

# *Impact of bank structural reforms in Europe*

Report for AFME

November 2014

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# *Executive summary*

The EU regulatory reform programme for banks has been considerable since the financial crisis. There have been packages of major prudential reforms that improve banks' resilience, implemented by the Capital Requirements Directive (IV) and Capital Requirements Regulation. There are, in addition to these reforms, the financial market reforms of European Market Infrastructure Regulation, Markets in Financial Instruments Regulation and Markets in Financial Instruments Directive (II) which increase risk transparency and aim to decrease counterparty risk. Further, Europe has in place a comprehensive framework for recovery and resolution of banks under the BRRD which will enable any bank to be resolved without taxpayer support or causing financial instability. The BRRD empowers the authorities to make changes to banks' structure where necessary to support this objective and will be further supported by implementation of the FSB proposals for global systemic banks to hold a minimum total loss absorbing capacity (TLAC). These reforms, taken together, are driving substantial changes in the EU banking industry.

This progress on the regulatory landscape is aimed at improving the resilience of individual banks, and the financial system as a whole. With such ambitious changes already legislated, the case for additional reforms needs to be considered carefully.

In January 2014, the European Commission published proposals for structural reform of the EU banking sector<sup>1</sup>. The main requirements are the prohibition of proprietary trading and the possibility of further economic separation of markets activities from the core credit institution, subject to certain risk metrics. When separation is required<sup>2</sup>, this is to mean separate funding, capitalisation and governance within a banking group.

PwC has been commissioned by the Association for Financial Markets in Europe (AFME) to undertake a study of the possible impact of this proposed regulation. Our aim is to expand the evidence available to policy makers as they consider the further policy development on the requirement for and specification of structural reforms. Our study has focused on the impact of the proposals as applied to 18 global systemically-important banks (G-SIBs) and large domestic systemically-important banks (D-SIBs) which would be amongst the main targets of the proposed regulation. We have assumed (on the basis of the existing information on banks' trading activities), that banks with large EU markets activities (which include investment banking, market-making and trading) would be required to separate them into separately capitalised subsidiaries<sup>3</sup>. This includes both EU headquartered banks and EU subsidiaries or branches of foreign headquartered banks (collectively termed 'EU banks' in our study).

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<sup>1</sup> EC (2014), 'Proposal for a Regulation Of The European Parliament And Of The Council on structural measures improving the resilience of EU credit institutions'.

<sup>2</sup> The proposed Regulation targets large credit institutions and banking groups. Competent authorities may exercise judgment, using a set of harmonised metrics, but when risks exceed levels to be defined by the metrics, the competent authority is likely to be required to enforce separation.

<sup>3</sup> The assets of EU activities of the 18 banks in our analysis range from €130 billion to €1,185 billion, with an average of €551 billion.

Our findings are summarised below:

*1. Bank Structural Reforms (BSR) will have cost impacts beyond banks - especially on companies seeking to borrow for growth, on pension funds and on overall EU economic growth and jobs*

**We estimate:**

- **Increases in the cost of debt finance for borrowers.** A 25% increase (30 basis points) in borrowing spread on average for companies that borrow from the debt capital markets, with bigger impacts for typically smaller corporates with smaller less liquid debt issuances. We estimate that the top 10% of firms most sensitive to changes to the cost of debt will experience a reduction in profits of at least 5%. This translates into an increase in annual borrowing costs to corporates of around €5 billion across the EU, or €2 million on average per issuer. We also estimate a c.10% increase in banking fees for debt and equity issuance costs and higher spreads for foreign exchange, which will impact importers and exporters.
- **Reductions in returns to investors.** Asset managers and investors will have to pay more (we estimate 12 bps) to trade in corporate debt. This will impact long-term returns. Compounded lower returns (over a 40-year working life), may amount to a 5% reduction in investment value. Higher corporate yields also translate into value losses: investors could face mark-to-market losses of 2% on their corporate bond holdings (€82 billion).
- **Higher administrative costs to businesses.** Smaller businesses (and investors) which typically use one banking service provider will have to engage with multiple banks to serve their full banking needs. Additional costs will also arise from re-documenting customer relationships (e.g. applying 'know-your-client' procedures).
- **Small impacts on retail customers but potential knock-on impacts on lending.** There is likely to be diminished access for smaller businesses to hedging and other risk management tools, which could increase the level of risk and volatility in the economy. Core credit institutions may need to reduce the loan-to-value (LTV) ratio of mortgage books to maintain credit ratings, making it more difficult and expensive for first-time buyers to obtain mortgages. Structural reform will hinder any re-establishing of a European securitisation market and the benefits this provide in funding residential mortgages and SME lending.
- **Considerable costs to the EU economy.** Economic costs include the impact of higher cost of credit for users of capital markets, the loss of market liquidity and the shrinkage of the financial services sector (and associated multiplier effects). Using inputs from the Macroeconomic Assessment Group of the Basel Committee on Banking Supervision (BCBS), we estimate a permanent reduction of the steady-state level of EU GDP of 0.15% or €20 billion, with equivalent negative employment impacts of up to 316,000 across the EU. Our estimate of economic costs is in addition to the potential costs of earlier financial sector reforms, which have been estimated by policy makers to be in the order of 1-2% of GDP.

*2. Separation as proposed will reduce the number of viable EU capital market banks, reducing liquidity, increasing market concentration and end-user costs;*

- To comply with the reforms, many of the markets entities of EU banks would become small and poorly diversified across their capital markets activities. This will place investment grade credit ratings at risk and increase funding costs, as well as higher capital and operational costs (we estimate annual costs of €21 billion and one-off implementation costs of €9 billion). We estimate a reduction in pre-tax returns of almost 15 percentage points for the markets entity of EU banks. This is likely to force banks to re-price their services and in many cases exit from segments that are no longer commercially viable, causing the impacts for users detailed above.
- **Market liquidity in corporate credit areas will drop.** Liquidity in corporate bond markets is already falling (as observed from falling trading volumes and falling bank inventories). Structural reform is likely to accelerate these falls. A reduction in the number of market makers and those banks contribution to liquidity through their inventory holdings would reduce market liquidity. This in-turn would increase the liquidity risk premium and therefore costs to borrowers.

*3. In response to a range of other regulations and competitive pressures, banks have been steadily implementing major structural and operational changes designed to improve financial stability*

- **EU Banks have been taking significant steps to recapitalise and re-shape.** The capital banks use to support their activities, and protect against losses (Tier 1 capital) across a sample of 24 large banks has increased by 80% from 2006 to 2013, a total increase of €609 billion. Leverage has reduced across the industry ahead of the regulatory schedule as banks have re-capitalised and reduced assets since 2006. EU Banks are repositioning themselves with clear strategies around serving the needs of distinct customer groups while cutting back on proprietary activities. This has involved simplification, exits from non-core business areas, and, we have identified cost savings programmes of €25.7 billion for ten of the larger EU banks.

*4. Tools for structural change of banks already explicitly exist within the Bank Recovery and Resolution Directive (BRRD), which comes into force in 2015.*

- The BRRD already includes a comprehensive set of measures, which require regulatory authorities to assess the resolvability of banks and to make changes to their legal entity and operating models to make each bank more resolvable. Article 17 of the BRRD lists a number of specific powers for authorities, including: divestment of specific assets; limiting or ceasing specific activities; restricting or preventing development of business lines or products; and, changing legal or operational structures of any group entity. Importantly, these powers are to be exercised on a bank-by-bank basis, which could mitigate some of the negative consequences of a one-size-fits-all approach as proposed in the regulation.

*5. Our study, based on applying econometric analysis of cost of funding data for EU banks, shows that implicit subsidies, once considerable, are now statistically insignificant*

- We use data on EU banks' funding costs and econometric techniques to produce an up to date analysis of state implicit guarantees. Our findings are consistent with other recent studies, mostly from the US, which have shown reduction and elimination of implicit subsidies. Our study concludes that there is currently no implicit guarantee for EU banks. This is an important conclusion, which suggests that markets now seem to be agreeing that, mainly because of BRRD and bail-in capital requirements, EU banks could be resolved without resort to public funds.

*6. Whilst the incremental costs of the structural reform proposals are clearly substantial; it is much harder to quantify incremental benefits*

- As a consequence of the many banking sector regulatory reforms undergoing implementation, the banks' responses to these reforms, the removal of implicit subsidies and the tools available to authorities through the Bank Recovery and Resolution Directive (BRRD), it is unclear whether structural reform will deliver significant incremental benefits. In contrast the costs to end-users, the impact on the development of European capital markets and the costs to the broader EU economy are considerable.

The European Commission has set out a bold programme of banking sector reform to improve financial stability. Capital markets have helped the transition process by assisting larger corporates to switch funding sources from banks to capital markets, thereby supporting growth of the wider economy. However, the proposed bank sector structural reforms, applied across the whole sector, risk draining vital liquidity from EU capital markets, a development which is increasingly being raised as a concern by central banks. Such an outcome would be at odds with the policy goal of creating deep, liquid capital markets capable of supporting higher levels of growth across the Union.

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# Section 1: Introduction

- 1.1. In January 2014, the European Commission published proposals for structural reform of the EU banking sector<sup>4</sup>. The main requirements are the prohibition of proprietary trading and the possibility of further economic separation of markets activities from the core credit institution, subject to certain risk metrics. The latter requires markets entities to be separately funded, capitalised and governed.
- 1.2. PwC has been commissioned by the Association for Financial Markets in Europe (AFME) to undertake a study of the possible impact of this proposed regulation. Our aim is to expand the evidence available to policy makers as they consider further policy development on the requirement for and specification of structural reforms.
- 1.3. Our work is split into three areas:
  - a. Impact assessment of the proposed structural reforms on the EU banking sector, EU capital markets, users of banking services and the EU economy;
  - b. Assessment of implicit guarantees in the EU banking sector; and
  - c. A review of the responses (to date) of EU banks to both regulatory reforms and commercial environment since the financial crisis.
- 1.4. This report provides the findings of our work. It is accompanied by two supplementary reports which provide the detailed evidence and analysis of our work on implicit subsidies and bank responses.
- 1.5. We have not relied on AFME, or its member banks for any data. We have used external, third-party data sources to provide a data-rich granular assessment of bank and market impacts. In a number of cases we have commissioned bespoke data from leading capital markets data providers. These include:
  - a. **Coalition** – an analytics and business intelligence provider to the global financial services industry;
  - b. **Tricumen** – a provider of financial markets benchmarking and client market sizing across capital markets, treasury & securities services, corporate banking and wealth & asset management;
  - c. **Trax** – a provider of capital market data, trade matching and regulatory reporting services to the global securities market; and
  - d. **UBS Delta** – a separate entity within UBS which develops portfolio analysis and risk management system to measure risk and performance across fixed income, commodities, equities and FX markets.
- 1.6. We have held discussions with AFME member banks to validate key assumptions.
- 1.7. In a number of areas we have used econometric and macroeconomic techniques to specify the key relationships that influence the impact of structural reforms. These techniques are described in the appendices to this report and supplementary reports.
- 1.8. The structure of this report is set out as follows:
  - a. In **Section 2**, we set out the context of regulatory change in the EU banking sector, as well as the responses of the banking industry to these changes and the wider commercial environment.
  - b. In **Section 3**, we review what remains to be done in relation to the progress that has been made within the banking sector, and how existing and planned reforms will substantially achieve the

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<sup>4</sup> EC (2014), 'Proposal for a Regulation Of The European Parliament And Of The Council on structural measures improving the resilience of EU credit institutions'.

objectives of the EC's proposed bank structural reform. We set out the structural reform proposals and suggest a framework for the evaluation of these proposals.

- c. In **Section 4**, we review the likely impacts on EU banks, the markets they operate in, users of banking services and the broader EU economy.
  - d. We provide a number of supporting appendices with additional supporting data and description of techniques used.
- 1.9. There are a number of key findings from our analysis that provide the evidence base for the arguments that are set out in the executive summary. These points are summarised in 'key points' boxes that are available at the start of sub-sections.



## Section 2: Context

### Key points

*There has been substantial progress in developing and implementing reforms of the EU banking sector. Higher capital and liquidity requirements, changes to market infrastructure and central clearing of derivatives and resolution planning all contribute to creation of a more robust financial system.*

*There have been economic costs to these reforms. The aggregation of economic impact studies for new EU regulations in the banking sector following the financial crisis shows a negative GDP impact of between 1% and 2%.*

### 2.1 The policy response to the financial crisis

- 2.1. To avoid a repeat of the 2008 financial crisis, the governments and central bankers of the G20 agreed a common set of principles to reform the regulatory and institutional regimes of the financial sector. The 2008 and 2009 G20 meetings committed to strengthening banks' resilience to crisis (via higher capital holdings) and to increasing transparency of derivatives markets by moving bilateral trading onto exchanges. Policymakers and regulators have been following these principles through legislative reform and rulemaking. They have since also strengthened the supervision of banking institutions to reduce the probability and impact of failure and contagion.
- 2.2. The world's largest banks have been identified as global systemically important financial institutions (G-SIFIs/G-SIBs). Their size and interconnectivity are deemed to present contagion risk to the international financial system such that the failure of a G-SIB could increase the probability and impact of a widespread financial crisis. Other large regional and domestic banks have been similarly identified as domestic systemically important banks (D-SIBs). Both G-SIBs and D-SIBs are now required to have additional higher capital requirements than other banks, in order to reduce the probability of failure and thus any wider financial instability.
- 2.3. In addition to these measures to improve institutional resilience, policymakers have been developing policies for dealing with institutions which end up in a risk of failure situation. The last financial crisis demonstrated that some financial institutions proved too large and complex for their home countries to credibly and swiftly resolve, and without common mechanisms for bailing in creditors, central banks, treasuries and ultimately taxpayers were required to intervene to prevent wider crisis. Policymakers have therefore been working on improving domestic and cross-border resolution frameworks, and regulators have required G-SIBs to produce recovery and resolutions plans (RRPs, sometimes referred to as Living Wills). In Europe, the Bank Recovery and Resolution Directive (BRRD) also specifies that additional capital (expected to be largely convertible long term debt) will be available to fund creditor bail-in, such that any resort to a publicly funded backstop should become very rare.
- 2.4. In some countries, policymakers decided on additional structural measures to separate banks' markets activities from their deposit-taking/retail businesses, in order to ensure that any implicit public support for an institution would be focused on operations critical to the financial stability of the home country.
- 2.5. Below is a summary of the key regulations now required of universal banks in Europe. The summary is divided into two sections: (i) the regulations with confirmed requirements and compliance dates, and (ii) regulations that are still being developed but are expected to be in force by 2018.

