, the fact that structured finance issuers may play important roles in their own programmes introduces an additional channel of risk for the continuity of

²⁵ Computing a single network-wide statistic for the degree also has drawbacks. Such a measure would not capture the risk sources that are a key focus for structured finance programmes, namely the extent of key roles being provided by issuers themselves or by affiliated entities.

structured finance instruments that cannot be directly measured by the degree distribution.²⁶

Other common network measures, such as the betweenness and closeness estimates, have similar shortcomings for this analysis and are not presented here.²⁷ For example, the betweenness measure has difficulty accounting for services provided by an issuer to itself, because only non-zero paths are counted, which essentially means that one of the most noteworthy features of structured finance services networks is not adequately captured.²⁸ One could consider the distance of firms from one another (i.e. the “closeness”: the number of “steps” necessary to reach other firms). However, this measure is not well defined when the network contains disconnected components, in other words issuers who do not have connections to any structured finance counterparties and instead fulfil crucial roles themselves. As discussed above (see Chart 3), there is a non-negligible portion of the structured finance counterparty network that is disconnected.²⁹

Moreover, this paper does not consider the aggregate network-level statistics of degree, betweenness and closeness using the value (i.e. strength) of connections between entities. This is due to the difficulty of establishing, for weighted networks, the theoretical maximum of the respective measure (e.g. degree) across all possible networks with the same number of entities.³⁰ Such a maximum is not well defined for networks of the type analysed here, because there are many ways a “maximum” strength of connections between entities could be defined. For example, the theoretical maximum could be based on all possible permutations of the original strengths of connections, with the result being a highly skewed (in terms of value) set of connections. Alternatively, the theoretical maximum could be set to arise from a set of connections whose value has been distributed with equal weight across the entities in the network (i.e. uniformly distributed).

²⁶ One could also compare the degree distributions excluding and including “self-loops” (i.e. issuers that use themselves for structured finance counterparty services). However, considering degree with “self-loops” would appear inferior to the ratio of close links discussed in the previous section, since merely comparing degree distributions would also miss out an intermediate and important potential source of risk: connections between issuers within the same banking group. Overall, the degree measure in this context appears too high-level to capture the relevant types of connection in the present network. This is also why the paper does not include more discussion of network-level degree measures (such as the Freeman centralisation) that are usually highly relevant in the study of financial networks.

²⁷ Results are nevertheless available on request.

²⁸ For a chosen node, betweenness measures the number of shortest paths between any two other nodes in a network passing through the chosen node, relative to the total number of shortest paths between the two same nodes. This measure is then aggregated over all possible pairs of nodes besides the chosen node.

²⁹ One could in principle compute the closeness of the entities in the structured finance counterparty network that are part of the largest connected component. However, this is omitted given that, as discussed above, a core source of risk arises from unconnected components.

³⁰ Such a maximum would then be the benchmark against which the chosen network-level measure would be compared. In principle, one could establish a theoretical maximum by ignoring the weights of connections between entities, however for the present purposes this would seem to miss out too much information, such as the strength of the close links between issuers and affiliated entities.

4.3 Assortative mixing

This section delves into the potential for ABS or CB issuers to themselves provide structured finance services to other issuers, as well as for structured finance service providers to themselves rely on services provided by firms that are also ABS or CB issuers. Essentially, this section compares the correlation of links between individual entities, attempting to examine the correlation between individual entities' links. Chart 11 compares the structured finance counterparty network and the previously discussed ABS and CB collateral network once more in terms of assortativity, which is the tendency across the system for similar entities to be connected with other similar firms – the tendency for “like to be connected with like”, in terms of a given property (Newman (2002)). The properties chosen here are the in-degree and out-degrees discussed in Adamic et al. (2017), who construct an Assortativity Index (AI).³¹

The AI measures the symmetry of clustering in the structured finance counterparty network. A positive AI suggests that one or both of the following situations are present in the network:

- Issuers of ABSs or CBs who use many non-affiliated structured finance service providers will themselves also tend to provide many structured finance counterparty services to issuers outside their banking group. This can be thought of as a “clique” of highly interconnected non-affiliated entities.
- Issuers of ABSs or CBs that rely on few non-affiliated structured finance service providers (i.e. either fulfil the necessary counterparty roles themselves or use entities in the same banking group) will tend to provide few counterparty services to issuers outside their banking group. This suggests a collection of entities with few connections beyond their group (“family”) but a rich set of connections within each group – a form of “self-sufficiency”.

