

Asset encumbrance and its relevance for financial stability

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Increased asset encumbrance in a number of countries has raised questions about the underlying driving forces and consequences of such trends for financial stability. This article argues that some increase in asset encumbrance is natural in distressed market conditions where investors demand more safety and there is an overall lack of safe assets. Yet asset encumbrance may be also driven by banks' strong private incentives to tilt their financing towards secured funding, with adverse effects on financial stability. The banks' failure to internalise liquidity effects, rating arbitrage, risk-insensitive deposit pricing, upcoming regulatory reforms and implicit government guarantees are leading banks to ignore some of the social costs associated with secured funding. Regulatory interventions should aim to encourage the issuance of unsecured funding and eliminate or mitigate regulatory imperfections. Among the recommended policy actions are increasing the transparency of asset encumbrance and changing the deposit insurance system to reflect asset encumbrance, as these measures do not require the assessment of a socially-optimal level of asset encumbrance that varies over time and across countries.

Introduction

The existing evidence shows that asset encumbrance, or using assets to secure claims, has increased markedly in a number of countries since 2005. This raises a host of questions that need to be answered. Why do banks prefer secured as opposed to unsecured funding? What are the consequences of asset encumbrance for investors, taxpayers and financial stability? Is there a case for regulatory interventions? And, if so, what regulatory tools should be used?

To answer these questions, the article first explains asset encumbrance and its most common sources. It then reviews the existing evidence on asset encumbrance, both in Sweden and abroad. The effects of asset encumbrance on the riskiness of different types of debts are then considered, together with potential reasons for why banks have increased asset encumbrance. Finally, the article discusses whether regulatory intervention is needed and what tools should be used.

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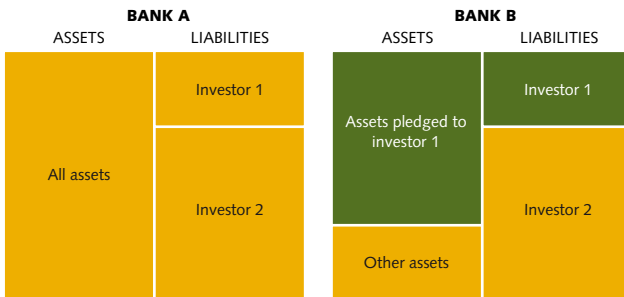
What is asset encumbrance?

To understand asset encumbrance, it is useful to start with a brief description of bank funding. Bank funding sources, such as deposits, market funding and capital, can be characterised by maturity, seniority and collateralisation. Maturity refers to the time period after which the security must be redeemed by the issuer. Seniority refers to the ranking of claims to the residual assets in the event of an issuer’s insolvency. Collateralisation refers to the existence or non-existence of assets that secure the claims in the event that an issuer fails to meet the claims.

It is the collateralisation feature of bank funding sources that gives rise to asset encumbrance. To secure or collateralise a claim, a bank must specify assets that creditors can possess in situations where the bank fails to honour its commitments. This process is typically called asset encumbrance, but can be also referred to as pledging or earmarking assets.

Asset encumbrance can be illustrated with a simple example of two banks (see Figure 1). In Bank A, all investors are uncollateralised or unsecured. Bank A is therefore said to have no asset encumbrance. In Bank B, the claims of investor 1 are safeguarded by the assets marked in green. The claims of investor 2 are left unsecured. Bank B is therefore said to have some asset encumbrance.

Figure 1. Unencumbered and encumbered bank



Sources of asset encumbrance

Asset encumbrance may originate from market funding, derivatives and insurance claims. It cannot originate from deposits or capital as these claims are of an uncollateralised nature (see Figure 2).

Two types of market funding can lead to asset encumbrance: short term secured funding, such as repos¹, and long-term secured funding, such as covered bonds. Types of market funding that do not lead to asset encumbrance include, for instance, commercial papers and senior unsecured bonds.

¹ Security borrowing is very similar to repos and can also lead to asset encumbrance. For simplicity, we consider security borrowing to be one class of repo. We also ignore the off-balance sheet encumbrance that arises with re-hypothecations associated with reverse repos.

Derivatives and insurance claims can also lead to asset encumbrance. Both derivatives and insurance claims can be thought of as debt instruments similar to those in market funding, but with some contingent features.

When derivatives are initiated, contracts are typically designed so that counterparties have no claims against each other at origination. But, as time passes, one of the counterparties typically accumulates claims against the other. To safeguard these claims, the debtor typically must post collateral, leading to asset encumbrance.

Figure 2. Sources of bank funding and asset encumbrance

DEPOSITS	Insured	Retail deposits
	Non-insured	Interbank funds
MARKET FUNDING	Short-term	Repos
		Commercial papers
	Long-term	Covered bonds
		Senior unsecured
CAPITAL	Tier 2	Subordinated
	Non-core Tier 1	Junior subordinated
	Core Tier 1	Common equity
DERIVATIVES		Interest rate swap
INSURANCE		Life insurance

Note. Sources of bank funding that can lead to asset encumbrance are marked in green.

Insurance contracts can be also collateralised and can thus lead to asset encumbrance. In a typical insurance contract, an insurance holder pays an insurance premium to an insurer for the period of the insurance coverage. These funds are then invested in assets which are usually earmarked to the benefit of insurance holders. Depending on the type of insurance, the insurer may increase asset encumbrance, either because the market value of insurance assets decreases while the corresponding insurance obligations are pre-determined or because the insurance obligations increase while the market value of assets does not.

Deposits and capital cannot lead to asset encumbrance. For deposits, this is despite the fact that some deposits have state guarantees. These guarantees mean that the owners of deposits are compensated in the event that a bank fails to meet its obligations. However, following this compensation, the state has a claim against the bank in the form of unsecured debt.