## *Regulatory reforms in place*

2.6. The main new regulations faced by large universal banks in Europe can be grouped into three related initiatives. First is the package of major prudential reforms that aim to increase the overall resilience of EU banks and investment firms, and to address risks in banks' banking books, and trading and financial markets activities implemented by the Capital Requirements Regulation and Directive (CRR and CRD IV)<sup>5</sup>. Second are the financial market reforms of European Market Infrastructure Regulation (EMIR)<sup>6</sup>, the Markets in Financial Instruments Regulation and Directive (MiFIR and MiFID II)<sup>7</sup> which increase risk transparency and aim to decrease counterparty risk. Third are the regulations enhancing European bank supervision and the recovery and resolution rules which address the risks posed by the largest and most complex banks.

### *CRD IV*

- 2.7. The 2008 financial crisis highlighted a lack of sufficient capital to provide for the necessary loss absorbency. To remedy this, CRD IV was implemented in Europe from January 2014 to require banks, building societies and large investment firms to hold more capital of a higher quality. This significant increase in capital should mitigate the future impact of non-performing loans on a bank's balance sheet. CRD IV also increases capital requirements held against securities and derivatives trading, which should mitigate the impacts of trading losses on a bank's balance sheet.
- 2.8. A number of tools designed to prevent and mitigate macroprudential and systemic risks have been built into CRD IV. G-SIBs must hold additional capital buffers. From 2016, G-SIBs will need to hold an additional buffer and potentially a systemic risk buffer if applicable, on top of the capital conservation buffer and the countercyclical capital buffer. The additional capital buffers will enhance the loss absorbing capacities of G-SIBs. Banks are holding significantly more capital today than before the crisis.
- 2.9. In the aftermath of the 2008 financial crisis, concerns about trading activities focused on the role of counterparty defaults in transmitting trading losses across borders and around the financial system. To dampen this contagion risk CRD IV generally increases the amount of capital held against derivative trades, specifically addressing the risk of counterparty failure. To minimise default risk and encourage the use of central counterparties (CCPs), particularly approved European CCPs, the legislation permits firms to apply lower risk weights for capital held as margin at CCPs approved by European Securities and Markets Authority (ESMA). Exposures to non-approved CCPs incur a higher capital charge. Non-centrally cleared bilaterally swapped derivatives incur the greatest capital charge. This new, additional capital held to meet counterparty credit risks reduces the potential impact of counterparty failure on a firm's balance sheet.
- 2.10. CRD IV also introduces a minimum leverage ratio requirement. CRD IV guards against modelling risk in the calculation of risk weighted assets, by introducing a minimum leverage ratio requirement against total assets and off-balance sheet exposures. The leverage ratio is, in fact, likely to become the de-facto determinant of regulatory capital for many banks. Initial estimates suggest that banks will need to hold significantly more capital to meet the new requirements. Disclosure of leverage is required from 2015, and banks will need to meet the leverage ratio requirement (yet to be finalised) by 2018.

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<sup>5</sup> Regulation (EU) No 575/2013, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013R0575> and Directive 2013/36/EU, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013L0036>, jointly 'CRD IV'

<sup>6</sup> Regulation (EU) No 648/2012, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L:2012:201:TOC>

<sup>7</sup> Regulation (EU) No 600/2014, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014R0600> and Directive 2014/65/EU, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0065>, jointly 'MiFID II'

## *Market reforms*

- 2.11. As noted, derivatives markets were seen as a key transmission mechanism from defaults in trading activity to bank's wider balance sheets. To limit this in future, EMIR introduced new pan-European regulatory regimes for all participants in derivative markets: derivative counterparties, CCPs and trade repositories. EMIR implements new regulatory requirements and minimum standards for derivatives trading which will improve operational and counterparty credit risk management and significantly increase reporting standards. In conjunction with CRD IV, EMIR encourages the use of approved CCPs. Clearing derivatives through CCPs buffers banking counterparties from the impact of default. New margin requirements for both these centrally-cleared and also the non-centrally cleared derivatives reduce the risk of counterparty default spreading a wider contagion more broadly across the financial system.
- 2.12. From 2017, MiFID II will modernise European securities market structures, increase market transparency, reduce data fragmentation, enhance investor protection and harmonise the regulatory regimes within different European Economic Area (EEA) jurisdictions. It extends the areas of the existing MiFID regime beyond equities to other product classes and a broader range of trading venues. Supplementing EMIR, MiFID II requires banks to trade securities and sufficiently standardised contracts on an exchange or trading facility. The effect is to reduce counterparty credit risk, contain crisis and provide much greater transparency to authorities charged with resolution.
- 2.13. The Central Securities Depositories Regulation<sup>8</sup> (CSDR) and T2S securities settlement initiatives will reduce risks and improve the timing of post-trade trade settlement, payment, and delivery in the Euro zone. Amongst other reforms, CSDR requires European CSDs to settle all trades within two days of execution. Those CSDs linking into the T2S service will significantly change the way they operate. Where T2S acts as cross-border facilitator it will enable direct CSD-to-CSD links for direct trade settlement. The T2S system will also support smooth and fast collateral movement between counterparties. Individually and combined, these initiatives will limit the contagion of counterparty default.

## *Enhanced supervision*

- 2.14. The sovereign crisis of 2010 revealed that there was no adequate way for a Eurozone bank to continue to provide essential banking functions while in insolvency, or to be closed without significant systemic damage. The BRRD<sup>9</sup> provides banking supervisors and resolution authorities with the power to impose structural changes to remove impediments to resolvability. Those powers, which take effect from 2015, will enable authorities to address bank-specific risks where, for example, structure or the scope of business activities inhibits resolvability.
- 2.15. The BRRD requires the preparation of resolution plans by the end of 2015. The BRRD gives authorities a debt write down (or bail-in) tool from 2016, in addition to tools for asset separation or sale of the firm. It is designed to effectively insulate tax payers from having to save a failing bank, based on the design and implementation of measures specific to the situation of individual banks.
- 2.16. The BRRD requires 'super preference' in the creditor hierarchy to retail and SME deposits below the deposit guarantee scheme protection limit of €100,000, and preference to deposits over this limit. Consequently deposits under the limit become the highest ranking unsecured creditors in the event of resolution. So losses in a bank failure are distributed amongst customer and SME deposits only after all other resources have been depleted, further protecting them from losses in any part of a banking group.
- 2.17. The BRRD and CRD IV underpin the Single Supervisory Mechanism (SSM) and Single Resolution Mechanism (SRM) for the Eurozone, and create a single set of rules across the EU which all banks will be held to. To this end, banks in Europe have submitted recovery plans and have provided information for supervisory and resolution authorities to develop resolution plans. Indeed, banks are working closely

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<sup>8</sup> Regulation (EU) No 909/2014, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014R0909>

<sup>9</sup> Directive 2014/59/EU, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0059>

with their lead supervisory authority and cross-border crisis management groups in order to develop effective resolution plans.

- 2.18. The European Banking Authority (EBA) is tasked with writing the single banking rulebook for the Union, aiming to provide a uniform set of prudential rules to which institutions throughout the EU will conform. This ensures transparency and comparability for supervisors, deposit-holders and investors.
- 2.19. Supervision of EU banks is also improving. In the Eurozone, Banking Union reforms are taking shape. The Single Supervisory Mechanism (SSM) charges the European Central Bank (ECB) as the central prudential supervisor for Eurozone financial institutions. From November 2014 it directly supervises the largest Eurozone banks to ensure they comply with the Single Rulebook and that any early intervention measures are applied, if triggered by concerns about changing business conditions and viability. In the UK, the Bank of England has responsibility for implementing the EBA single rulebook and for enhanced prudential supervision via the Prudential Regulation Authority (PRA). The same is true for central banks in other countries of the EU which are outside the Eurozone.
- 2.20. Before assuming its powers under the SSM, the ECB conducted a comprehensive assessment of the Eurozone banks it will supervise. Its assessment comprised two parts: an Asset Quality Review (AQR) that adjusted balance sheets to implement a common definition of non-performing loans, and the EBA's stress test on those adjusted balance sheets. The ECB identified capital shortfalls; which banks are required to remedy: capital shortfalls identified under the baseline stress test scenario or in the AQR need to be covered by 30 April 2015. Those banks with shortfalls identified under the adverse stress test scenario have until end 31 July 2015 to raise the necessary capital. Stress testing and remedies will continue to be a tool used by the ECB in supervising the major banks of Europe.
- 2.21. The Single Resolution Mechanism (SRM) will apply to banks under the SSM. When Eurozone banks fail, the SRM will ensure bank resolution is managed effectively through a Single Resolution Board, with a new Single Resolution Fund also available to assist with bridge financing should that be required. The Fund will be financed by the banking sector. The SRM is designed to ensure an orderly resolution of failing banks with minimal costs for taxpayers.

### *Fundamental review of the trading book (FRTB)*

- 2.22. The Basel Committee on Banking Supervision (BCBS) has reviewed the amount of capital held by banks against trading activity and suggested improvements to address weaknesses it identified in the overall design of the approach and implementation of risk measurement techniques. This new FRTB approach will apply to banks using both the internal modelling and standardised approaches to risk modelling. It's likely the FRTB will ultimately require banks using internal models to hold more capital; the BCBS made enhanced capitalisation of credit and market liquidity risk an explicit aim of the FRTB.
- 2.23. The FRTB will address capital allocation, transparency and supervisory oversight of trading activities on a desk-by-desk basis. The new framework proposes to substantially increase a supervisor's ability to review and address the capital adequacy and structural concerns that specific trading activities pose to banks' resolvability, and to the stability of the wider financial system. Importantly, the transparency embedded in the FRTB will produce more intensive scrutiny and desk-specific capital requirements appropriate to the risks being undertaken there. This should limit the accumulation of unseen trading losses. The BCBS is expected to finalise the new trading book recommendations by end 2015, with implementation likely to follow in 2017.

### *Other areas of reform*

- 2.24. The Financial Stability Board (FSB) has proposed a global standard for minimum amounts of Total Loss Absorbency Capacity (TLAC) to be held by G-SIBs. It requires a G-SIB to hold a minimum amount of regulatory capital plus long term unsecured debt equal to 16-20% of RWAs, in addition to existing capital buffers. As a backstop the amount of a firm's regulatory capital and long-term debt cannot be less than 6% of its leverage exposure.

- 2.25. In addition to these requirements, TLAC would also include a subjective component (called "Pillar 2") to be assessed for each firm individually, based on qualitative firm-specific risks that take into account the firm's recovery and resolution plans, systemic footprint, risk profile, and other factors. TLAC is designed to ensure that G-SIBs have the loss absorbing and recapitalisation capacity so that, in and immediately following resolution, critical functions can continue without requiring taxpayer support or threatening financial stability.
- 2.26. There have been other areas of reform around accounting developments (with more prudent loan-loss provisioning under accounting rules), macro prudential policy, bankers' remuneration, board governance and product regulation. To a varying degree these support financial stability alongside other policy objectives.

## 2.2 The economic benefits and costs of financial services reforms

- 2.27. The case for reform has widespread political and economic support. It has generally been made by comparing the cost of new regulations against the benefits of avoiding another financial crisis. Evidence collected by the FSB suggests the output loss from a financial crisis is 63% of pre-crisis GDP<sup>10</sup>. Expressed as an annual figure, by multiplying by the annual probability of a financial crisis means the benefit of eliminating all future crises is worth 1.8% per year. While individual country experiences vary, this average GDP cost has been used by policy makers to justify financial reform.
- 2.28. However, these reforms have not been without associated economic costs. The cumulative impact of a number financial service reforms is set out in Table 1.

Table 1: Economic cost of financial services reforms

Reform area	Source of economic impact assessment	GDP impact (steady-state)
Capital, liquidity and leverage	Source: BIS (2010) "An assessment of the long-term economic impact of stronger capital and liquidity requirements"	Up to 0.59% of GDP (+6% CT1/RWA, incl NSFR)
Deposit guarantees and resolution funds	Source: EC (2010) "Impact assessment of the deposit guarantee scheme"	0.25% of GDP
RRP/Living wills	Source: EC (2012) "Impact assessment of the RRD"	0.09% of GDP
Financial stability contribution	Source: IMF (2010) "A fair and substantial contribution by the financial sector: Final report for the G-20"	0.3% of GDP
Market infrastructure	Source: BIS (2013) "Macroeconomic impact assessment of OTC derivatives regulatory reforms"	0.04% of GDP
<b>Total</b>		<b>1.27% of GDP</b>

- 2.29. This estimate of 1.27% of GDP is likely to be an underestimate as it does not include the full range of financial service reforms, and the impact of capital reforms is likely to be higher as additional capital buffers and leverage requirements are added. These assessments also do not account for the potential inconsistencies in the measures and objectives of regulatory reforms, as well as cross-border differences in the implementation of these reforms.

<sup>10</sup> The magnitude of economic costs depends on whether the loss in output is assumed to be temporary (i.e. the level of GDP catches up with its pre-crisis path) or permanent (i.e. the level of GDP remains on a permanently lower path). The median cumulative discounted output loss from a financial crisis across all comparable studies is 63% of pre-crisis GDP.