In contrast, a negative AI indicates that one or both of the following situations are present in the network:

³¹ Assortativity is defined over the interval [-1,1] and is denoted

$$AI = \frac{1}{4} \left(\left(\rho(k_i^{to}, k_j^{to}) + \rho(k_i^{from}, k_j^{from}) \right) - \left(\rho(k_i^{from}, k_j^{to}) \rho(k_i^{to}, k_j^{from}) \right) \right)$$

Given an ABS or CB issuer i and structured finance service provider j :

- k_i^{to} refers to the number of ABS or CB issuers to which issuer i is supplying structured finance services (which is weighted by the total value of counterparty services provided by issuer i);
- k_i^{from} refers to the number of ABS or CB issuers from which issuer i is receiving structured finance services (which is weighted by the total value of counterparty services received by issuer i);
- k_j^{to} refers to the number of unique issuers to which service provider j is providing structured finance services (which is weighted by the total value of services provided);
- k_j^{from} refers to the number of unique issuers from which service provider j is receiving structured finance services (which is weighted by the total value of services received).

The terms $\rho(\dots)$ denote the correlation between these different degrees, calculated over all unique pairs of firms in the network.

- Issuers of ABSs or CBs that use many non-affiliated structured finance service providers will not often provide counterparty services themselves to other ABS or CB issuer banking groups.
- Issuers of ABSs or CBs that use few non-affiliated structured finance service providers will often tend to provide many counterparty services to other non-affiliated ABS or CB issuers.

For simplicity, a positive AI is referred to as displaying a network of either “cliques” or “self-sufficiency” (depending on which of the first two situations holds), while a negative AI is referred to as displaying a network of “relative specialisation”.

As with the degree measure, the Assortativity Index considers only linkages beyond the issuer. This implies that the measure cannot capture all of the salient features of the network as discussed in the previous section, although the measure is still instructive when examining the correlation between links. Moreover, the measure presented below has been produced at the level of each entity’s banking group, and therefore accounts only for linkages across banking groups (in contrast to the close links discussion in the previous sections). This is an important distinction to bear in mind as, in effect, the present AI provides a description of dispersion only for relationships that are beyond the issuer’s banking group.

Assortativity can also be used to examine Eurosystem collateral networks, by considering which instruments are eligible as collateral for Eurosystem credit operations and which instruments are actually pledged by banks with the Eurosystem. In this context, a positive AI suggests that banking groups pledging many items of collateral issued by non-affiliated issuers will themselves issue collateral that is popular among other banks seeking collateral to pledge.³² In contrast, a negative AI suggests that banks pledging many items of collateral from other non-affiliated issuers will themselves issue collateral that is not widely pledged by banks outside their banking group.³³

Chart 11 suggests that, from 2008 to 2012, structured finance counterparty networks involved both “cliques” and “self-sufficient” relationships. In other words, issuers frequently seeking services from non-affiliated counterparties tended to often provide services themselves to other non-affiliated counterparties, while issuers that preferred to rely on entities within their own banking group for counterparty services were generally less in demand as service providers from ABS and CB issuers outside their banking group. However, Chart 11 also shows that this

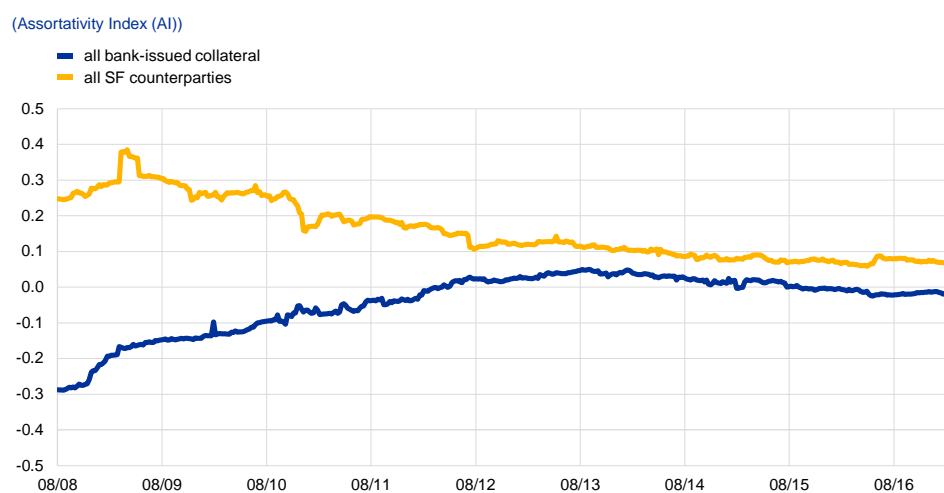
³² A positive AI can also describe a network where banks that mostly pledge their own issuances as collateral with the Eurosystem (“high own users”) have few other non-affiliated banks seeking to pledge the collateral issued by these “high own users”. However, this second case of a positive AI is tautological: banks whose collateral pledged with the Eurosystem is mostly issued from within the same banking group will naturally have fewer remaining issuances available in the financial system for other non-affiliated entities to pledge as collateral.