Even though bank capital may include some debt instruments in addition to equity, this does not lead to asset encumbrance. This is because the debt under capital is always

unsecured. The difference between unsecured market debt and debt classified as capital stems from their different levels of seniority.²

Needless to say, asset encumbrance can change over time. A bank's deliberate funding choices can provide one reason for this. A completely unencumbered bank can decide to issue secured funding, which means that its asset encumbrance increases suddenly. Asset encumbrance also changes over time due to factors beyond the bank's immediate control. For instance, a margin call from the derivatives' counterparty due to an unfavourable change in the underlying asset can lead to a sudden increase in encumbrance.

Data on asset encumbrance

Data on asset encumbrance is not readily available at either the bank or the country level. The evidence provided below is thus restricted to a limited number of countries and banks in Europe and excludes some sources of asset encumbrance such as insurance and derivatives.³

Both the level and growth of asset encumbrance have varied considerably in the European countries (see Figure 3). In 2005, the level of asset encumbrance was highest in countries with strong covered bond traditions, such as Spain and Germany.

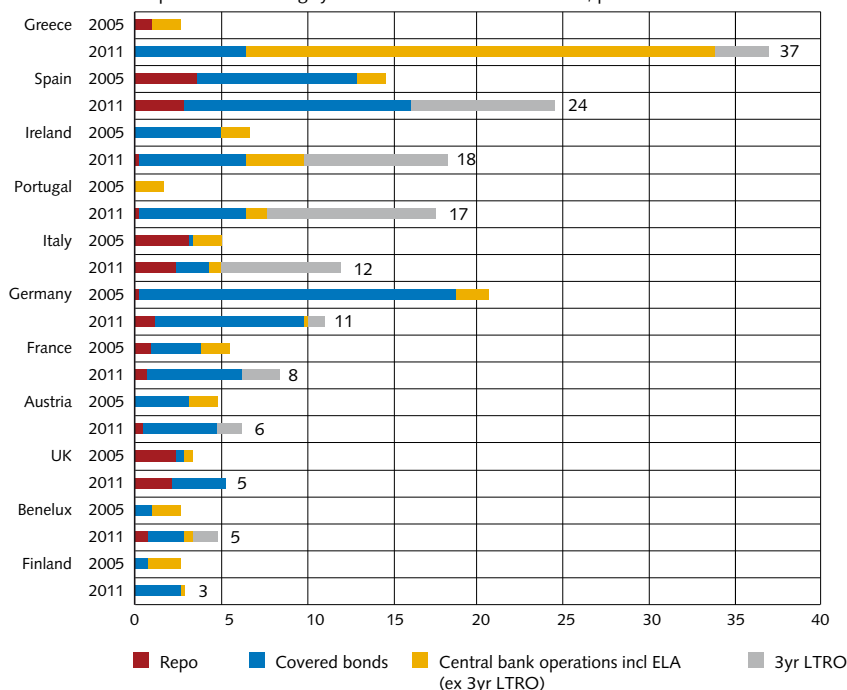
Between 2005 and 2011, asset encumbrance increased significantly in all sample countries except Germany.⁴ Even though the importance of covered bonds increased in Europe during this period, by 2011 the level of asset encumbrance was no longer highest in the traditional covered bond countries. Instead, asset encumbrance levels reached new heights in countries with problematic public finances, such as Greece, Spain, Ireland, Portugal and Italy. For these countries, the main source of asset encumbrance was repo funding associated with the liquidity assistance provided by the European Central Bank (ECB).

2 Seniority of a debt instrument determines the order of repayment in case of bankruptcy. In this example, all unsecured market debt gets paid before the debt that is classified as capital.

3 This data limitation should be kept in mind when comparisons across countries and banks are made. As illustrated by Dexia, derivatives represent an important source of encumbrance (see also Alloway 2011).

4 Asset encumbrance decreased in Germany between 2005 and 2011 due to the removal of state guarantees for German public banks in 2005.

Figure 3. Encumbrance trends in Europe
 Proportion of banking system balance sheet encumbered, per cent

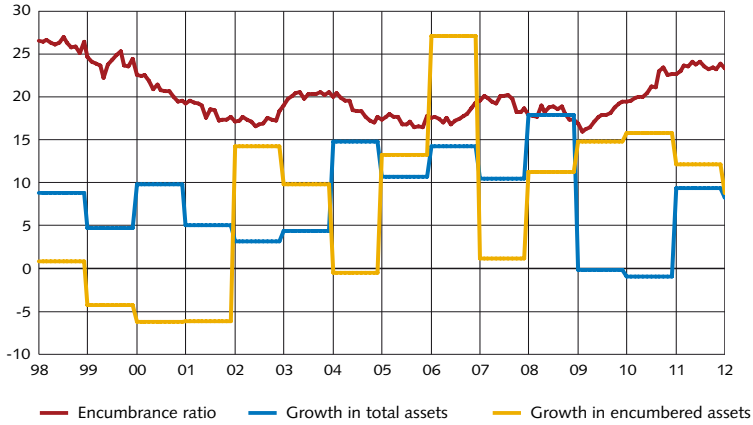


Note. LTRO and ELA stand for long-term refinancing operations and emergence liquidity assistance, respectively.

Source: Barclays Capital 2012.

In Sweden, system-wide encumbrance from covered bonds increased from 16 per cent in 2005 to 23 per cent in 2011 (see Figure 4). A clear upward trend started in 2009. Between 2009 and 2010, banks and mortgage institutions experienced zero growth in total assets. Nevertheless, the annual growth rate of covered bonds was around 15 per cent.