[http://www.financialstabilityboard.org/publications/r\\_100818a.pdf](http://www.financialstabilityboard.org/publications/r_100818a.pdf)

## 2.3 The response of the industry

- 2.30. Since the financial crisis, the banking industry has undergone dramatic change, as banks and regulators have responded to the weaknesses exposed. These changes have struck to the core of banks, challenging how and where they operate, and what services they provide.
- 2.31. This section summarises those changes, whether driven by new regulatory or commercial imperatives. While EU banks have been the main focus of this study, due to the importance of their European activities, major Swiss and US banks have also been included. Our report: *“Supplementary Report 2: Inventory of bank responses to regulatory change”* provides the detailed findings of our review of how banks have responded to the new regulatory and commercial environment. This provides additional information of the banks and definitions used in our analysis.
- 2.32. Common themes of change within the industry have emerged after the financial crisis::
- The Recovery & Resolution process and group resolvability assessments are beginning to drive structural changes, which are improving resolvability and lowering systemic risk;
  - Banks are making strategic business changes which focus on servicing key end user clients, involving moves away from certain regions and businesses;
  - Banks have taken significant steps to strengthen, de-risk and deleverage their balance sheets through capital raising and asset reduction initiatives;
  - The creation of non-core divisions and the run-off of non-core assets have been a key driver in balance sheet strengthening, with the aim of deleveraging, exiting off-strategy areas and providing greater direction and customer focus to banks’ remaining activities;
  - Supporting this balance sheet strengthening has been a move towards de-risking, both at a market level (e.g. OTC derivative reform) and at a bank level (e.g. cost reduction and enhanced risk management).
- 2.33. We have carried out our research of banks’ responses based on the following core themes, which were drawn from the G20 commitments on Strengthening Financial Stability<sup>11</sup>:

### *Recoverability, resolvability, and other structural changes*

#### **Key points**

- The Recovery and Resolution process offers a mechanism for regulators to influence bank structures on a tailored basis, with new regulatory early intervention and resolvability powers.*
- Banks are already beginning to make structural changes in order to reduce systemic risk and improve resolvability. This can be seen in a number of areas:*
  - The increased use of subsidiaries over branches.*
  - The growing subsidiarisation of booking models.*
  - The creation of organisational structures to facilitate bail-in.*
  - The development of independent service companies to promote operational continuity.*
- Banks are simplifying and aligning to core services through organisational changes:*
  - Nine of the ten large representative banks studied have restructured their investment banking business since 2009 to sharpen their focus on key clients and services.*

- 2.34. In response to concerns about too-big-to-fail issues since the financial crisis, banks have been working to improve resolvability and to this end have taken actions to simplify their legal structure and reduce entity interconnectedness.

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<sup>11</sup> Financial Stability Board (2009) “Overview of Progress in Implementing the London Summit Recommendations for Strengthening Financial Stability: Report of the Financial Stability Board to G20 Leaders”, September 2009

- 2.35. Banks and regulators are developing organisation-specific Recovery and Resolution Plans (RRPs) in close dialogue with one another, and regulators increasingly have the power to influence all facets of the bank through enhanced intervention tools. All G-SIBs have already formally submitted resolution plans, and RRP are currently being enhanced on a global basis. Whilst regulatory feedback suggests that there is still much work to be carried out on the plans, progress is being made towards the goal of allowing banks to fail without a wider risk to global, regional and national financial stability.
- 2.36. Banks are making structural changes, with perhaps the greatest change being the move towards greater subsidiarisation and the increased segregation of entities. Recent years have seen the greater usage of subsidiaries in foreign markets, as opposed to branches, with booking models across the industry trending towards a more subsidiarised model, too, in line with regulatory expectations. Banks have also reorganised their structures, at both a global and intermediate level, in order to facilitate resolvability in the event of bail-in, and independent service companies to promote operational continuity.
- 2.37. Banks are also aligning their business towards core services through organisational changes, and have made internal structural changes in order to reposition themselves towards key clients and competencies. Of the ten large representative banks studied, nine have restructured their investment banking business since 2009 to sharpen their focus on key clients and services. Whilst organisational change strategies have varied by institution, a number of firms have recently brought investment banking and corporate banking activities together, changes which may need to be undone in the face of structural reform and ring-fencing.

## *Servicing key end user clients*

### **Key points**

- *Banks are making strategic changes in order to serve key end user clients, and are consolidating in core areas of strength.*
- *Firms have exited from businesses where they have low scale, in order to focus elsewhere:*
  - *Three-fifths of European-based banks studied have downscaled their commodities operations since 2009.*
  - *Two-fifths of European-based banks studied have reduced their equities presence since 2009.*
- *Proprietary trading activities have been reduced:*
  - *Of the European-based banks studied with proprietary trading activities pre-financial crisis, almost 90% have since announced a reduction in activities, with over half stating full business exits.*
- *Many banks are also undergoing geographic downscaling, and are exiting from regions and jurisdictions in order to concentrate on areas of key strength and utility:*
  - *Just under a third of European-based banks studied have exited from Hong Kong, Japan, Korea or Singapore since 2009.*
  - *A similar proportion of banks studied have sold their Swiss Private Banking business since the financial crisis.*

- 2.38. To make best use of available capital, firms are focusing on core business activities and customers, consolidating in areas of strength and downsizing in peripheral spaces.
- 2.39. Banks have announced significant reductions or exits from low scale businesses and product lines where they have faced increased capital requirements. This includes exits from some businesses where financial institutions play a key market making role and where non-financial institutions may not be able to pick up the slack (e.g. equities, where two-fifths of European-based banks studied have reduced their presence since 2009). There is also evidence of regulatory pressure driving exits, particularly with regards to proprietary trading in light of the US Volcker Rule.
- 2.40. Similar trends are also visible with geographic downscaling, as banks have exited from countries and regions with low market share in order to concentrate on regions and jurisdictions of key strength and utility. The specifics have varied by institution, however, some overarching trends are visible, namely downscaling in APAC and exits from Swiss Private Banking. Despite the pressure to reduce balance sheet

size, however, some banks continue to expand into strategic markets, seeking growth and supporting connectivity for European corporates with emerging markets.

- 2.41. Banks have also looked to refocus on key clients and service areas in order to free-up capital and generate stable sources of revenue, repositioning themselves with clear strategies revolving around a core customer base. The route being taken differs by bank – some are emphasising the importance of large institutional clients whilst others are recalibrating towards smaller retail customers – however almost all are now able to better articulate their core client base.

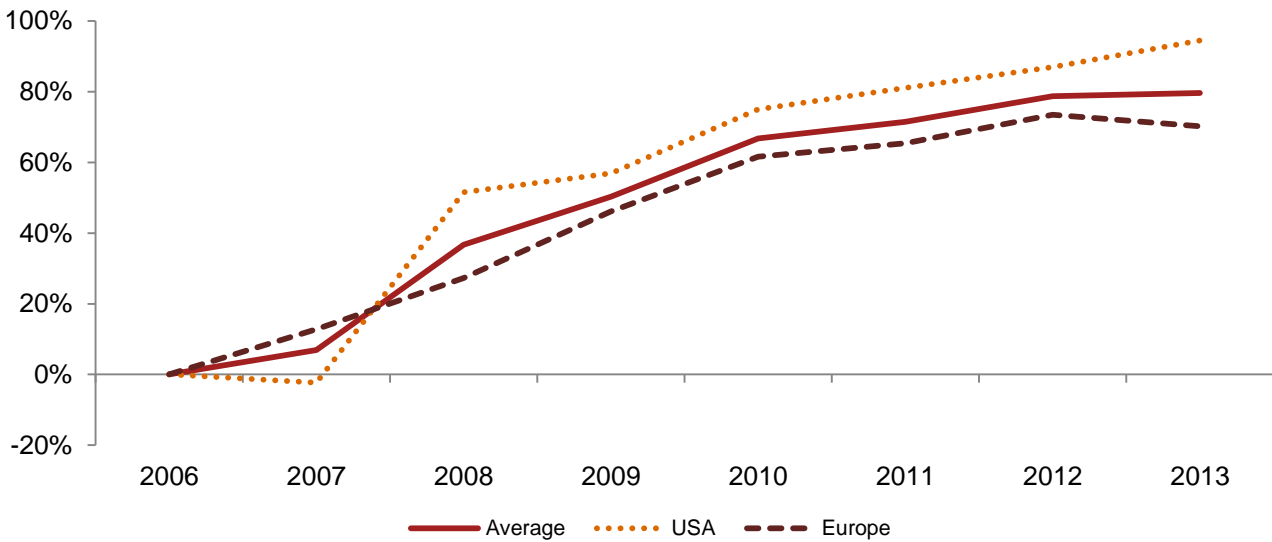
## *Strengthening the balance sheet*

### **Key points**

- *Banks have strengthened their balance sheets in response to the lessons learnt from the financial crisis and regulatory pressure.*
  - *Tier 1 capital has increased by 79.7% since 2006 across banks studied – an increase of €609 billion across 24 banks. Total equity across the 24 banks has grown by two-thirds since 2006.*
  - *Across 24 banks studied, total assets fell 12.3% from a peak in 2008 to 2013, a reduction of €3.6 trillion.*
  - *Reported risk weighted assets (RWAs) have fallen by 7.5% since 2008 across banks studied. Adjusted for changes in Basel methodology this reduction can be estimated at 11.6%, or €1.3 trillion across the 24 banks.*
  - *The average Common Equity Tier 1 (CET1) ratio stood at 10.9% at H1 2014, with all banks studied already exceeding the minimum fully-phased in 2019 regulatory CET1 ratio.*
  - *Leverage has improved across the industry:*
    - *All of the banks studied reporting the Basel III leverage ratio had a ratio above 3.0% as at H1 2014, with an average of 4.4% across the banks.*
    - *Using a rudimentary leverage ratio of Tier 1 capital as a proportion of total assets, over 90% of the banks studied have improved their leverage since 2006.*
- 2.42. Some of the most significant changes made since the crisis have revolved around balance sheet composition, particularly with the advent of Basel III and stricter capital requirements. In order to achieve the new regulatory capital and liquidity ratios, banks have been deleveraging their balance sheets through programmes of capital raising and asset reduction.
- 2.43. Since the financial crisis, banks have looked to boost capital and strengthen their balance sheets in line with regulatory expectations, particularly focusing on Tier 1 and Common Equity Tier 1 capital. Across 24 banks studied, total Tier 1 capital grew by almost 80% between 2006 and 2013 (Figure 1), an increase of €609 billion, whilst total equity across the banks has grown by two-thirds since 2006. Banks have used a variety of tools to achieve this capital increase, including share issues, business divestment, subsidiary floatation, dividend reduction, and issuance of contingent capital (CoCos).



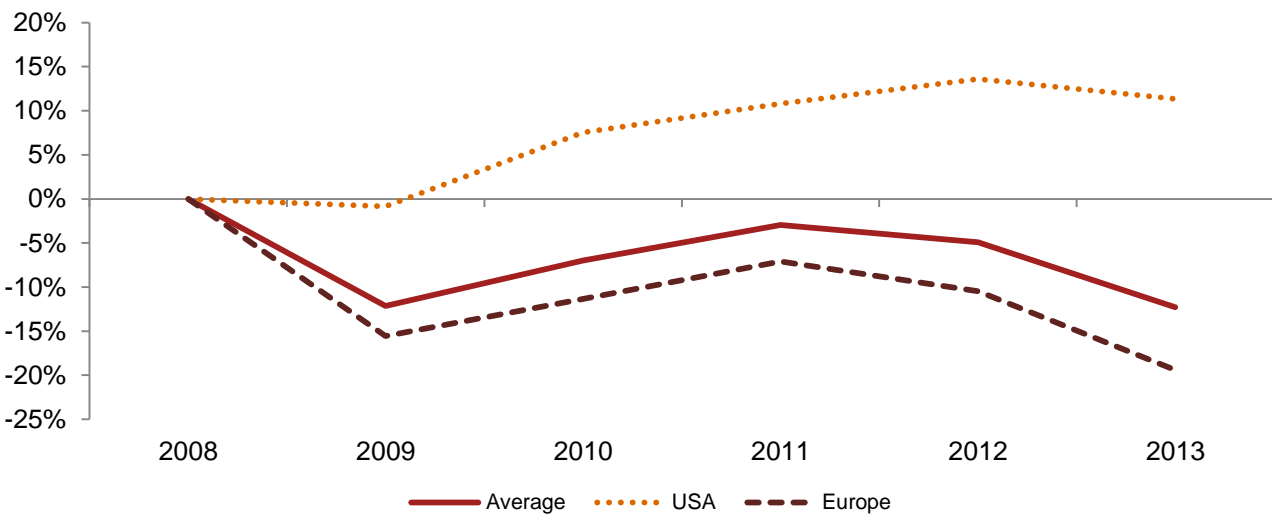
Figure 1: Tier 1 capital growth of 24 banks studied



Source: Annual reports/S&P Capital IQ

2.44. Capital increases have been supported by decreases in balance sheet size, both in terms of total assets and RWAs. Across 24 banks studied, assets have fallen by 12% since 2008 (a reduction of €3.6 trillion) as banks seek to solidify the balance sheet (Figure 2). European banks have outperformed their US peers with regards to asset reduction, and have cut total assets by 19% over the same period. This has driven a significant decline in RWAs – reported RWAs have fallen by 7.5% across sample banks since 2008, and adjusted for changes in Basel methodology this decrease can be estimated at 11.6% (€1.3 trillion across 24 banks).