³³ A negative AI could also, in theory, mean that banks pledging mostly their own issuances as collateral with the Eurosystem tend to issue collateral that, when it has been sold off by the bank to a non-affiliated entity (i.e. not retained for use with the Eurosystem by that banking group), is widely sought after. However, this is necessarily a small share of collateral movements, since by definition there is little collateral available by such “high own use” banks for use by other banking groups in the system. We therefore do not discuss this possible interpretation of a negative AI in the subsequent paragraphs.

trend has declined over time and, since early 2012, has stabilised at a relatively low level. Taken together with Chart 8 above, which shows a sustained high share of close links, this suggests that fewer “cliques” exist among non-affiliated structured finance counterparty providers and users: non-affiliated structured finance service providers are less frequently issuers of ABSs and/or CBs that rely on many non-affiliated service providers. At the same time, Chart 8 and Chart 11 together suggest that there remains a high proportion of banking groups that are “self-sufficient” in terms of structured counterparty service provision and usage, although the rise of back-up servicing requirements may also have helped to dilute this self-sufficiency.

Chart 11

Assortativity among structured finance issuers/counterparties and bank collateral users/issuers



Sources: Moody's, Standard & Poor's, Fitch Ratings, DBRS, Bloomberg, Intex, transaction documents, authors' calculations.
 Notes: Only structured finance services with an importance score of three or higher (see Table 1 above) are counted. Bank-issued collateral refers to ABSs, CBs and UBBs. Entities (either structured finance counterparties or banks) are clustered at the level of each banking group.

In contrast, the network of eligible bank-issued collateral displayed a “relative specialisation” structure, particularly during 2008-2010. That is, banks issuing relatively less popular collateral tended to pledge collateral issued by widely sought-after banks in other banking groups. This structure has declined over time, however: from 2012 onwards the collateral network has displayed a less skewed allocation between collateral users and providers. One possible explanation for this relative reduction in negative AI (i.e. a reduction in “disassortative mixing”) can be found in the measures taken by the Eurosystem to increase the amount of available eligible collateral – which were in part oriented towards ABSs – while at the same time providing extensive amounts of liquidity to eligible counterparties. In addition, recalling the high share of close links shown in Chart 8 above, the situation since 2012 may also suggest that many banking groups have tended to rely substantially on collateral issued by their own banking group (which, as discussed above, would not be captured in the assortativity measure). Although conceptually distinct (due to the focus on borrowing from a single liquidity provider entity – the Eurosystem), these findings for bank collateral networks are in line with the changing relationships

between “core” and “peripheral” banks observed by Fricke and Lux (2015), Anand et al. (2014), and Langfield et al. (2014), among others.³⁴

4.4 Retention for use as collateral

Chart 8 and Chart 9 above presented a time series of close links. This section explores the relationship between close links in terms of structured finance services, close links in terms of collateral pledging, and programme size. The aim here is to combine several previous discussions, by examining whether there is a relationship between, on the one hand, the tendency for ABS or CB issuers to have a high share of structured finance services provided by entities within the same banking group and, on the other hand, the tendency for those same ABS and CB issuers to pledge their own instruments as collateral with the Eurosystem. The analysis is conducted at the level of banking groups, in line with the general approach for considering close links.³⁵

Chart 12 presents a “snapshot” of the situation as at 20 March 2013. The chart displays the overall outstanding amounts of structured finance programmes as at 20 March 2013. The chart also segments the population of issuer groups into two categories: those whose structured finance programmes were primarily retained for use as collateral with the Eurosystem at that date (yellow circles) and those whose structured finance programmes were not retained (blue circles). The share of close links in structured finance services is also displayed (horizontal axis), as well as the number of programmes issued by the groups (larger circles indicate more outstanding programmes).