Figure 4. Encumbrance trend in Sweden
Per cent

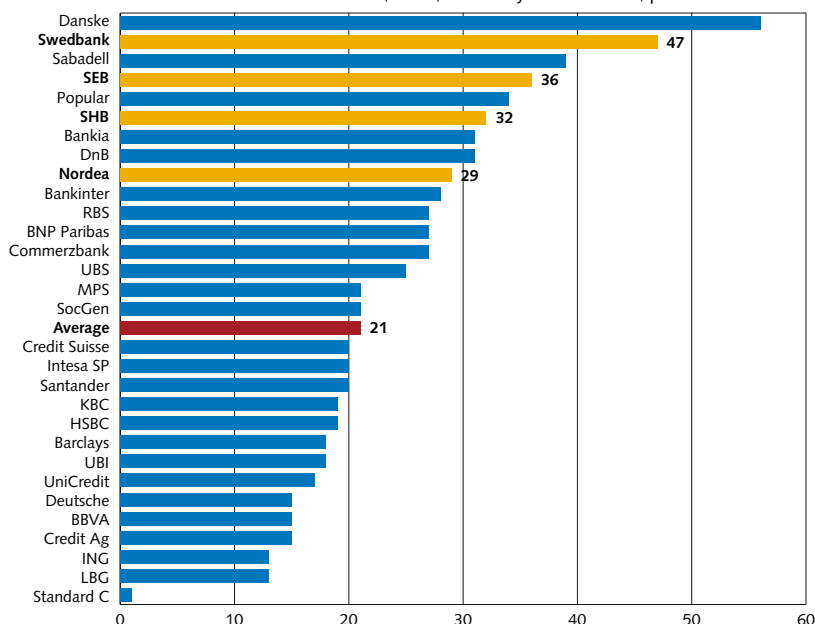


Note. Encumbrance ratio is a ratio of outstanding covered bonds to total assets adjusted for 30 per cent of over-collateralisation. This data includes the Swedish banks and mortgage institutions.

Sources: Statistics Sweden and the Riksbank.

Asset encumbrance tends to vary widely, not only across European countries, but also across European banks (see Figure 5). Consistent with the country-level evidence, banks headquartered in countries either with strong covered bond traditions (for example Danske Bank from Denmark) or problematic public finances (for example Sabadell and Bankia from Spain and Popular from Cyprus) tend to be at the top of the encumbrance list.

Figure 5. Asset encumbrance in European banks
 Encumbered assets to total assets, 2010, ranked by encumbrance, per cent



Note. This data refers to the end of 2010. Total assets exclude derivatives and encumbered assets exclude LTROs.

Source: Barclays Capital 2012.

It is also noteworthy that asset encumbrance also varies considerably across banks within a country. For instance, in Sweden, asset encumbrance varies between 30 and 50 per cent across the four largest banks.

Understanding asset encumbrance

The evidence in the previous section shows that asset encumbrance tends to vary systematically across banks and countries, and over time. In order to understand where such a systematic variation comes from and whether it poses a problem to financial stability, it is necessary to understand the effects of asset encumbrance.

EFFECTS OF ASSET ENCUMBRANCE: STRUCTURAL SUBORDINATION

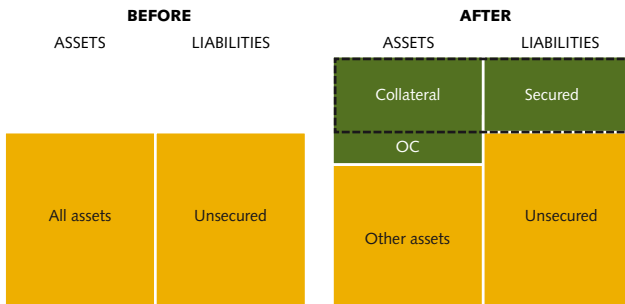
One of the effects of asset encumbrance is that it tends to shift risks to unsecured creditors, a process called structural subordination. Rational investors, however, do not need to be adversely affected since they can price in such increases in risk. Both of these statements are illustrated in the following section.

Figure 6 presents a graphical illustration of risk-shifting. Two balance sheets are shown, before and after the issuance of secured funding. The issuance of secured debt is somewhat

simplified here. It is assumed that the funds raised from secured funding are used to invest in assets which, in turn, are used as collateral for secured debt.

In this example, structural subordination of unsecured claimants takes place via two channels. Firstly, the issuance of secured funding is usually over-collateralised.⁵ This means that unsecured claimants finance some part of pledged assets or collateral. Secondly, even if the issuance of secured funding has no over-collateralisation, structural subordination usually takes place. As the value of collateral is usually risky, it may not be enough to satisfy the claims of secured investors. It is thus possible that some of the other assets could be used to satisfy the claims of secured creditors in the event of default. For both of these reasons, unsecured claimholders tend to be worse off after asset encumbrance increases. As will be illustrated below, structural subordination depends both on the degree of collateralisation as well as the relative share of secured and unsecured debt.

Figure 6. An issuance of secured funding



To understand the exact magnitude of risk-shifting, it is also useful to carry out a more rigorous analysis. In the following, we illustrate the effect of structural subordination for a hypothetical bank. We assume that secured and senior unsecured debts are the only funding sources available, and there is no equity. Asset encumbrance is captured by varying the ratio of secured debt to total assets and the degree of over-collateralisation. The bank is assumed to face a stress scenario in which its assets fall 20 per cent and it is forced to liquidate these assets.⁶

Recovery rates for unsecured and secured debt at different levels of asset encumbrance are presented in Figure 7. The average recovery rate is assumed to be 80 per cent, corresponding to a 20 per cent fall in assets.⁷ With no secured debt funding, the recovery rate for unsecured debt is equal to the average recovery rate.

As the share of secured debt in funding increases, the recovery value for unsecured debt falls below the average recovery rate, indicating that an additional risk is shifted to

5 Over-collateralisation is just another way to refer to haircut.

6 This fall in assets does not necessarily have to come from credit risk. It can also stem from the fact that the fire-sale values of these assets might deviate from the assets' fundamental values.

7 In professional terms, 20 per cent loss is called loss given default (LGD) and recovery rate is defined as one minus loss given default.

unsecured debt-holders. The recovery rate for secured debt also decreases, but it stays above the average recovery rate until secured debt is the only source of funding. Note also that the relation between recovery values for unsecured debt and the share of secured debt is non-linear. This means that the risk for structural subordination is larger for a bank with a high initial share of secured debt, as compared to a bank with a low initial share of secured debt to total funding.