Figure 2: Change in total assets of 24 banks studied

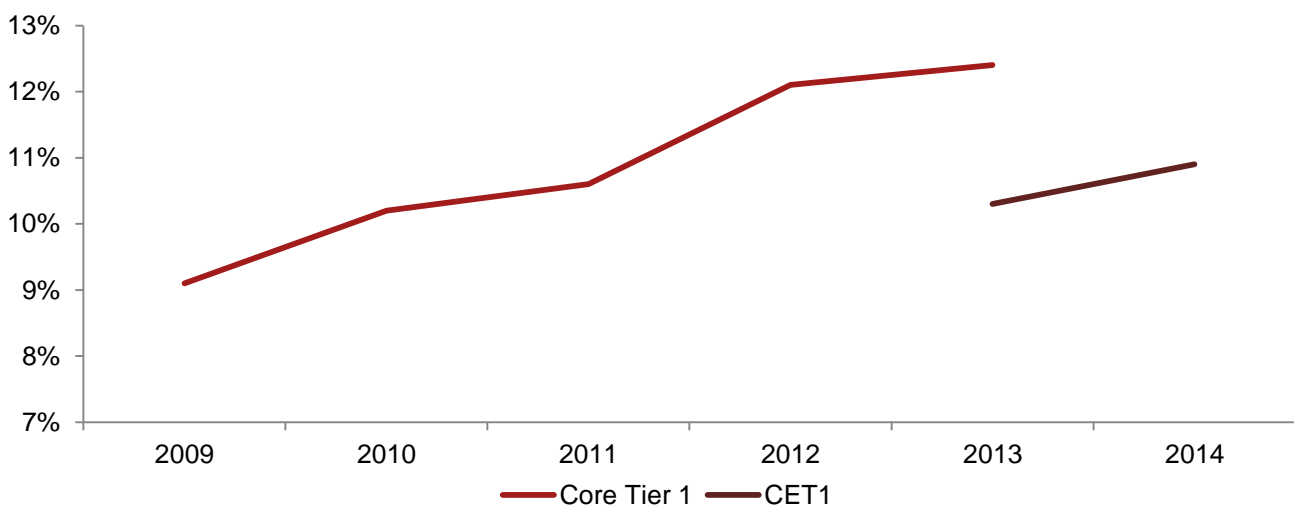


Source: Annual reports/S&P Capital IQ

2.45. As a result of these capital increases and RWA reductions, banks are currently making strong progress in relation to Basel III capital and leverage ratio requirements.

- 2.46. The average Core Tier 1 ratio across 24 banks studied rose from 9.1% in 2009 to 12.1% in 2012. This is shown in Figure 3. Since 2013 banks have moved to reporting Common Equity Tier 1 (CET1) ratios and these too have increased, from an average of 10.3% in 2013 across the 24 banks in 2013 to 10.9% by the end of H1 2014<sup>12</sup>. Additionally, taking into account the additional phased-in capital buffers and the G-SIB loss absorbency requirement, banks are ahead of the regulatory schedule.
- 2.47. Leaving aside the currently non-operational countercyclical buffer, all of the 24 banks studied at H1 2014 have already exceeded the expected minimum fully phased-in 2019 regulatory CET1 ratio requirement of 9.5%<sup>13</sup>. Building upon this, the majority also have explicit plans and targets in place to further improve capital ratios. Although the EBA EU-wide stress test highlighted some shortcomings in the capital ratios of a number of European banks, these tended to be amongst the smaller institutions and no G-SIBs were deemed to have a capital shortfall.

Figure 3: Average Core Tier 1/CET1 ratio of 24 banks studied<sup>14</sup>



Source: Annual reports

- 2.48. Similarly, all of the banks sampled reporting the Basel III leverage ratio had a figure above 3.0% as at H1 2014, with an average of 4.4% across the banks. In addition, using a rudimentary leverage ratio of Tier 1 capital as a proportion of total assets, over 90% of the sample banks have improved leverage since 2006.
- 2.49. These ratios are increasingly being tested under stressed conditions by regulators around the globe, with the Comprehensive Capital Analysis and Review (CCAR) in the United States, the Comprehensive Assessment programme from the ECB (comprising both the stress test and Asset Quality Review), and UK-specific stress testing from the Bank of England. Early indicators from these regulatory analyses suggest that banks have improved with regards to capital adequacy, and that the majority (including all major institutions) are able to cope with stressed conditions.
- 2.50. Alongside this, banks are improving liquidity and funding in order to strengthen the balance sheet and have reported solid progress towards the future liquidity coverage ratio (LCR) and net stable funding ratio (NSFR) requirements.
- 2.51. Balance sheet strengthening has come at a price, however, as banks' capacity to extend credit has fallen as they become less leveraged. Using total assets that can be supported by a given amount of Tier 1 capital as a proxy for market capacity (i.e. the capacity of the balance sheet to undertake financial transactions),

<sup>12</sup> Due to data availability Santander UK CET1 ratio data has been used for average figures, rather than Santander Group.

<sup>13</sup> This is based on CRD IV fully-loaded basis. This is comprised of the base CRD IV CET1 requirement (4.5% of RWAs), the fully phased-in capital conservation buffer (2.5%), and the G-SIB loss absorbency buffer (2.5%). Whilst the G-SIB loss absorbency buffer can be increased to 3.5% of RWAs, the current maximum attributed by the FSB to an institution is 2.5% (to HSBC and JP Morgan Chase).

<sup>14</sup> Tier 1 capital ratios in this figure on CRD IV fully-loaded basis.

this has declined by approximately one-fifth across the studied banks between 2009 and 2013, and by one-third in investment banks.

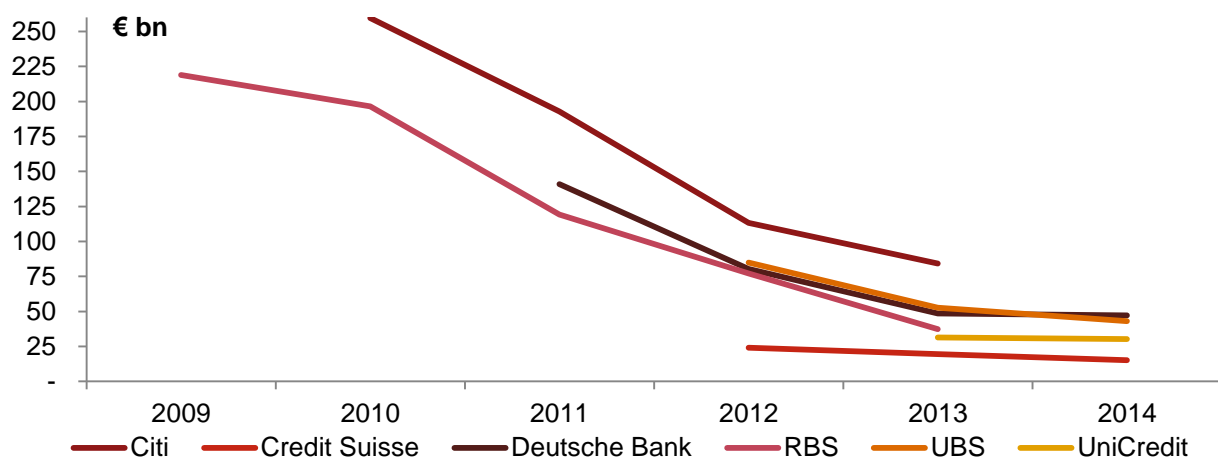
### Non-core initiatives

#### Key points

- Banks are creating non-core divisions to manage, run-off and divest non-core assets.
- Over half of the European-based banks studied have created segregated non-core divisions.
- Over 90% of the European-based banks studied have built a non-core programme or portfolio.
- A study of a subset of non-core divisions suggests that total assets have fallen by 71% within these divisions since inception (a reduction of €912 billion across six banks).

- 2.52. The movement towards strategic re-alignment and balance sheet strengthening has been supported through the creation of non-core divisions, which have helped to reduce assets, exit off-strategy areas and provide greater direction and customer focus to remaining activities. In some cases banks have formed specific divisions to manage, run-off, and divest off-strategy assets, whilst in others segregated portfolios have been created.
- 2.53. Of European-based banks studied, 54% have created non-core divisions, whilst 92% have created some form of non-core programme/initiative. Although non-core asset make-up is institution dependent there are some trends across the industry – a number of banks have moved their FICC business to non-core, whilst non-performing loan and mortgage portfolios are another frequent component of non-core divisions in the wake of the financial crisis.
- 2.54. Within these non-core divisions, there has been significant asset reduction. Amongst a subset of six banks with non-core divisions where total assets have been reported, a cumulative asset reduction of €912 billion within the divisions has been achieved since 2009 (equating to a decrease of 71%).<sup>15</sup> Where reported, RWAs have also fallen within non-core divisions (Figure 4, adjusted for changes in Basel methodology).

Figure 4: Non-core RWAs (adjusted) of six banks reporting the metric



Source: Annual reports

<sup>15</sup> Sample consists of Citi, Credit Suisse, Deutsche Bank, RBS, Société Générale, and UBS.

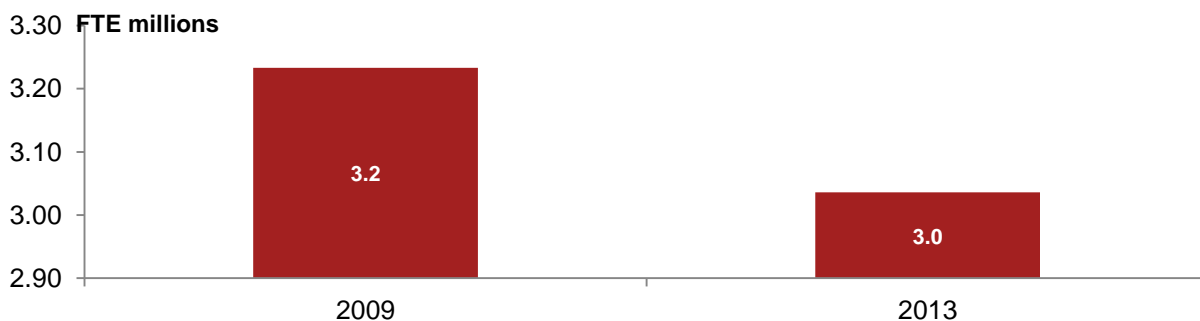
## De-risking of derivative markets and banks

### Key points

- *OTC derivatives reform has strengthened the market:*
  - *Clearing requirements have helped to tackle systemic risk, whilst portfolio compression has reduced the size of the OTC derivatives market.*
  - *Increased transparency around derivative pricing and volumes has been brought about through reporting and the ongoing move to exchange trading.*
- *Banks have made significant cost savings since the financial crisis:*
  - *Across a subset of ten large representative banks, we have identified major cost savings programmes totalling approximately €25.7 billion since 2009.*
  - *Headcount has fallen by an aggregate of almost 200,000 between 2009 and 2013 across 24 banks studied, a decline of 6.1%.*
  - *Risk management has also been high on the agenda, with improvements made across all risk types, including credit, market, liquidity and operational risk.*

- 2.55. Underpinning the balance sheet strengthening underway across the industry has been a general de-risking, at both a global and bank level.
- 2.56. Actions taken by banks in response to derivatives reform (e.g. EMIR, Dodd-Frank Title VII) have strengthened the global derivatives market. Regulatory pressures (such as clearing requirements) have reduced the overall size of the OTC market. The International Swaps and Derivatives Association (ISDA) have estimated that through portfolio compression \$239 trillion of notional amounts of interest rate derivative outstanding has been removed from the market since 2009 (30% of the current total), whilst the FSB have reported that almost half of the outstanding interest rate derivatives are now cleared.<sup>16 17</sup> The margining of uncleared derivatives will add further security to the market when fully implemented under BCBS/IOSCO rules and, furthermore, reporting requirements and the move towards exchange trading have resulted in increased transparency with regards to derivative pricing and volumes.
- 2.57. Finally, banks have responded to the financial crisis by strengthening core business fundamentals, particularly around operational costs and risk management. Significant savings have been achieved throughout the industry as a result of efficiency programmes, and across a subset of ten large representative banks, we have identified major cost savings initiatives totalling approximately €25.7 billion since 2009. The precise focus of each initiative varies by bank, however headcount reduction is a common and significant driver for cost savings – reported headcount fell by a total of 197,195 between 2009 and 2013 across 24 banks studied, representing a total reduction of 6.1% (Figure 5).

Figure 5: Total headcount across 24 banks studied (2009-2013)



Source: Annual reports

<sup>16</sup> ISDA Publication - Interest Rate Derivatives: A Progress Report on Clearing and Compression (February 2014).

<sup>17</sup> FSB Publication – OTC Derivatives Market Reforms: Seventh Progress Report on Implementation (April 2014).

- 2.58. Banks have also undertaken a number of risk management initiatives since the crisis, with improvements made across key risk categories such as market risk, credit risk and operational risk (including conduct and culture).

### *Summary*

- 2.59. Although there is still work to be done and improvements to be made, the steps taken by banks since the financial crisis have been pronounced. As a collective they have served to make the industry more resilient, and robustness will only increase as the RRP process takes full effect. The requirement for banks to hold (total) loss-absorbing capital (TLAC) will also strengthen and operationalise the resolution regime.
- 2.60. Policymakers need to recognise there is a cumulative impact of regulatory change on banks and the wider economy and that future regulatory reforms should carefully review the incremental benefits of adding to these reforms and the economic costs of doing so. In the next Section we review what remains to be done and review the European Commission's proposals for further structural change.

## Section 3: What remains to be done?

- 3.1. In this section, we review structural reform proposals, both in the EU and internationally. We then review progress against the stated aims of structural reform and then propose a framework for assessing current EU proposals for structural reform.