Chart 12 suggests a positive relationship: issuer groups with more outstanding structured finance programmes tend to have a greater share of structured finance services provided by entities within the same banking group, and also tend to retain more of those programmes for their own usage as collateral with the Eurosystem. Put differently, it appears that issuers of primarily retained programmes, compared with issuers of primarily non-retained programmes with roughly the same overall total outstanding volume, rely more frequently either on themselves or on entities within their own banking group for high-importance ABS and CB counterparty services. At the same time, there appears to be a negative (though weak) relationship between the number of an issuer group’s outstanding programmes (circle size) and the share of close links in high-importance structured finance services. Chart 13 presents the same picture exactly four years later – as at 16 March 2017 – and suggests a stronger positive relationship between close links for high-importance structured finance services, retention for use as collateral and total volume of issuances.

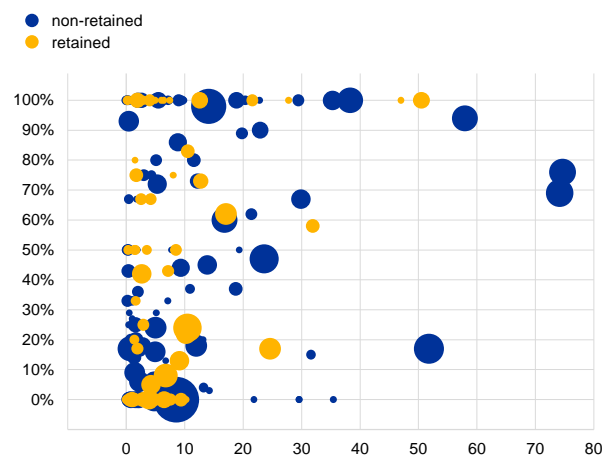
³⁴ See also Alves et al. (2013) for a useful discussion of core/periphery structures for interbank markets, as well as references to further studies.

³⁵ As in the previous sections, if an issuer is not part of a larger banking group, then that issuer is also included in the analysis.

Chart 12

Close links in structured finance services, outstanding volumes, and retained use as Eurosystem collateral – as at 20 March 2013

(x-axis: total eligible outstanding amounts (EUR billion); y-axis: share of structured finance services that are closely linked; circle size: number of deals issued by the issuer banking group)



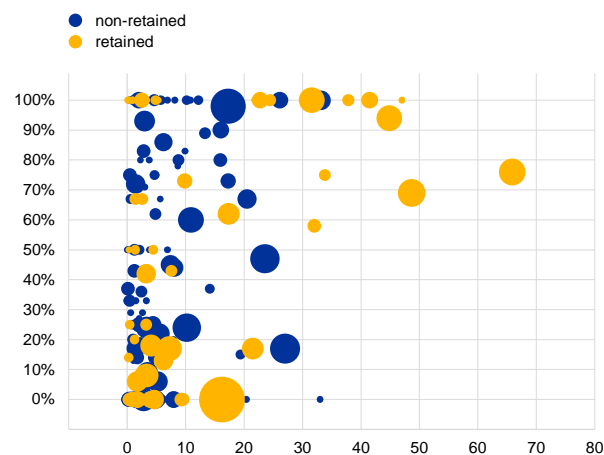
Sources: Moody's, Standard & Poor's, Fitch Ratings, DBRS, Bloomberg, Intex, ECB databases, authors' calculations.

Notes: each circle represents an issuer banking group. Retained issuances are calculated as the sum of all amounts of ABS and CB programmes issued by the banking group and pledged by that same issuer banking group as collateral with the Eurosystem. A circle is considered to be "retained" when the total retained issuances pledged represent at least 50% of the total outstanding eligible amounts of all ABS and CB issuances by that banking group at the snapshot date in question. The vertical axis represents the share of ABS and CB structured finance services that are performed by either the issuer itself or entities within the same banking group as the issuer, relative to the total number of highly important ABS and CB services in that issuer group's outstanding programmes at that snapshot date. Only services which have an importance score of three or higher and should be provided by a non-affiliated entity (see Table 1 above) are counted.