Figure 7. Recovery rates and the share of secured debt to total funding in banks with no over-collateralisation

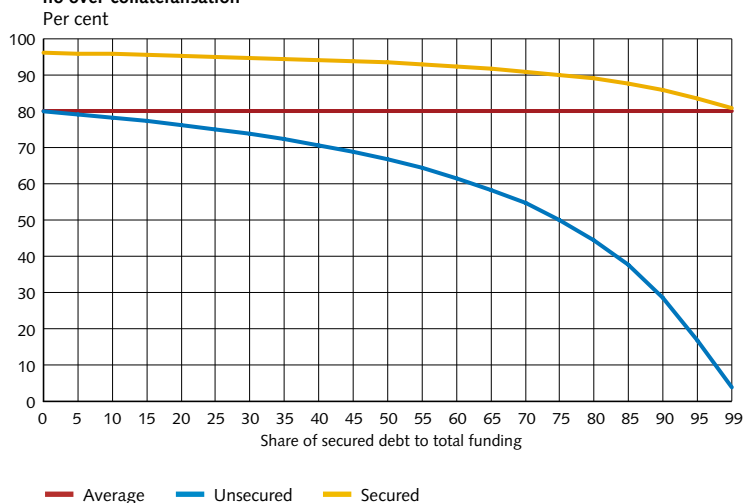
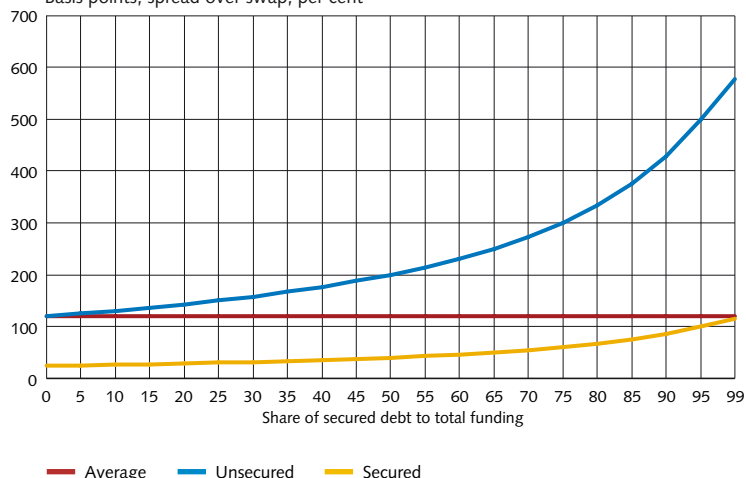


Figure 8 shows the effects of asset encumbrance on spreads for unsecured and secured debt.⁸ The calculation uses recovery rates from Figure 7. We can see that falling recovery rates from increased asset encumbrance lead to increased spreads for unsecured debt. Put another way, to compensate for the increases in risk stemming from asset encumbrance, a higher spread must be offered to investors holding unsecured debt.

⁸ This is done simply by multiplying loss given default by the risk-neutral probability of default, which we have assumed to be 6 per cent. Note also that an implicit assumption is that investors have all the information that is required to assess the riskiness of their claims.

Figure 8. Fair spreads and the share of secured debt to total funding in banks with no over-collateralisation

Basis points, spread over swap, per cent



To summarise, we have seen that asset encumbrance leads to structural subordination of unsecured claimants: their claims become riskier as asset encumbrance increases. We have also seen that rational investors can price in increased riskiness by requiring higher spreads. The analysis above can be recalculated for different levels of over-collateralisation, but the main implications remain unchanged (see Appendix).

As our analysis in this section is based on somewhat arbitrary parameter values, it is also worth mentioning how the analysis changes as parameter values change. Two parameters, the average recovery value for assets and probability of default, have direct implications for our results.

As assets are made riskier in terms of decreased average recovery value, structural subordination clearly increases: the gap between the average recovery value and the recovery value for unsecured creditors increases for any given level of asset encumbrance.

Increases in the probability of default do not affect the magnitude of structural subordination as defined above, but make the effects of asset encumbrance more relevant. In a situation where no bankruptcy ever takes place, recovery values clearly play no role. But as the probability of default increases, the effects of asset encumbrance become relevant for investors and are thus increasingly factored into spreads.

In conclusion, the effects of asset encumbrance on unsecured claimants are stronger at high levels of asset encumbrance (non-linearity) and at times of financial instability, when asset quality is low and the probability of default is high.

EFFECTS OF ASSET ENCUMBRANCE: LIQUIDITY RISKS

Secured funding and the resulting asset encumbrance can change also banks' liquidity risk, thereby affecting the banks' probability of default (see Figure 9). We focus here on two

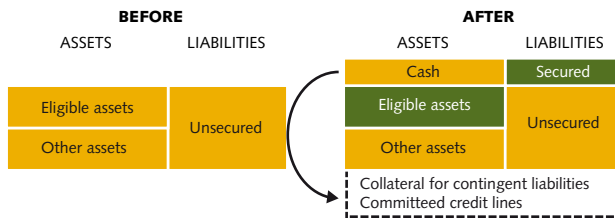
specific aspects of liquidity risks that relate to asset encumbrance and secured funding: the ability to obtain extra liquidity and the potential for increased outflows.

In the following, we ignore liquidity risks that relate to the stability of different funding sources (for example roll-over risks). The reason for this is that there is no *a priori* reason for why some funding sources are more stable than others. Indeed, certain imperfections, such as market segmentation, are necessary, and these imperfections are studied in the subsequent sections.

Unencumbered balance sheets allow banks to use eligible assets to obtain extra liquidity in the future, if needed (see Figure 9).⁹ In other words, low encumbrance of eligible assets acts as an unused liquidity buffer for banks which can be used for unexpected liquidity needs such as those from committed credit lines or margin calls related to derivatives.

It is important to note that the act of encumbering assets itself does not increase the probability of default. Indeed, the encumbrance of eligible assets tends to increase banks' cash holdings and thus helps decrease banks' immediate probability of default. But after a bank has made use of this extra cash holding, it will have a smaller liquidity buffer left to cover the remaining liquidity risks.