### 3.1 Background on structural reforms

- 3.2. Splitting the wholesale and retail operations of the largest banks was suggested in the Report of the (UK) Independent Commission on Banking<sup>18</sup> headed by Sir John Vickers in 2011, then echoed in principle in the Report of the High-level Expert Group on reforming the structure of the EU banking sector<sup>19</sup> chaired by Erkki Liikanen in 2012. Both suggested organisational splits to reduce the risk that wholesale and investment banking activities could disrupt vital retail banking services, to make it easier for resolution authorities to determine which activities of a failing bank should be continued, and to make it possible to require creditors of failing banks to bear losses instead of taxpayers. UK banks are required to implement their new retail ring fencing requirements by the start of 2019.
- 3.3. The United States has pursued its own form of structural reforms using the Volcker rule in the Dodd-Frank Act. This prohibits banks from conducting certain investment activities with their own accounts (proprietary trading), and limits their ownership of and relationship with hedge funds and private equity funds, also called covered funds. Banks have to fully comply with these rules from July 2015.
- 3.4. The European Commission published its proposals for structural reform in January 2014. The objectives of these reforms are set out in the proposal document:

*“It aims at preventing the residual unmanaged risks in the Union banking system from materialising. It will curtail the artificial expansion of banks' balance sheets, particularly those activities of a purely speculative nature, thereby reducing the risk that tax payers have to step in to save failing banks, and reducing the cost and complexity of any resolution when required.”<sup>20</sup>*

- 3.5. The aims can be split into three:
- Reducing banks' balance sheets, particularly in relation to activities of a speculative nature;
  - Reducing the risk of taxpayers supporting failing banks; and
  - Reducing the cost and complexity of resolution.
- 3.6. In the next section we review progress against these three aims

### 3.2 Reducing banks' balance sheets

- 3.7. In Section 2 we set out our analysis of 24 banks we have studied in detail. Across these banks, total assets have fallen 12.3% from their peak in 2008 to 2013, a reduction of €3.6 trillion. This is a significant reduction in the size of bank's balance sheets.
- 3.8. Of the European-based banks studied with proprietary trading activities pre-financial crisis, almost 90% have since announced a reduction in activities, with over half stating that they have fully exited

<sup>18</sup> <https://hmt-sanctions.s3.amazonaws.com/ICB%20final%20report/ICB%2520Final%2520Report%5B1%5D.pdf>

<sup>19</sup> [http://ec.europa.eu/internal\\_market/bank/docs/high-level\\_expert\\_group/report\\_en.pdf](http://ec.europa.eu/internal_market/bank/docs/high-level_expert_group/report_en.pdf)

<sup>20</sup> EC proposal, Section 1

proprietary trading. This suggests that much of the ‘speculative’ element of banks’ balance sheets has now gone.

- 3.9. There is a complex benefit trade-off in reducing banks’ balance sheets. While inflated balance sheets were a contributory factor in the creation and transmission of risk during the financial crisis, banks deliver their services and support the efficient working of capital markets through holding financial assets. This means that beyond a certain point, reduction in balance sheet size has a direct and detrimental impact on capital markets liquidity and finance provision throughout the economy.
- 3.10. This means that it is not clear that further reduction in the size of banks’ balance sheets is necessarily desirable. As we show in this report, there is a substantial economic cost of further reduction in the size of bank balance sheets.

### 3.3 Reducing the risk of taxpayers supporting failing banks

#### **Key points**

- *A number of recent studies have suggested that the implicit subsidy of the banking sector has diminished substantially since 2008.*
  - *We consider econometric techniques using analysis of bank funding costs to be a robust approach for assessing implicit guarantees compared to analysis of credit support ratings. This is because bank funding costs are a more direct measure of costs to a bank.*
  - *Analysis of current market evidence on debt spreads does not suggest that EU G-SIBs benefit from lower funding costs compared to EU non-G-SIBs. Debt spreads are closely aligned across a range of medium and large banks (including G-SIBs and non G-SIBs).*
  - *Our econometric analysis does not suggest a funding cost benefit for G-SIBs compared to non G-SIBs; the regression coefficient for G-SIBs is statistically insignificant in explaining funding cost differences across banks. Therefore, based on our analytical assumptions, this supports the view that currently, on average, banks do not benefit from any implicit subsidies.*
  - *Our analysis cannot test for the possibility that a higher implicit subsidy may return (e.g. during a period of unexpected financial market stress). Nonetheless, with such substantial changes to the bail-in and resolution approach implemented via BRRD, along with other regulatory changes, this should limit the extent of any reappearance.*
- 3.11. Taxpayers can support banks explicitly, through financial support to avert failure, or implicitly through the expectation of financial support if necessary. The two are linked: expectations of explicit support lead to implicit guarantees. For this reason financial regulators have focussed on implementing reforms which reduce the risk of taxpayers supporting failing banks and, at the same time, reducing the implicit subsidies which large and systematically important banks can benefit from.
  - 3.12. The impact of being TBTF on banks’ behaviours and potential uncompetitive advantages compared to smaller banks has been a topic of research and discussion since the global financial crisis. Most of this research has concentrated on whether G-SIBs benefit from funding advantages compared to smaller banks, as a consequence of this implicit guarantee.
  - 3.13. The analysis of an implicit subsidy (if any), and its current magnitude in the context of EU banks, is essential for an accurate assessment of the need and benefits of further reform of the EU banking sector and also allows a retrospective assessment of any benefits that might already have been achieved through various regulatory reforms. Our report: “*Supplementary Report 1: Is there an implicit subsidy for EU banks?*” provides a detailed review of studies on implicit guarantees in the banking sector and sets out our analysis of implicit subsidies in the EU banking sector. We summarise our findings below.

## *Approaches used to assess implicit subsidies*

- 3.14. There have been a substantial number of studies which estimate the value of implicit subsidies using a range of different approaches. There is significant variation in the estimates produced across these studies, depending on the methodology used, the time period considered and the geographical focus (US, EU etc.). The most commonly used approaches focus on cost of funding analysis using econometric techniques and credit ratings analysis.
- 3.15. Econometric analysis has often been used in studies valuing implicit subsidies involving US financial institutions, for example GAO (2014)<sup>21</sup> and Oliver Wyman (2014)<sup>22</sup>. This approach assesses the drivers of bank funding costs and hence isolates the impact of systemic importance on funding costs. A key challenge associated with using econometric analysis is access to good quality detailed financial market data, which is particularly difficult for EU banks compared to the US<sup>23</sup>. There is also a need to ensure that the parameters are correctly specified and the econometric model is robust and passes key regression specification tests.
- 3.16. A credit ratings based approach has often been used in the EU context, for example OECD (2012)<sup>24</sup>, IMF (2014)<sup>25</sup> and EC (2014)<sup>26</sup>, although a number of studies in the US have also used this approach. This approach relies on rating agencies, such as Moody's, Standard and Poors and Fitch, who report a stand-alone as well as a support rating for the financial institutions they cover<sup>27</sup> – and essentially uses the differences between the two ratings to estimate the level of government support. While credit rating based approaches provide useful evidence on credit risk exposure and the level of implied government support for individual financial institutions, they are fundamentally shaped by the judgement of credit ratings agencies. As such, there is no market basis of assessing the impact of the difference between the stand-alone rating and the support rating – as investors price the risk inherent in the overall rating without specifically differentiating between base-line credit assessment (stand-alone) and the support rating.
- 3.17. Moreover, this approach of segmenting overall rating between stand-alone and (government) support rating has been adopted post-financial crisis across financial institutions and has been influenced by the circumstances around the financial crisis (for example, previous bail outs). At some point this explicit difference may no longer be used and the overall government, political and legislative environment will revert to being one key factor in determining a company's debt rating. Across other sectors, the government, political and legislative environment already plays an important role in determining a companies credit rating and it is therefore unclear how much this supports ratings compared to the explicit support in the case of banks.
- 3.18. Views of credit rating agencies with regards to trends in the level of government support for TBTF banks have emerged recently – for example, Moody's markedly lowered the support component in its overall ratings of SIBs in November 2013.<sup>28</sup>

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<sup>21</sup> 'Large Bank Holding Companies: Expectation of Government Support', GAO-14-631.

<sup>22</sup> 'Do Bond Spreads Show Evidence of Too Big to Fail Effects', Oliver Wyman, available at SSRN 2422769.

<sup>23</sup> Systems such as TRACE (Trade Reporting and Compliance Engine) in the US, make over the counter secondary market information more transparent compared to the EU.

<sup>24</sup> Schich and Lindh, 'Implicit Guarantees for Bank Debt: Where do we stand?', *OECD journal: Financial Market Trends*, Vol. 2012, Issue 1.

<sup>25</sup> 'How Big Is the Implicit Subsidy for Banks Considered Too Important to Fail?', IMF, *Global Financial Stability Report*, chapter 3.

<sup>26</sup> 'Economic Review of the Financial Regulation Agenda', European Commission, *Commission Staff Working Document*, SWD(2014) 158 final.

<sup>27</sup> 'Quantifying the value of implicit government guarantees for large financial institutions', Moody's, *Modelling methodology*, Moody's analytics, 2011.

<sup>28</sup> Moody's (2014), 'Reassessing Systemic Support for EU Banks'.



- 3.19. Our econometrics analysis therefore attempts to improve on some of the challenges associated with the credit rating based approaches by using market pricing information – analysing the statistical relationship between funding costs and key drivers.

### *Studies on the current level of implicit subsidies*

- 3.20. In the US, the most recent evidence based on studies by GAO and Oliver Wyman (both using econometric techniques), suggests that subsidies did exist during the financial crisis, but they have since declined. The most recent estimate of funding cost advantages for G-SIBs was statistically insignificant (Oliver Wyman) or indeed the effects may have reversed (GAO)<sup>29</sup>. The IMF, using the credit rating based approach (amongst a range of other approaches) and also focusing on the US<sup>30</sup>, notes that the subsidy has been declining in the US, consistent with the results from GAO and Oliver Wyman, but that subsidies for financial institutions do still exist and they are at elevated levels compared to the pre-crisis period.
- 3.21. Recent studies in Europe, specifically the UK, show a range of results. Typically they suggest that there has been a decline in implicit subsidies, but the decline is less pronounced than in the US and generally subsidies still exist, as suggested by IMF (2014) and the EC (2014). The IMF finds that implicit subsidies for SIBs in Eurozone economies averaged around 80bps during the peak of the crisis and have since declined to around 50bps more recently (using 2013 data). The EC study calculated a total value for the implicit subsidy of €72-95bn and €58-82bn, for 2011 and 2012 respectively. Although, these results show a reduction between the two years, they suggest that subsidies were still significant in 2012, amounting to approximately 0.5% to 0.8% of EU GDP.
- 3.22. We have used data from Moody's on the stand-alone and support ratings for a range of 50 EU banks over the last 5 years to determine a ratings view on the trends and current level of government support for EU financial institutions<sup>31</sup>. The data is consistent with the results of the studies above, suggesting that ratings support has declined in recent years but still exists and is somewhat comparable to pre-crisis levels.
- 3.23. We have not seen any approach that employs an econometric technique to analyse the recent evidence on levels of implicit subsidies in the EU banking sector.
- 3.24. Overall, the evidence on trends and current levels of implicit subsidies is shaped by the methodology used for the assessment. In the US, studies suggest that the level of subsidies has declined over time, but different approaches support markedly different conclusions on the current levels of subsidies, with econometrics analysis suggesting much smaller subsidies than credit ratings analysis. Similar methodology comparisons are difficult to draw in the context of the EU as, to the best of our knowledge, there is no recent econometric study on the cost of funding for European banks (as there is in the US).

### *Our preferred approach for estimating implicit subsidies*

- 3.25. We use econometric techniques to analyse the relationships between the banks' cost of funding (calculated using the spread of fixed rate senior unsecured debt over a government borrowing cost) and a range of explanatory factors, explicitly including a G-SIB variable which captures the impact on bond spreads for G-SIBs. This approach is consistent with the methodology that has been adopted across some of the previous studies (including Oliver Wyman and GAO) which have explained the relationship between a range of drivers and funding costs differentials across banks of different sizes (and various other related factors such as credit risk). The range of explanatory variables used in our analysis also builds upon the analytical evidence reflected in the research undertaken by some of the other studies (specifically in the US) – our key drivers of funding costs are:

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<sup>29</sup> Oliver Wyman calculate a funding advantage of around 2bps which is statistically insignificant, whereas the GAO study suggests a funding disadvantage of 8bps for large banks (comparing banks with \$1trn in assets to those with \$10bn in assets). However, as part of their assessment they note that funding differentials cannot be consistently attributed to TBTF perceptions and therefore any results should be interpreted with caution.

<sup>30</sup> The IMF note that subsidies for G-SIBs averaged around 30bps at the peak of the crisis whereas current estimates are close to 15bps.

<sup>31</sup> We focused on a sample of 50 banks with a range of asset thresholds with market coverage consistent with our base-line econometric specification.

- a. **Lag of spread** – In our (dynamic) model specification we expect that the bond spread from the previous period has some explanatory power on the spread today. In other words, spread exhibits some persistence over time. We expect the relationship to be positive.
  - b. **Years to maturity** – Years to maturity captures the time remaining in years until a bond's maturity. Although the impact of maturity on spreads will vary with the shape of the yield curve, we expected generally that long-term debt requires a premium in the current environment.
  - c. **Total assets** – Total assets are a core measure of the size of a bank. We have a prior expectation that larger banks have a higher likelihood of benefiting from both economies of scale and TBTF effects. Both of these may reduce funding costs.
  - d. **Leverage** – We define leverage as total liabilities (excluding equity) as a percentage of total assets. Therefore, as this variable increases the bank is said to have higher leverage (a lower proportion of equity relative to total assets). Higher leverage is a measure of a bank's risk and therefore we expect it will lead to a higher cost of funding.
  - e. **Modified Merton (distance to default)** – This represents a measure of default risk. It is calculated using implied share volatility and leverage (where leverage represents the proportion of non-equity funding). For more details on the precise calculation, please refer to Bystrom (2003). As the distance to default increases (as captured by Modified Merton), the cost of funding is expected to decrease.
  - f. **Return on average equity (ROAE)** – ROAE is calculated as earnings from continuing operations divided by average total equity. It is a key business performance measure where higher values signify better performance, and as such we expect that it will be negatively related to the cost of funding.
  - g. **G-SIB variable** – This identifies whether the bank is categorised as a G-SIB. If there are any funding cost advantages, we would expect GSIBs to have a higher likelihood of benefitting from TBTF effects and hence should have a negative relationship with cost of funding.
- 3.26. We use an econometric technique called a system generalised method of moments (GMM) estimator approach, which helps to solve some of the econometric challenges encountered in previous studies which predominantly rely on OLS (ordinary least squared) based approaches<sup>32</sup> One of the key benefits of using the system GMM approach is that it does not specify a particular distribution for the errors, and hence does not depend on the assumption of normality of the error term unlike the simple OLS approach used across other studies. This is important in the context of our analysis due to the presence, in our dataset, of very large or very small banks which may potentially result in the presence of outliers thereby causing the errors to be non-normally distributed.
- 3.27. We focus on a sample of EU banks with assets above €30 billion and cover a range of different countries (including Germany, France, Italy, Spain, Sweden, Switzerland, the Netherlands, and the UK). We use extensive data evidence, covering over 900 bonds across 40+ banks (under our bonds level assessment – as discussed in detail later), analysing spread differentials at both the individual bond level and aggregated bank funding cost level. We perform a range of econometric tests and choose econometric models which pass all regression specification tests and are therefore statistically robust.