Chart 13

Close links in counterparty structured finance services, outstanding volumes, and retained use as Eurosystem collateral – as at 16 March 2017

(x-axis: total eligible outstanding amounts (EUR billion); y-axis: share of structured finance services that are closely linked; circle size: number of deals issued by the issuer banking group)



Sources: Moody's, Standard & Poor's, Fitch Ratings, DBRS, Bloomberg, Intex, SNL Financial, ECB databases, authors' calculations.

Notes: each circle represents an issuer banking group. Retained issuances are calculated as the sum of all amounts of ABS and CB programmes issued by the banking group and pledged by that same issuer banking group as collateral with the Eurosystem. A circle is considered to be "retained" when the total retained issuances pledged represent at least 50% of the total outstanding eligible amounts of all ABS and CB issuances by that banking group at the snapshot date in question. The vertical axis represents the share of ABS and CB structured finance services that are performed by either the issuer itself or entities within the same banking group as the issuer, relative to the total number of highly important ABS and CB services in that issuer group's outstanding programmes at that snapshot date. Only services which have an importance score of three or higher and should be provided by a non-affiliated entity (see Table 1 above) are counted.

On its own, this situation could suggest a number of risks. In particular, the ability to ensure the smooth repayment of an ABS or CB following an issuer default could be complicated if many important structured finance services in these programmes were provided by either that issuer or affiliated entities. Exacerbating this situation – from the Eurosystem's perspective – are the relatively large amounts of such programmes being pledged as collateral by the issuer or affiliated entities.

The next section turns to the tools available to the Eurosystem to help mitigate these risks.

5 A Eurosystem perspective on these findings

The Eurosystem is well aware of the potential risks posed by these counterparty concentrations, and has established a number of risk control measures to protect itself against these risks. For example, for primarily retained ABSs or CBs, the Eurosystem will respond to the lack of a representative market price by defining a theoretical price and, furthermore, applying an additional valuation haircut in the form of a valuation markdown of 5%.³⁶ Furthermore, an additional valuation haircut of between 8% and 12%, depending on the instrument rating, is applied to CBs that are retained by the issuer for its own use as collateral.³⁷

Moreover, the Eurosystem has explicitly ruled out close links that it deems categorically unacceptable among ABS and CB instruments. For example, counterparties may not pledge as collateral any ABSs if the entity itself, or any affiliated entity, provides a currency hedge to the programme.³⁸ In addition, ABSs that contain extremely high close links between the issuer and any entity providing liquidity support to the programme are also ineligible as collateral.³⁹

More generally, the Eurosystem conducts extensive internal monitoring of collateral usage, and retains the option to exercise discretion when accepting individual instruments as collateral, conditional on the prevailing monetary stance decided on by the Governing Council. These discretionary measures include applying supplementary haircuts to the collateral value, requiring additional guarantees from guarantors meeting the Eurosystem's credit quality requirements, and rendering the ABS or CB instrument in question ineligible for use as collateral in Eurosystem credit operations. Additional risk control measures may also be applied at the level of individual counterparties, if required.

As regards its asset purchase programme, the Eurosystem also takes a number of measures to ensure that it purchases instruments that meet its credit quality standards. Only ABSs and CBs that are eligible as Eurosystem collateral may be purchased by the Eurosystem under its purchase programmes (European Central Bank (2014a) and (2014b)), which ensures consistency between the above-mentioned discretion available to the Eurosystem and its purchasing decisions. In addition, appropriate due diligence is conducted on ABSs prior to purchasing. The Eurosystem has published guiding principles to illustrate its preferences as regards the ABSs it considers for purchase under the ABS purchase

³⁶ Article 4(a) of European Central Bank (2015c).

³⁷ Article 4(b) of European Central Bank (2015c).

³⁸ Article 140 of European Central Bank (2015d).

³⁹ Article 142 of European Central Bank (2015d).

programme (ABSPP), which also reflect the due diligence experience it has gained since the start of the ABSPP.⁴⁰

At the same time, ongoing regulatory efforts to provide clarity and reassurance on these linkages are to be welcomed. For example, the forthcoming EU Securitisation Regulation will enshrine a number of ABS transparency requirements in EU legislation. As part of the draft Regulation, the European Securities and Markets Authority (ESMA) will develop regulatory technical standards specifying what information must be made available by the originator, the sponsor and the special purpose entity of the securitisation.⁴¹ Furthermore, ABSs seeking to be treated as “simple, transparent and standardised” for regulatory purposes must set out how continuity of the programme’s servicing, hedge, liquidity and account bank provisions will be ensured in the event of an issuer default or other counterparty default or downgrade.⁴² Looking further ahead, the European Commission’s investigations regarding a European covered bond framework are also welcome (European Commission (2015b), European Central Bank (2016)).