Figure 9. Liquidity risks and asset encumbrance



In addition to the banks' decreased ability to obtain extra liquidity, reliance on secured funding makes the banks' liquidity position more sensitive to changes in the underlying collateral. Whenever the value of collateral is decreased, the banks usually have to find additional collateral to offset this initial fall in the value of collateral. This contributes to the banks' liquidity risks during times of distress.

We conclude this section by highlighting the interaction between structural subordination and liquidity risks stemming from secured funding and asset encumbrance. Different funding sources usually have different maturity profiles. Consequently, encumbering assets and raising cash clearly benefits those investors in unsecured debt whose claims are maturing. Encumbering assets and raising cash may also benefit the remaining unsecured investors if the ultimate default is avoided by such encumbrance. In the event that the ultimate default cannot be avoided, the remaining unsecured debt holders are worse off as a result of such transactions, as the recovery value for their claims has decreased.

⁹ Traditionally, secured funding was meant to be used when funding could not be obtained in any other way (see Euromoney 2011).

Potential driving forces of asset encumbrance

The previous sections show that asset encumbrance leads to the structural subordination of unsecured creditors and can increase liquidity risks. This section takes these two effects as given and tries to understand the systemic variation of asset encumbrance across banks, countries and over time.

Dynamic aspects of asset encumbrance

As explained previously, low encumbrance of eligible assets can be viewed as an unused liquidity buffer. Given that banks act prudently in normal times, this extra liquidity buffer can and should be used in times of distress leading to counter-cyclical asset encumbrance.

Three main mechanisms lead to increased asset encumbrance in times of distress. Firstly, as the value or quality of existing collateral decreases, banks must post additional collateral to offset such a tendency. Secondly, confidence in banks usually falls in times of distress. This means that banks' counterparties may require a higher level of collateralisation in times of distress than in normal times. Thirdly, for some banks, unsecured markets may be closed entirely. In such circumstances, the only option for a bank may be recourse to secured markets.

Another potential driver of asset encumbrance over time may be changes in the demand for and supply of safe assets. Since the outbreak of the global financial crisis in 2008, investors' low risk appetite, together with a number of regulatory changes for banks, insurance companies and central counterparty clearing houses, has clearly contributed to increased demand for safe assets (see IMF 2012). At the same time, the collapse of high quality securitisation instruments, the sovereign debt crisis and the reduced re-hypothecation of collateral have decreased the supply of safe assets (see IMF 2012). In the light of these changes, the banks' issuance of secured assets represents the banks' response to the excessive demand for safe assets.

The recent changes in regulatory environment may also have contributed to asset encumbrance via their treatment of covered bonds. Many investors of bank debt enjoy extra benefits if they choose to invest in covered bonds instead of unsecured bank debt. The Basel III Accord partly allows the inclusion of covered bonds into the liquidity buffer in LCR. The Solvency II Directive requires insurance companies to hold less capital if they hold covered bonds as compared to unsecured debt. Central banks have typically lower haircuts for covered bonds than for unsecured debt (see, for example, ECB). Covered bonds are usually excluded from write-downs in many resolution frameworks, while unsecured debt is not (see, for example, the Danish system and the EU Commission's proposal on bail-in).

The dynamic aspects of asset encumbrance described above can account for some of the systematic variation in asset encumbrance observed in the data. For instance, the global financial crisis that started in 2008, together with the sovereign debt crisis, clearly seems to have contributed to the overall increase in encumbrance. Furthermore, the asymmetric allocation of the sovereign debt crisis in European countries also fits the observed increases in asset encumbrance across countries (for example Greece vs. Finland).

Structural aspects of asset encumbrance

This section focuses on asset encumbrance deriving from banks' structural preferences for secured funding. Before starting, it may be useful to recall that any risk-shifting that results from secured funding cannot, *per se*, be a driver of bank funding choice. Whenever a bank issues low-cost secured funding, this cost-saving should be exactly offset by higher spreads on unsecured debt, unless some imperfections exist that hinder such a mechanism.

Due to their safe nature, secured funding allows banks to cater to the needs of investors seeking safety. In the absence of secured funding, these investors would be forced to invest in riskier instruments than they would prefer. Thus secured funding lowers banks' funding costs, since banks escape offering the premium that would otherwise be required to attract these investors. In addition, when risks are allocated to the investors that are best suited to bear them, the roll-over risk for banks tends to decrease.

Another market imperfection that influences the banks' optimal balance of secured and unsecured funding is the possible uncertainty regarding the future encumbrance of the banks. Given that banks cannot commit to a certain level of asset encumbrance, unsecured creditors would price in such an uncertainty. As the riskiness of unsecured debt is more sensitive to changes in asset encumbrance than secured debt (see the section on structural subordination), banks can lower their funding costs by using secured as opposed to unsecured funding.

The possibility of catering to safe investors, the potentially lower roll-over risk and the relatively low sensitivity to future encumbrance all imply that the issuance of *some* secured funding can be optimal for banks. To identify their optimal funding structure, banks should balance these benefits of secured funding against the cost of secured funding, which mainly comes from increased liquidity risks from asset encumbrance (see the section on increased liquidity risks).

In reality, the optimal balance between secured and unsecured funding described above does not usually prevail due to implicit liquidity guarantees from central banks, the existence of risk-insensitive deposit insurance and potential rating arbitrage.

Implicit liquidity guarantees from central banks tilt banks' funding structures towards secured funding. In a systemic liquidity crisis, central banks usually provide extra liquidity to the system. This leads banks to ignore some of the liquidity risks from asset encumbrance, tilting bank funding toward secured funding.

Risk-insensitive deposit insurance is a clear driver of secured funding in banks with a large deposit base. The holders of senior debt and depositors face structural subordination in equal magnitudes in jurisdictions where deposits and senior unsecured debt have the same priority. But while the holders of senior unsecured debt can get compensated for this extra risk, the pricing of deposit insurance usually does not incorporate the effects of structural subordination. This means that banks with a large deposit base find it privately optimal to issue secured funding and shift risks to depositors.