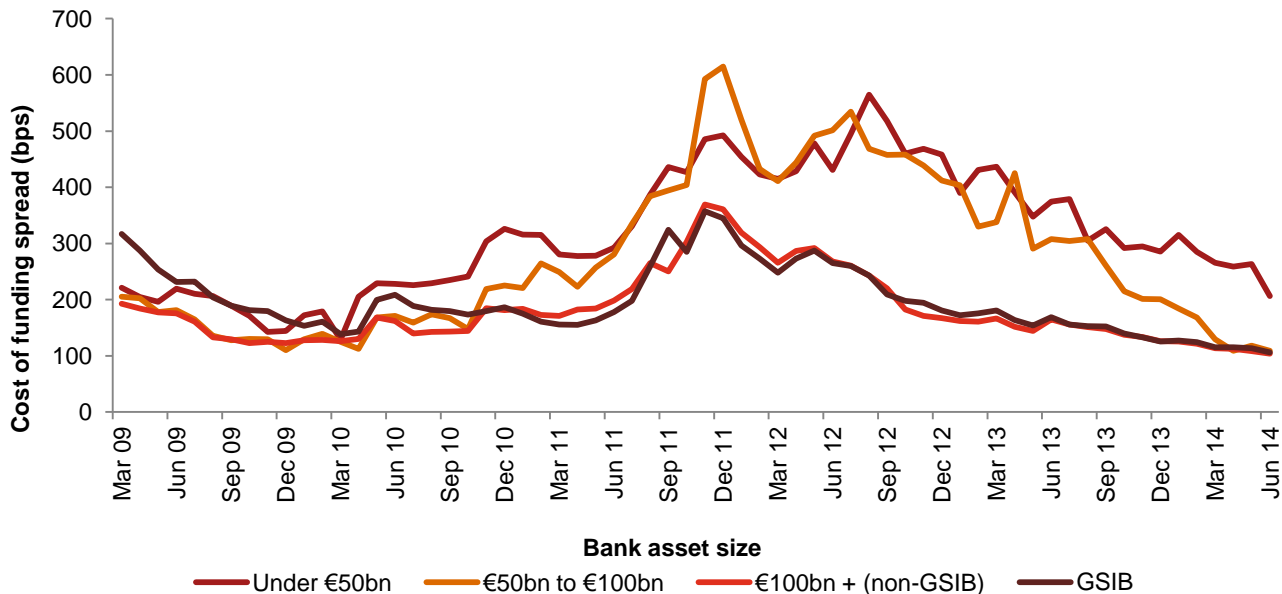
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<sup>32</sup> The GMM approach involves using an instrumental variable-based approach where higher lag values of the lagged dependent variable are used as instruments. In contrast to OLS in which the estimator minimises the squared vertical distances between the observation and the mean (the first moment), system GMM minimises the sample average of the second, third and fourth moments: the variance, the skew and the kurtosis. This differencing also serves to eliminate any potential omitted variable bias and unobserved heterogeneity, which means firms' fixed effects, or firm characteristics that are time-invariant, are accounted for. For more details on this approach, please refer to Baum, Schaffer and Stillman (2007), 'Enhanced routines for instrumental variables/generalized method of moment's estimation and testing.' Boston College Economics Working Paper No.667.

### Comparison of funding costs

3.28. Figure 6 below shows the median spreads on large G-SIBs compared to large non-G-SIBs (€100bn+ assets<sup>33</sup>) and a selection of medium (€50 to €100bn) and relatively smaller sized banks (<€50 bn) over the last five years.

Figure 6: Median funding spread by size cohort



Source: S&P Capital IQ, Thomson Reuters, PwC analysis

3.29. Median spreads<sup>34</sup> across large G-SIBs were higher than those for smaller banks for most of 2009. Between 2010 and 2011, spreads on all banks increased – in part reflecting the greater volatility in financial markets as the Eurozone sovereign debt crisis developed – but spreads on larger banks (with assets of €100 bn+) were markedly below spreads on medium and smaller size banks, and were broadly comparable between G-SIB and non G-SIBs. Subsequently, the spreads across the entire sample of banks declined between 2012 and 2013, although throughout the period the trend of larger banks obtaining lower funding costs continued to be considerable (roughly in the order of around 100bps). More recently the spreads for large and medium sized banks have become more aligned, although funding costs for smaller banks are markedly higher.

3.30. While it is not possible to draw direct conclusions on the impact of implicit subsidies from this graph, the simple comparison of spreads across banks of different cohorts suggests that bank spreads are now well aligned across a range of banks of varying asset thresholds between €50 to €100 bn+ irrespective of being a G-SIB or non G-SIB. Differences in spreads do exist for relatively smaller sized banks. Therefore, the simple comparison of funding costs does not support a lower cost of funding for G-SIBs purely based on size i.e. being a G-SIB does not reduce funding costs, however, this is too simplistic and there are a range of other factors that might influence credit spreads (maturity of bonds, coupon) hence there is a need for more robust econometric analysis.

<sup>33</sup> Based on total assets reported in the balance sheet.

<sup>34</sup> Calculated as spreads to Government bonds. A Eurozone benchmark is used for all Eurozone banks.

### *Econometric analysis of implicit subsidy*

- 3.31. Table 2 below sets out the results from our regression analysis. This model passes all the regression specification tests and covers the most recent time period of January 2013 to June 2014. The key variable of interest is the G-SIB variable which shows the impact on spreads for banks that are G-SIB. The modelled G-SIB coefficient is low and negative, suggesting that G-SIBs have around a 4 bps funding cost advantage compared to banks which are non G-SIB. However, more importantly, the coefficient is statistically insignificant. This suggests that EU G-SIBs do not currently have a funding cost advantage compared to EU banks which are not G-SIB.
- 3.32. Size, which is proxied by total assets, has a relatively small negative (and statistically insignificant) impact on spreads – suggesting that, on average, as size increases (scaled to €100s of billions), the funding cost spreads should decrease (however, this should be interpreted with caution as it is statistically not different from zero). In essence, our analysis suggests that neither the G-SIB variable nor size (statistically) currently explains the difference in funding cost spreads. Indeed, as set out in the Appendix of Supplementary Report 1, this finding is consistent with a range of other model specifications where the G-SIB dummy for the most recent period continues to be statistically insignificant in explaining spreads. Rather we find that credit risk (the ‘Modified Merton’ variable in Table 2 below) is a more important determinant of funding costs across banks, i.e. implying that banks with higher credit risk exposure (i.e. lower distance to default as captured by the Modified Merton metric) are likely to have a higher underlying cost of debt funding. Our model also suggests that the impact of leverage (proportion of non-equity funding) and return on average equity on cost of funding, whilst directionally correct, are statistically insignificant and hence cannot explain differences in funding costs across financial institutions.

*Table 2: Econometric outputs from bonds level assessment*

<b>Dependent variables (spread to benchmark for individual bonds)</b>	<b>Coefficients estimates January 2013- June 2014</b>
Constant	-811.48
Lag of spread	0.57***
Year to maturity	2.83*
Total assets	-1.32
Leverage	981.01
Modified Merton	-124.87*
ROAE	-0.17
GSIB	-4.14
Country dummies	Yes
Number of observations	8,946
<b>Tests</b>	
Nickell Bias	No
Arellano – Bond test AR (2)	Good
Hansen J test	Good

Notes: \* Significant at 10% level, \*\* significant at 5% level, \*\*\* significant at 1% level

Source: S&P Capital IQ, Thomson Reuters, Bloomberg, Moody's, PwC analysis.

## Conclusion

- 3.33. Overall, our analysis suggests that G-SIBs do not currently benefit from a funding cost advantage compared to other non G-SIBs. The changing regulatory landscape within the EU over the last few years may explain this result. For instance there have been significant regulatory developments with a view to making banks more resilient and therefore less likely to be reliant on government support – including the adoption and phased-in implementation of the Capital Requirement Directive (CRD IV) and Capital Requirement Regulation (CRR). Moreover, the European Parliament has voted to adopt the Bank Recovery and Resolution Directive (BRRD), establishing a new framework for managing troubled banks in the European Union (EU), as well as the Single Resolution Mechanism (SRM) regulation, which empowers a Single Resolution Board (SRB) to manage bank resolution in the euro area. While some of these are still evolving and will only be fully implemented in due course, any assessment based on market pricing information does inherently incorporate debt investors' expectations of the impact of these regulatory developments (as spreads capture forward looking expectations of default, and hence take into account the future implementation of regulation).
- 3.34. We note that just because the G-SIBs do not currently appear to benefit from implicit government support based on our assessment, there is still a possibility that this effect might return during a period of unexpected financial market stress in the future. It is inherently difficult to develop a framework to understand the future impact of unexpected periods of financial market distress, particularly beyond the short-term bank funding horizon<sup>35</sup>. We will only truly know that TBFT and associated implicit subsidies have been eliminated when the new regulatory frameworks are put to test in a bank failure situation.

## 3.4 Reducing the cost and complexity of resolution

### Key points

- *The Bank Recovery and Resolution Directive (BRRD) already includes a comprehensive set of measures which require the authorities to assess the resolvability of banks and to make changes to their legal entity and operating models to improve resolvability. The BRRD requires banks to be better prepared for a severe crisis and that resolution authorities should have the necessary tools to intervene early in a troubled institution.*
- *Banks are all starting from very different places with different business mixes, operating models and legal entity structures. This means there will be a different route required for each bank to comply with the proposed structural reforms. An alternative approach which allows bank-specific resolvability assessment and improvement (that is already available under the BRRD) may result in lower costs, but still offer improvements to the resolvability and stability of the financial sector.*

- 3.35. The European Union has successfully executed a series of reforms that address the aims of reducing the likely incidence, contagion effect and potential impact to taxpayers of an institution in crisis. In Section 2 we set out the progress on the BRRD, particularly in relation to the preparation of recovery plans by 2015 to ensure that essential services remain uninterrupted during resolution, the introduction of bail-in tools from 2016 and in tools for asset separation or sale of the firm during insolvency. Furthermore, proposed TLAC requirements aim to provide sufficient loss-absorbing capacity to minimise any requirement for taxpayer support.
- 3.36. In particular, the Banking Recovery and Resolution Directive (BRRD, which came into force in 2014, empowers the Union's bank supervisors and resolution authorities to require changes to the structure and organisation of any individual institution to improve its resolvability. This is set out in the preamble to the BRRD:

<sup>35</sup> To the extent that expectations of future market volatility are already priced into spread differences by investors, as they reflect a forward looking perspective, and given the average maturity of bonds in our sample is around 5-7 years, our assessment already incorporates some degree of forward looking view on the future evolution of implicit subsidies.

*“Resolution authorities, on the basis of the assessment of resolvability by the relevant resolution authorities, should have the power to require changes to the structure and organisation of institutions directly or indirectly through the competent authority, to take measures which are necessary and proportionate to reduce or remove material impediments to the application of resolution tools and ensure the resolvability of the entities concerned.”*

- 3.37. The ability to require changes to legal or operational structures of any group entity is further set out in Article 17: Powers to address or remove impediments to resolvability, Part 5G.
- 3.38. Collectively the tools being implemented through the BRRD will reduce the complexity of resolving a failing bank, which will also allow supervisors to require structural changes. However, the BRRD also states that the measures should be proportionate, which allows for bank-specific resolvability assessments and improvements rather than requiring a once-size fits all approach. This means that most of the benefits of resolvability and stability of the financial sector can be achieved using existing tools and without resorting to industry-wide structural reform.