⁴⁰ [Guiding principles of Eurosystem-preferred eligible ABSs.](#)

⁴¹ Article 5(3) of European Commission (2015a).

⁴² Article 9(6) of European Commission (2015a).

6 Conclusions

Structured finance instruments (ABSs and CBs) are an important source of Eurosystem-eligible collateral, as well as a key component of the Eurosystem’s asset purchase programme. Structured finance counterparties act to mitigate specific risks associated with ABSs and CBs. At the same time, counterparty services are not free and therefore present issuers with a trade-off between cost and credit resilience. This trade-off is reflected in the choice between providing such services themselves, obtaining them from an entity within the same banking group, or seeking fully non-affiliated support.

This analysis suggests that the vast majority of structured finance services are supplied by a few large providers. In addition, more than half of all structured finance issuers either provide key services (which should be obtained from non-affiliated providers) themselves to their own programmes or rely on closely linked entities. This may raise concerns about the continuity of these issuers’ programmes in the event of issuer default. This high share of services provided by closely linked entities appears to be driven especially by protection and account bank services. In contrast, issuers tend to use non-affiliated entities for roles relating to agency services and back-up servicing. In addition to being supported by the Eurosystem’s collateral eligibility requirements for back-up servicing, this tendency perhaps also reflects the natural economies of scope for firms providing these services.

From the perspective of widely used network measures, the structured finance counterparty network appears to display a highly skewed distribution of connections between financial firms (a “scale-free” structure). However, it is important to highlight that this distribution of connections has less meaning than in other types of financial network. This is because structured finance issuers have the potential to provide key structured finance services themselves, in contrast to networks of financial exposures that cannot be self-referenced (such as interbank markets or credit default swaps). Other common network measures (such as closeness and betweenness) suffer from similar drawbacks.

From a time series perspective, the extent of close links in ABS and CB services appears relatively stable over time, despite the large changes in issuances and amounts outstanding of these instruments since 2008. This suggests a structural preference among issuers either to provide certain important roles themselves or to use entities within their banking group. Moreover, when comparing the structured finance network against the network of bank-issued collateral pledged by eligible counterparties in Eurosystem credit operations, from 29 August 2008 to 16 March 2017, it is clear that the largest extent of close links has consistently come from ABS collateral.

The paper also illustrates a different form of concentration: the tendency to rely on a few non-affiliated firms, when ABSs or CB issuers do contract structured finance services from entities outside their banking group. This tendency is most apparent from 2008 to 2012, when ABS and CB issuers that hired

non-affiliated service providers tended to rely on a relatively concentrated set of non-affiliated firms. This trend has declined over time, and more recently has stabilised, suggesting that there is now less reliance on a “clique” of entities: for structured finance counterparty relationships that were not closely linked, the provision of those services tended to come from a wider array of counterparties. In contrast, eligible bank-issued collateral tended to observe a relatively specialised structure throughout much of 2008-2010: banks issuing relatively less popular collateral themselves pledged collateral that was issued by widely sought-after banks. This tendency has declined steadily, however, and suggests that the provision of bank-issued collateral has tended to become less concentrated among a set of “key” collateral suppliers. One possible explanation is the measures taken by the Eurosystem to increase the amount of available eligible collateral while at the same time providing extensive amounts of liquidity to eligible counterparties.

In addition, there appears to be a positive relationship between outstanding eligible amounts of structured finance programmes and retention as collateral with the Eurosystem. Moreover, it appears that issuers of primarily retained programmes, compared with issuers of primarily non-retained programmes with roughly the same overall total outstanding volume, rely more frequently either on themselves or on entities within their own banking group for high-importance structured finance services.

These findings help justify the measures available to the Eurosystem to mitigate the risks it faces when either accepting such ABSs and CBs as collateral or purchasing them in the APP. The Eurosystem has at its disposal a wide range of tools, including valuation measures, limit-setting and the explicit ruling-out of certain types of close links, as well as the option of exercising discretion when accepting certain instruments as collateral. Beyond the Eurosystem’s own tools, nevertheless, ongoing EU regulatory efforts to provide clarity and reassurance on these linkages are to be welcomed.

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