The way rating agencies assign credit ratings can also tilt banks' preference toward secured funding such as covered bonds. To rate senior unsecured debt, rating agencies

focus primarily on the probability of default rather than recovery values (see Deutsche Bank 2011). This leads to rating arbitrage for banks since the increased share of secured funding does not lead to the downgrading of senior unsecured debt, even if it reduces the recovery value for unsecured creditors.

The drivers of asset encumbrance explained above are structural, that is they can explain the level of asset encumbrance but not necessarily trends. For instance, deposit insurance schemes already existed in 2005, so the presence of deposit insurance schemes to explain trends of asset encumbrance between 2005 and 2011 is limited.

Yet, when these structural drivers are combined with changes in the probability of default, they can also explain the trends. In stable times, the difference between the cost of secured and unsecured funding is minimal since default is distance. It can thus be argued that, before the outbreak of the global financial crisis in 2008, banks had relatively little to gain when they substituted unsecured funding with secured funding. But, as the probability of default increased in the post-crisis period, the gains became material and the banks had a stronger impetus for undertaking these transactions.

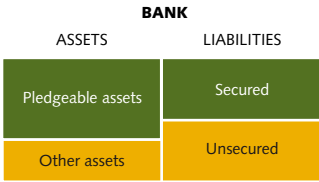
Additional aspects of asset encumbrance across countries and banks

Despite a number of factors mentioned previously, some aspects of asset encumbrance still remain unclear. For instance, it is unclear why there was such a large difference in asset encumbrance across countries in 2005 before the outbreak of the global financial crisis. Moreover, it is unclear why there is a systematic variation in asset encumbrance across banks within a given country. This section reviews two factors that can explain these puzzles: differences in countries' financial structures and banks' business models.

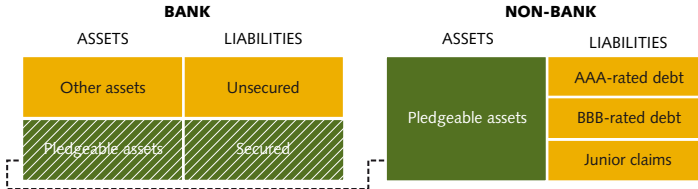
Differences in countries' financial systems form important driving forces of asset encumbrance across countries. For instance, one can make a distinction between countries with and without securitisation markets. In countries without securitisation markets (for example Sweden), banks follow an 'originate and hold to maturity' model, in which almost all loans are kept on the banks' balance sheets (see Figure 10). In such countries, asset encumbrance tends to be high, since credit intermediation takes place mainly within the banking sector and some of this credit intermediation (for example mortgages) is naturally funded with secured funding.

Figure 10. Asset encumbrance in bank-oriented and securitisation-oriented financial systems

Panel 1. Bank-oriented system



Panel 2. Securitisation-oriented system



In contrast, in countries with securitisation markets (for example the United Kingdom), banks usually engage in limited credit intermediation. A large part of credit intermediation takes place via securitisation. In this model, banks usually originate loans, but then sell some of these loans, such as mortgages, to other non-bank institutions which, in turn, fund these transactions with secured debt instruments. Clearly, in such a system, the importance of secured funding within the banking sector is reduced and the observed asset encumbrance in the banking sector tends to be low.

Another important explanatory factor behind the high variation in asset encumbrance across banks is the banks’ business model. Due to regulatory restrictions, only certain lending can be financed with secured funding. For instance, a common type of lending that is allowed in most covered-bond legislations is mortgage lending. A mortgage-focused bank thus tends to have more asset encumbrance than a bank with a non-mortgage focus.

Are regulatory actions motivated?

In the previous sections, we discussed various driving forces behind asset encumbrance. Factors such as the level of financial stress, existing and forthcoming regulatory frameworks, the balance between the demand for and supply of safe assets, banks’ business models, differences in countries’ financial markets and frictions in financial markets all tend to influence asset encumbrance. Importantly, some of these factors determine the socially-optimal level of asset encumbrance, while others tend to push asset encumbrance above the level that is socially optimal.

The socially-optimal level of asset encumbrance is an abstract concept, but has a clear definition: the point at which social benefits and costs are maximised (see Figure 11). Factors that determine the social optimum include excessive demand for safe assets, differences in countries’ financial markets, frictions in financial markets and the liquidity risk that stems from asset encumbrance.

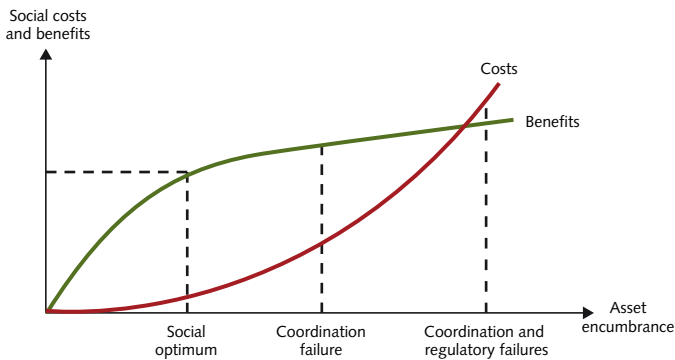
The social optimum has a clear country and time dimension, as factors mentioned above can vary across countries and over time. For instance, the excess demand for safe assets clearly varies over time, depending on the underlying demand and supply dynamics in each country. In addition, countries with more traditional banking sectors clearly have a higher level of socially-optimal asset encumbrance than countries with less traditional banking sectors, simply because more credit intermediation takes place within such a banking sector.

Regulatory actions are necessary when there is more asset encumbrance in the banking sector than is socially optimal. Excessive asset encumbrance can result from the following imperfections and market failures:

- the failure of individual banks to internalise the effects on the system, also known as coordination failure;
- regulatory imperfections;
- self-fulfilling expectations, especially in times of distress.