### 3.5 How to appraise bank structural reforms (given existing reforms)?

#### Key points

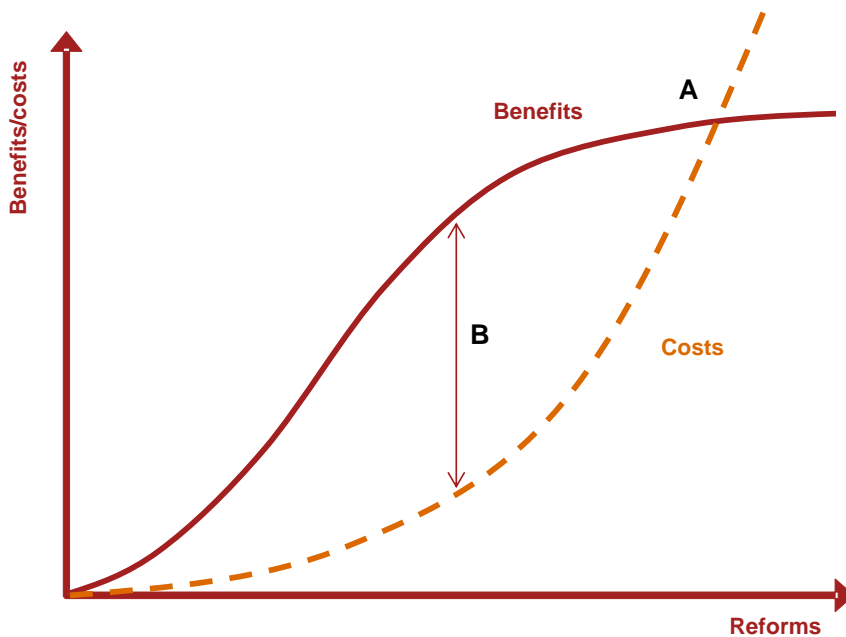
- *Given the now substantially-changed regulatory landscape, it is critical that new regulations are assessed on the basis of their incremental benefits and incremental costs. As a consequence of the powers available to supervisors through the BRRD and benefits already realised, it is unclear whether structural reform will deliver significant incremental benefits.*
- 3.39. Against the backdrop of changes and regulatory levers already in place via CRD/CRR and BRRD, the benefits of additional measures to separate retail from wholesale activities in 2018 must therefore be substantially lower than they would have been before these other measures were implemented.
- 3.40. This suggests that the benefits of reform are therefore both variable and path-dependent. They are variable because they depend on the interaction with other reforms. Where there is overlap, this will dilute the impact of individual reforms. They are path-dependent because earlier reforms will tend to contribute more to financial stability than later reforms. This also means that there is likely to be decreasing marginal benefits of subsequent reforms.
- 3.41. This observation is at odds with the framework typically used for evaluating banking sector reforms. The benefits to financial stability from banking sector reforms are typically assessed by estimating the reduction of the probability and impact of future financial crises. Individual reforms then are assumed to take a share of these financial stability benefits. While such an approach was appropriate at the beginning of the reform journey, there is now a risk that it will overstate benefits of additional reforms.
- 3.42. The challenge for policy makers is that the benefits of reforms are *concave*, as the benefits become progressively smaller with increasing reforms. This is most clear in the case of increasing capital ratios, in the context of the financial crisis. Using information on the cumulative losses across European banks during the period 2007 to 2010, a 4% higher regulatory capital ratio would have helped 17 European banks cover their losses during the financial crisis. A further 4% increase in the capital ratio would have helped 13 banks, but a further 4% would have only helped 3 additional banks. The capital ratio would have had to have gone as high as almost 40% to cover Anglo Irish Bank’s losses.<sup>36</sup> In contrast, the cost of reforms is *convex*. This is because small impacts can be absorbed with smaller impact on economic activity, but as impacts grow, the behavioural response from both banks and consumers leads to more detrimental effects. For example the change of the price of a loan by 5 basis points is unlikely to alter a

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<sup>36</sup> Using calculations of losses from the Independent Commission on Banking Final Report (2011), Page 112. A similar effect can be seen in the MAG (2010) study of the benefits of capital and liquidity requirements, which shows that the benefits of increasing capital and liquidity peak at a certain point, and plateau beyond this point.

business investment decision, but an increase of 2% may cause the investment decision to be deferred, which has broader economic costs. Diagrammatically this is represented in Figure 7 below.

Figure 7: Benefits and costs of reforms



- 3.43. This profile means that there is a risk that legislators enact too many reforms. Rather than looking to the point where overall benefits of reforms outweigh costs (point A on Figure 7 above), the objective should be to maximise net benefits (the gap between the cost and benefits outlined by B on the Figure 7). This requires assessing regulations on the basis of their incremental benefits and incremental costs. Beyond point B, the aggregate benefit of additional reforms may still outweigh aggregate costs, but the additional reforms may come at negative incremental benefit.
- 3.44. We consider there could be incremental benefits of a consistent global approach to structural reform, which should be framed by an incremental cost-benefit assessment.

# Section 4: Analysis of the European Commission proposals

## 4.1 Approach

### EU proposals<sup>37</sup>

- 4.1. The EU proposals are aimed primarily at EU banks and their parents based in the EU, including their subsidiaries and branches wherever they are located. The proposal also states that foreign branches operating in the EU would be covered. The proposals target EU global systemically-important banks (G-SIBs) and credit institutions, which pass the following thresholds for three consecutive years:
  - a. the bank's total assets exceed €30 billion; and
  - b. the bank's total trading assets and liabilities exceed €70 billion or 10% of their total assets.
- 4.2. According to the EU proposals, the entities within scope cannot engage in proprietary trading and are prohibited from investing in or holding shares in hedge funds (or certificates/derivatives linked to these). These activities are also prohibited from being carried out in a separate subsidiary within a deposit-taking banking group.
- 4.3. In addition to the proprietary trading ban, banking groups may also be subject to the separation of markets activities, which include trading and investment banking activities (such as market making, lending to venture capital and private equity funds), in a separate entity from deposit-taking activities, if certain risk thresholds<sup>38</sup> are exceeded. The following activities cannot be carried out within the separated entity and must be carried out within the deposit-taking entity or the core credit institution:
  - a. taking deposits that are eligible under the Deposit Guarantee Scheme in accordance with Directive 94/19/EC of the European Parliament and of the Council<sup>40</sup>;
  - b. lending including consumer credit, credit agreements relating to immovable property, factoring with or without recourse, financing of commercial transactions (including forfeiting);
  - c. financial leasing;
  - d. payment services as defined in Article 4(3) of Directive 2007/64/EC of the European Parliament and of the Council<sup>41</sup>;
  - e. issuing and administering other means of payment such as travellers' cheques and bankers' drafts insofar as such activity is not covered by point (d);
  - f. money broking, safekeeping and administration of securities;
  - g. credit reference services;
  - h. safe custody services; and
  - i. issuing electronic money.

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<sup>37</sup> Proposal for a Regulation Of The European Parliament And Of The Council on structural measures improving the resilience of EU credit institutions

<sup>38</sup> These are yet to be determined by regulators.



- 4.4. Groups subject to separation must ensure legal, economic, governance and operational separation between the markets entity (which undertakes market-making and trading activities) and the core credit institution (which undertakes deposit-taking and lending activities). For example, banking groups must be structured with “functionally homogenous subgroups” – the core credit institution cannot hold shares or voting rights in markets entities. A majority of the board members of one entity cannot serve on the board of the other.
- 4.5. Interactions between the core credit institution and markets entity will also need to be on an arms’ length basis. The core credit institution may not have exposures of over 25% of its capital to any group entity outside its own subgroup. Each separate entity is also required to issue its own debt, unless this conflicts with the group’s resolution plan. The core credit institution may not have exposures over 25% of capital to individual financial institutions or over 200% to financial institutions in aggregate.
- 4.6. The prohibition on proprietary trading activity is scheduled to take effect on 1 January 2017, and the provisions for the wider separation of trading activities is scheduled to take effect on 1 July 2018.
- 4.7. The EU proposals are therefore a mixture of the Volcker Rule in the US – which similarly prohibits proprietary trading<sup>39</sup> – and the UK Financial Services (Banking Reform) Act 2013 – which prohibits deposit-taking banks (or “ring-fenced” banks) from “dealing in investments as principal”. These activities, which include market-making and securities underwriting, must be undertaken in a separate ring-fenced entity, but may be held under the same bank holding company. Whereas the UK reforms focus on ring-fencing the retail bank, the EU proposals place more emphasis on the separation of trading and market-making activities.
- 4.8. The EU proposals depart from the Liikanen report in two important aspects: the first is that it will require the complete prohibition of proprietary trading activities within a banking group that also undertakes deposit-taking activities, even if proprietary trading takes place within a separate subsidiary. Second, the separation of wider markets activities, including trading and market-making are no longer compulsory but are subject to “trigger thresholds” that will be calibrated based on various metrics that reflect the size and riskiness of banking activities beyond core banking activities. These thresholds will be determined by the European Banking Authority and agreed with the Commission<sup>40</sup>. The scope of activities that could be subject to separation is wide: only traditional banking operations such as deposit-taking, lending, money broking and payment services, and trading in EU sovereign debt are excluded from separation.
- 4.9. The structure of the rest of this section is as follows:
  - **Section 4.2** sets out the approach used and the key findings from our analysis of the bank impacts of structural reform, specifically the impact on funding and capital costs, operational costs and one-off implementation costs.
  - **Section 4.3** sets out the impact on key markets, by incorporating the likely impact on banks from the structural reforms and the importance of banks to those markets. This takes account of the role of banks in providing liquidity in capital markets.
  - **Section 4.4** sets out the consequential impacts on the users of banking services.
  - **Section 4.5** sets out the approach used and the key findings from our analysis of the economic costs and benefits of structural reform.

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<sup>39</sup> The EU proposals are a slightly watered down version as its definition of proprietary trading is narrower than under the Volcker Rule.

<sup>40</sup> <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52014SC0030>

## 4.2 Impact of structural reforms on banks

### Key points

- *On a separated basis, the markets entities of EU banks will be small in relation to the size of the universal banks of which they are currently a part. The impact on the core credit institution will be less substantial.*
- *Due to their smaller size and reduction in revenue and funding diversification as separate entities, funding costs will be higher, particularly for the markets entities. Markets entities could experience downgrades (compared to the universal banking groups they are currently in) averaging 3½ credit rating notches and an increase in funding costs of around 70bps.*
- *The leverage ratio is expected to be a significant constraint to separated entities. Banks will have to hold additional Tier 1 capital of €41 billion over and above what is required for a single EU entity in order to meet operational leverage ratio requirements of 4%.*
- *The total costs of structural reform to banks are significant: the European operations of the largest 18 G-SIBs could face additional annual costs of more than €16 billion. The total additional annual costs for all EU banks affected by structural reforms could amount to €21 billion. The industry could also face one-off implementation costs of around €9 billion. Implementing major structural reforms is a complex, multi-year effort, during which the focus of a typical bank will be dominated by internally-driven change.*
- *Fixed-income trading activities are likely to be most heavily impacted: fixed income activities are both funding and capital intensive because they operate through over-the-counter markets and rely on the support of banks' balance sheets (as opposed to exchange traded instruments). Equity and derivatives trading will experience some impact, particularly in prime services. Investment banking advisory services (ECM, DCM and M&A) will be least impacted.*
- *European banks' returns could fall substantially: Group-level pre-tax returns could fall by 2 percentage points on average as a result of structural reforms. Pre-tax returns to banks' investment banking and trading activities could fall by almost 15 percentage points significantly impacting the economic viability of some capital markets operations. More than half of EU banks could experience negative post-reform returns in most of their FICC businesses (rates, credit, commodities, securitisation), which raises serious questions about the viability of these segments in EU banks after structural reforms.*
- *Bank exits in FICC segments would be likely to further reduce secondary capital market liquidity. Banks are likely to mitigate against declines in pre-tax returns by raising prices or exiting from certain market segments: segments where there are few alternatives to banks (e.g. investment banking) could experience long-term price increases of around 10%. Bank exits in some FICC segments could accelerate (we estimate around 9 banks' FICC businesses would become commercially unviable with pressure to exit).*

### Overall assessment approach

- 4.10. We first analysed the broad constitution of the two separated entities – the core credit institution and the markets entity. For these two entities we set out their asset composition, revenues, margins and returns. This provides a pre-reform reference point against which we assess the impacts of structural reform.
- 4.11. We then consider four impacts of structural reforms on banks:
- a. **Bank funding costs:** the standalone markets entity is likely to experience an increase in funding costs due to the inability of smaller entities to achieve as strong credit ratings as the universal banks they are currently a part. There is a potential impact on the core credit institution, but this is likely to be much smaller because of the larger size of core credit institutions.
  - b. **Capital costs:** there is a possible requirement for increased capital for both the markets entity and the core credit institution as a consequence of meeting regulatory capital and leverage requirements in both entities separately.
  - c. **One-off implementation costs** due to the costs of implementing the legal and operational changes required to comply with structural reforms, such as IT infrastructure costs, legal and programme costs, separation of previously integrated functions (e.g. HR and procurement), contract novation and re-documenting client relationships.

- d. **Ongoing operational costs** due to the loss of efficiencies and economies of scale, particularly in the areas of shared services, e.g. duplication of finance/IT infrastructure, HR and procurement costs.
- 4.12. We then aggregate these costs in order to quantify the impact on overall banks' costs and returns at the business segment and group level. We then use these findings to assess the likely behavioural response from banks, i.e. re-pricing or withdrawal from certain markets. This then informs our views on the impact on market liquidity. These are explored in further detail in the market impacts section where we assess the potential market impacts of structural reforms.

### *Scope of separation*

- 4.13. In our analysis, we assume that structural reform results in full economic separation. This means that the two resulting entities may share name, branding and basic support services, provided continuity can be provided in the event of failure of either entity. However, the two entities will not be able to share liquidity or funding resources, and will need to be capitalised on a standalone basis.
- 4.14. The proposals also specify a ban on proprietary trading activity. We have not quantitatively assessed the impact of this ban separately, due to the lack of data on banks' proprietary trading activity, and because many large banks have exited proprietary trading or have scaled down their trading desks in recent years, notably large American banking groups which are subject to the Volcker Rule in the US that bans proprietary trading, such as Citigroup, Morgan Stanley and Goldman Sachs.<sup>41</sup> European banks have also followed suit: large banks like HSBC, Credit Suisse and Deutsche Bank have exited entirely. As a result of these developments, we consider the impact of a proprietary trading ban in Europe is now unlikely to have significant additional impacts.
- 4.15. We considered the impacts of structural reforms on the 45 banks that are based primarily in Europe, which could be affected by structural reform.<sup>42</sup> We also analysed in more detail the impact on 16 global systemically-important banks (G-SIBs) and 2 large domestic systemically-important banks (D-SIBs) which account for 76% of total banking assets that could be affected by EU structural reform. We have assumed (on the basis of the existing information on banks' trading activities), that banks with large markets activities (which include investment banking, market-making and trading) would be required to separate them into separately capitalised subsidiaries.<sup>43</sup>
- 4.16. We analysed the impact of structural reforms on these 18 banks by using data from Tricumen and other sources (e.g. S&P Capital IQ, Thomson Reuters).<sup>44</sup> We analysed banks' segment-level revenues, risk-weighted assets (RWAs) and assets, capital, profitability and returns. Our analysis is based on 2013 data, which captures the impacts of reforms to date, such as capital and liquidity requirements as most banks have either met or are on their way to meeting these requirements. We note that there are likely to be some ongoing effects from other reforms (such as TLAC requirements, leverage ratio requirements etc.), but these have not been taken into account. The data is also adjusted for one-off charges where possible to avoid one-off factors having undue influence on the data. We present information on a non-named basis to preserve bank confidentiality and because we are most interested in aggregate bank and market impacts.
- 4.17. Our analysis of bank impacts do not take into account mitigation actions by banks, e.g. withdrawing from less profitable segments or re-pricing their products and services. This is considered in the markets and economic impact sections that follow.