Coordination failure relies on the idea that a decentralised banking sector may lead to a suboptimal outcome (see Korinek 2012). In the context of asset encumbrance, coordination failure can be applied to liquidity risks. The argument is that, in the absence of counterbalancing measures, individual banks choose a level of asset encumbrance that is consistent with their own liquidity profile, but which is suboptimal at the system level. The resulting decentralised outcome has too much liquidity risk at the system level, as banks fail to incorporate possible fire-sale externalities when they choose their optimal liquidity profile (see Figure 11).

Figure 11. The optimal level of asset encumbrance



In addition to coordination failure, there are various regulatory imperfections that distort banks' funding choices, with an end result of excessive asset encumbrance (see Figure 11). Banks can derive pure private gains from the issuance of secured funding, leading to excessive encumbrance due to the following reasons:

- Secured funding tends to shift risks to tax-payers via risk-insensitive deposit pricing. Unlike other unsecured investors, depositors do not price in the increased risk at default (that is, decreasing recovery values) that may result from the issuance of secured funding.
- Secured funding shifts risks to tax-payers via implicit liquidity guarantees. Due to implicit liquidity guarantees from central banks, banks rationally tend to ignore some of their liquidity risks. To the extent that the liquidity provision is costly, these costs are shifted to tax-payers.
- Secured funding shifts risk to unsecured debt-holders, which, considering the presence of implicit state guarantees, may fail to factor in such increases in risks.
- The upcoming regulatory reforms such as the Basel III Accord, the Solvency II Directive and bail-in regulations favour secured, as opposed to unsecured, funding.

Another market failure that may lead to excessive asset encumbrance is the possibility of self-fulfilling expectations (see also Haldane 2012). Whenever investors of unsecured debt expect a high level of asset encumbrance, the rational response from banks is indeed to rely on secured funding, leading encumbrance to increase in a self-fulfilling manner. Such expectations may ultimately lead to a financial system with a maximum degree of secured funding. In such a system, the benefits of having secured funding are minimal (since almost everybody would be secured), but all the negative side-effects of secured funding, such as increased liquidity risks, would be present.

What separates the possibility of self-fulfilling expectations from coordination failure and regulatory imperfections is the underlying time dimension. Both coordination and regulatory imperfections push banks to take excessive levels of asset encumbrance in normal unstressed situations. However, self-fulfilling expectations tend to become important in times of distress, when the optimal level of asset encumbrance increases temporarily to accommodate the stress. It is after the realisation of the stress that self-fulfilling expectations may start hindering a return to the lower socially-optimal level of asset encumbrance.

Potential policy remedies

As a result of market failures and regulatory imperfections, asset encumbrance can become excessive. Various regulatory measures can be undertaken to constrain these excesses. Below, we review a gross list of regulatory measures that can be undertaken and highlight the pros and cons of each such measure.

Perhaps the most important difference between these various regulatory measures is their reliance on the measurement of the socially-optimal level of asset encumbrance. We therefore make a distinction between two groups of measures: those that increase market discipline and those that rely explicitly or implicitly on knowing the socially-optimal level of asset encumbrance.

Regulatory tools that increase market discipline

A straightforward way to increase market discipline is to increase the transparency of asset encumbrance. The current disclosure of asset encumbrance is, in general, poor and varies considerably across banks and different sources of asset encumbrance. Asset encumbrance from covered bonds is probably the best-documented form of encumbrance. Yet, even for covered bonds, there are no widely-accepted disclosure standards. Asset encumbrance from repos and derivatives has limited or no disclosure at all. For instance, repos that banks have undertaken with the ECB represent a good example in this category, as neither banks nor the ECB routinely disclose such information.

The existing low disclosure of asset encumbrance is puzzling. After all, any uncertainty around the existing level of asset encumbrance should be factored in by unsecured investors which, in turn, would give banks clear incentives to disclose this information.¹⁰ Yet, as explained previously, the presence of government guarantees can make investors somewhat reluctant to demand such information. In addition, banks may choose not to disclose such information, even if investors would strongly require it. Arguably, the market for senior unsecured debt is currently closed for a number of European banks, partly because of limited disclosure on encumbrance.

In this light, a mandatory disclosure of encumbrance would increase investors' awareness of asset encumbrance risks and contribute to a better pricing of these risks. As the effects of encumbrance are factored into the spreads, banks would have better incentives to keep a proper balance between secured and unsecured debt, lowering potentially excessive encumbrance.

Another way to increase market discipline is to reduce banks' incentives to shift risks to tax-payers via deposits. Recall that deposits are a form of unsecured funding for banks and thus are affected by asset encumbrance and structural subordination. There are three ways to limit the deposit arbitrage.

The first option is to make the deposit insurance premium sensitive to asset encumbrance. Since depositors are a form of senior unsecured creditors, the fair risk-adjusted deposit insurance premium is observable from the market.

The second option is to increase seniority of deposits above that of senior unsecured debt. This clearly reduces banks' deposit arbitrage. It also discourages other senior unsecured debt holders somewhat, at least temporarily. Yet this should not be seen as problematic as these investors can and should request compensation for it.

The third option is to separate mortgage taking from deposit taking. In countries like Sweden, this would imply that mortgage institutions would act as separate entities with no ties with their mother institutions. A downside to this solution is a changed financial system,

¹⁰ Whenever a bank does not disclose, investors would price in the expected or average encumbrance. Given this, banks with below average encumbrance would disclose since the cost of debt would decrease in this case. Investors would update their expectations of encumbrance for the remaining banks, leading to a new wave of disclosure.

which, in turn, could have unexpected consequences, such as the creation of securitisation markets.

Some of these solutions have been implemented internationally. The seniority of deposits over other senior unsecured debt has been proposed in some jurisdictions such as the United Kingdom, while, for instance, in the United States such seniority already exists (see Barclays Capital 2012). The separation of deposit taking from mortgage lending is essentially taking place in Denmark, where mortgage institutions are specialised lenders with no deposit funding or implicit funding ties from their mother companies (see ECBC 2011).

Regulatory tools with a concrete knowledge of the social optimum

A clear way to limit excessive encumbrance is to set explicit limits on asset encumbrance. Such limits would control the level of encumbrance mechanically, preventing it from increasing above the socially-optimal level. Yet such limits might also discourage unsecured creditors. In normal times, such limits control the level of encumbrance. However, in stressed situations, when unsecured markets would be closed, such limits would not allow banks to tap secured funding markets, increasing the probability of default. In essence, these limits would incentivise banks to be prudent in normal times but would also undesirably restrict banks' actions in times of distress.¹¹

In addition, such limits have a number of operational drawbacks. Firstly, it is unclear how the socially-optimal level of asset encumbrance could be determined. Clearly, financial systems in different countries tend to call for different limits. But, even within a country, such limits give rise to discriminatory effects across banks with different business models. Secondly, it is unclear which measures of asset encumbrance should be used. A large part of encumbrance, such as that from derivatives, is hard to measure. This may lead to a measure of encumbrance that focuses on the visible part of encumbrance, such as that from covered bonds.

Many of the limitations of setting explicit limits on asset encumbrance could be avoided via the usage of soft limits instead. One way of doing this could be by linking capital requirements under Pillar II¹² to the level of encumbrance. Whenever encumbrance starts to increase above the social optimum, banks would be required to hold more capital. The increased capital requirements would motivate banks to reduce encumbrance. It would also reduce the structural subordination of unsecured investors either via decreasing the probability of default or lowering the loss that must be borne by debt holders.

Importantly, such soft limits could vary over time and be based on different measures of encumbrance. The flexibility coming of the soft limits may prove to be useful as we learn how the financial system responds to such limits. These soft limits may also be used to constrain the self-fulfilling expectations that are likely to follow after the period of high

¹¹ In essence, the optimal regulation would call for the counter-cyclical limits: in good times, low limits will be desirable, while in bad times, high limits will be preferred.

¹² Pillar II refers to the supervisory review process under the Basel II Accord.

encumbrance and distress. The Pillar II treatment also has drawbacks, mainly in the form of low transparency and the banks' incentives to resist and manipulate these soft limits.

Some of the policy options outlined previously have been already considered internationally. Countries like Australia, Canada, Greece, Italy, New Zealand, Spain and the United States have placed explicit limits on the issuance of covered bonds (see ECBC 2011). In the United Kingdom and the Netherlands, the regulation of asset encumbrance follows soft limits in the sense that the limits are determined on a case-by-case basis (see Bank of America Merrill Lynch 2011).

Concluding remarks

Asset encumbrance varies over time and across banks and countries. Some of this variation can clearly be justified by the level of financial stress, the demand and supply dynamics of safe assets, and differences in countries' financial systems and banks' business models. Yet there are also good reasons to believe that asset encumbrance can become excessive when left unregulated. The failure of individual banks to internalise their liquidity effects on other banks, together with existing and upcoming regulatory imperfections, could lead to situations in which asset encumbrance is higher than is socially optimal. Regulators have a wide range of tools available to counterbalance potential excesses in asset encumbrance. Some of these tools rely on knowledge of the socially-optimal level of asset encumbrance, which may be hard to measure. Consequently, tools that rely less on this knowledge have a clear comparative advantage.

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Appendix: The effects of over-collateralisation on recovery rates and spreads

The analysis in the section on structural subordination can also be carried out for different levels of over-collateralisation (see Figure A1). Increasing asset encumbrance via increased over-collateralisation leads to a higher degree of structural subordination for a given share of secured debt to total funding. An interesting aspect to note, however, is that an increased asset encumbrance via over-collateralisation leads to increased recovery rates for secured debt. This can be contrasted with asset encumbrance via an increased share of secured debt in total funding, which leads to decreasing recovery rates both for secured and unsecured bondholders.

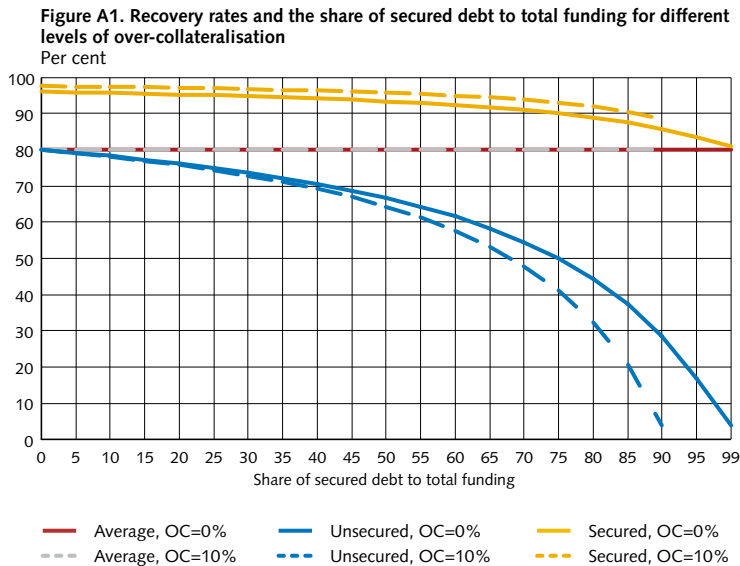


Figure A2 shows the effects of asset encumbrance on spreads for unsecured and secured debt. The calculation uses recovery values from Figure A1. We can see that falling recovery values from increased asset encumbrance lead to increased spreads for unsecured claimants. The effect of asset encumbrance on spreads for secured debt depends on the type of asset encumbrance. A new issuance of secured debt with unchanged over-collateralisation leads to increasing spreads for secured debt, while increased over-collateralisation for a given fraction of secured debt in total funding leads to decreased spreads.

Figure A2. Fair spreads and the share of secured debt to total funding for different levels of over-collateralisation

Basis points, spread over swap, per cent