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<sup>41</sup> See Wall Street Journal (2010) "Goldman to Close Prop-Trading Unit", 4 September 2010, Wall Street Journal (2011) "Morgan Stanley Team to Exit In Fallout From Volcker Rule", 11 January 2011, Bloomberg (2012), "Citigroup Exits Proprietary Trading, Says Most of Unit's Workers to Leave", 27 January 2012.

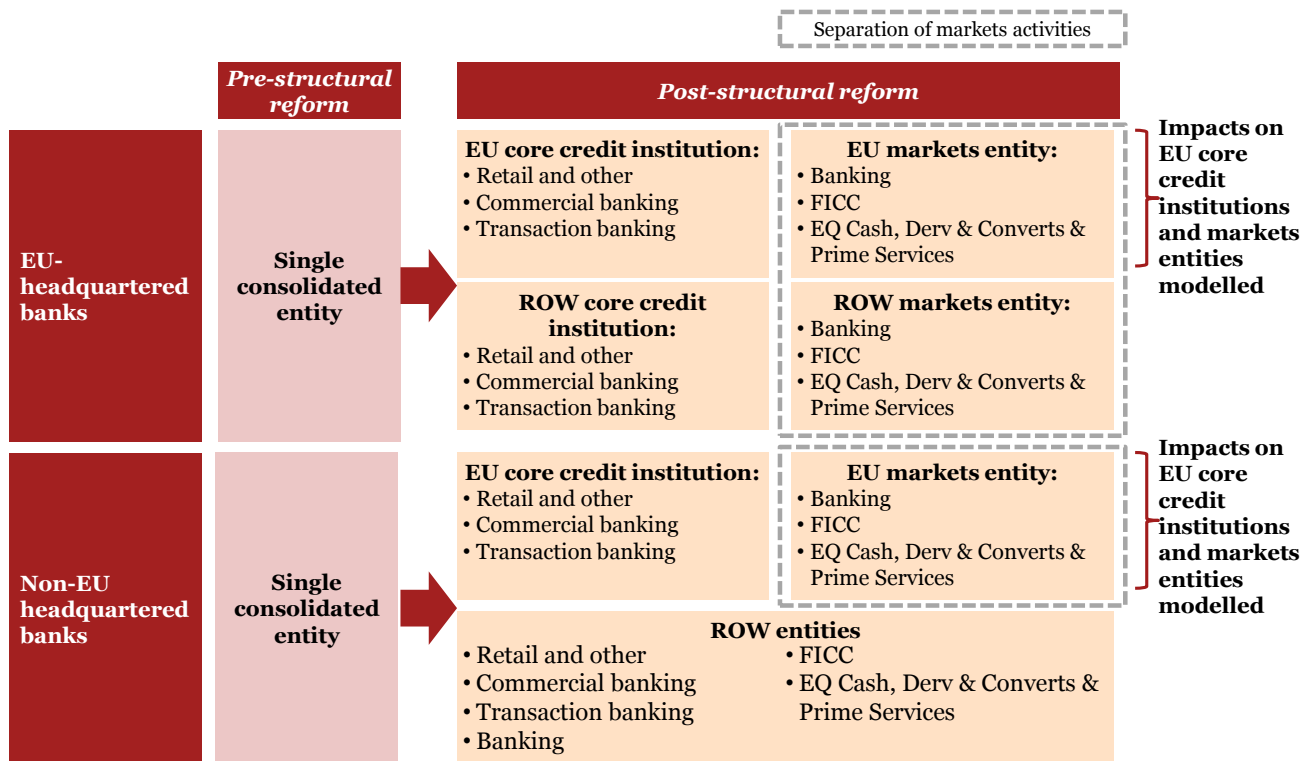
<sup>42</sup> A list of the banks likely to be affected by structural reform are included in Table 10.

<sup>43</sup> The assets of EU activities of the 18 banks in our analysis range from €130 billion to €1,185 billion, with an average of €551 billion.

<sup>44</sup> Tricumen definitions and coverage of banks' capital markets activities are provided in Appendix 3

4.18. Figure 8 summarises the impact of the EC’s structural reform proposals on banks’ operations. We assume that EU-headquartered banks will separate all their markets activities from the rest of the group on a global basis, which will be rehoused in a markets entity. These markets activities include investment banking, fixed income, commodities and currencies (FICC) and equities segments. Non-EU headquartered banks will separate only their EU markets activities from the rest of the banking group. However, the focus of our assessment is the impact of structural reform on banks’ (both EU and non-EU headquartered) operations within the EU. This means there may be additional impacts on EU banks’ global operations, but these have little impact on the EU economy and so are not considered in our analysis. This does mean that any dividends (or loss of dividends) from non-EU entities of EU headquartered banks remitted back into the EU are not captured in our analysis.

Figure 8: Impact of the EC’s structural reform proposals on banks’ operations



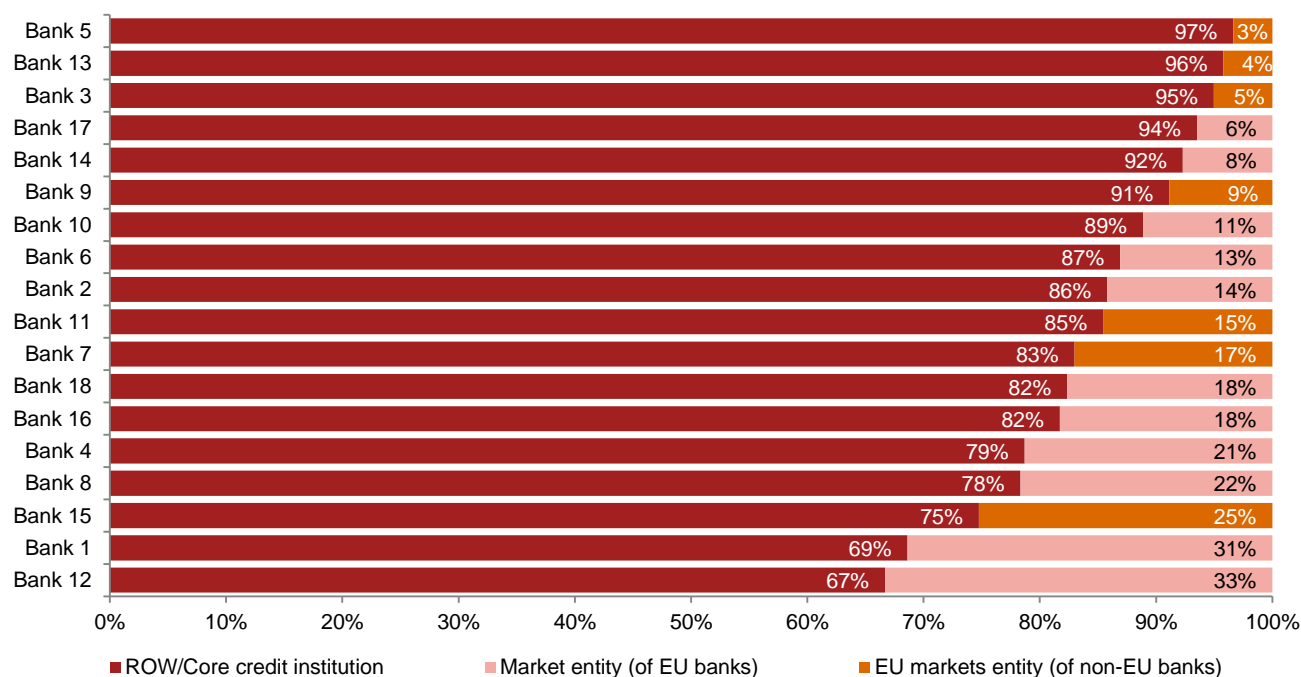
4.19. We note that foreign subsidiaries of EU banks may be exempted if they are subject to equivalent separation rules or are subsidiaries of banking groups that have an autonomous geographic decentralised structure pursuing a multiple point of entry resolution strategy.<sup>45</sup> However, due to the lack of available data on the operating structure of banks in our sample, our analysis assumes that all foreign operations of the EU banking groups within scope would also be affected (consistent with the European Commission’s aim of creating a level playing field). The EU operations of banks headquartered in non-EU countries are considered in our study. We note that the branches of non-EU headquartered banks may seek exemption from European structural reform if they pass the EU equivalence test. It is not presently clear which jurisdiction would meet this test.

4.20. In addition, national authorities in the UK, France, Germany and Belgium have also proposed or introduced structural reform for domestic groups that vary in scope and depth. There is some scope for countries that have introduced “super-equivalent” measures of structural reform to derogate from the EU’s proposals in order to avoid costly alignment of existing provisions with its own proposals. However, it must be demonstrated that the national rules are not incompatible with the proposed EU regulation.

<sup>45</sup> “Proposal for a Regulation of the European Parliament and of the Council on structural measures improving the resilience of EU credit institutions”

- 4.21. Because the intention of national authorities for structural reform is ideologically similar to the EU proposals, we keep all UK, French, German and Belgian banks in our analysis. To remove them would omit the impact of any structural reform in these countries and conversely to assume both national and EU regulation or “double ring-fence” would seem to be overly excessive (but remains a possible outcome). This means our analysis provides an estimate of EU-wide structural reform, but does not capture any of the national variations which may increase or reduce both effectiveness and impact.
- 4.22. Below, we set out in more detail banks’ capital markets segments that we assume will be placed in the separate markets entity:
- a. **Investment banking:** Investment banking activities include equity capital markets (ECM), debt capital markets (DCM) and mergers and acquisitions (M&A) advisory. ECM and DCM activities help corporates raise financing from capital markets by underwriting issuance of debt and equity securities (e.g. via IPOs), as well as market and distribute these issues to a global pool of investors. Banks also advise corporates on the initiation, execution and closing of large transactions.
  - b. **FICC:** FICC activities focus on the buying and selling of bonds (or “fixed income”, which can be categorised in rates and credit), currencies (FX) and commodities. These activities help corporates manage financial risks associated with investment, production and trade by providing a range of instruments that suit corporates and investors’ particular funding or hedging needs, and maturity and risk profiles. Banks also play an important role in providing secondary market liquidity by making markets and holding inventory to enable investors to trade investments quickly and at low transaction costs.
  - c. **Equities:** Banks’ equities business focuses on equity trading, and includes cash equities, derivative instruments such as futures, options and swaps. Banks also provide prime brokerage services to large institutional clients and hedge funds so that they are able to trade across multiple asset classes and with multiple brokers while maintaining a central account with the prime broker.
- 4.23. In Figure 9, we show the allocation of group global assets into the markets entity and the core credit institution following structural reform. For the EU-incorporated banks in our sample, the assets within the markets entity (both in the EU and third counties) account for around 6-33% of total group assets. For non-EU incorporated banks, this ranges from 3-25%.

Figure 9: Group global assets - structural reform will create smaller and weaker markets entities compared to the banking group as a whole



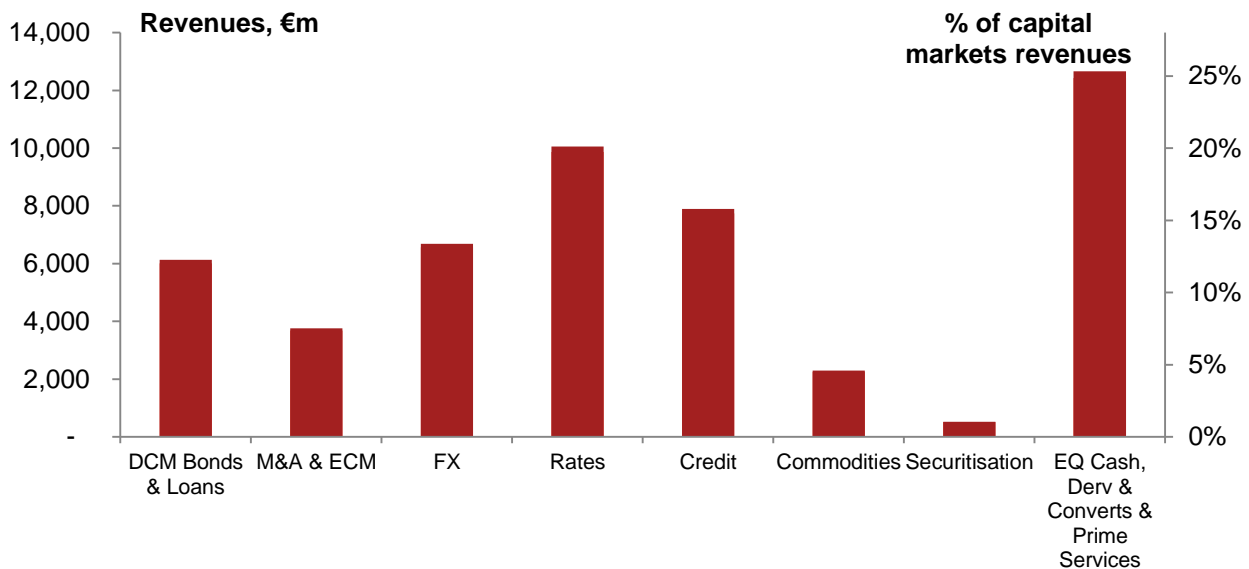
Source: Tricumen, PwC analysis

### Key capital markets businesses

4.24. In this section we review the performance of key capital markets businesses.

4.25. Figure 10 shows the total capital markets revenues in the EU for the banks in our analysis in 2013. Total capital markets revenues amount to around €49 billion in 2013. Rates, credit and FX account for a significant proportion of capital markets revenues, at 20%, 16% and 13% respectively for our sample of 18 banks.

Figure 10: Banks' capital markets revenues in EU, 2013



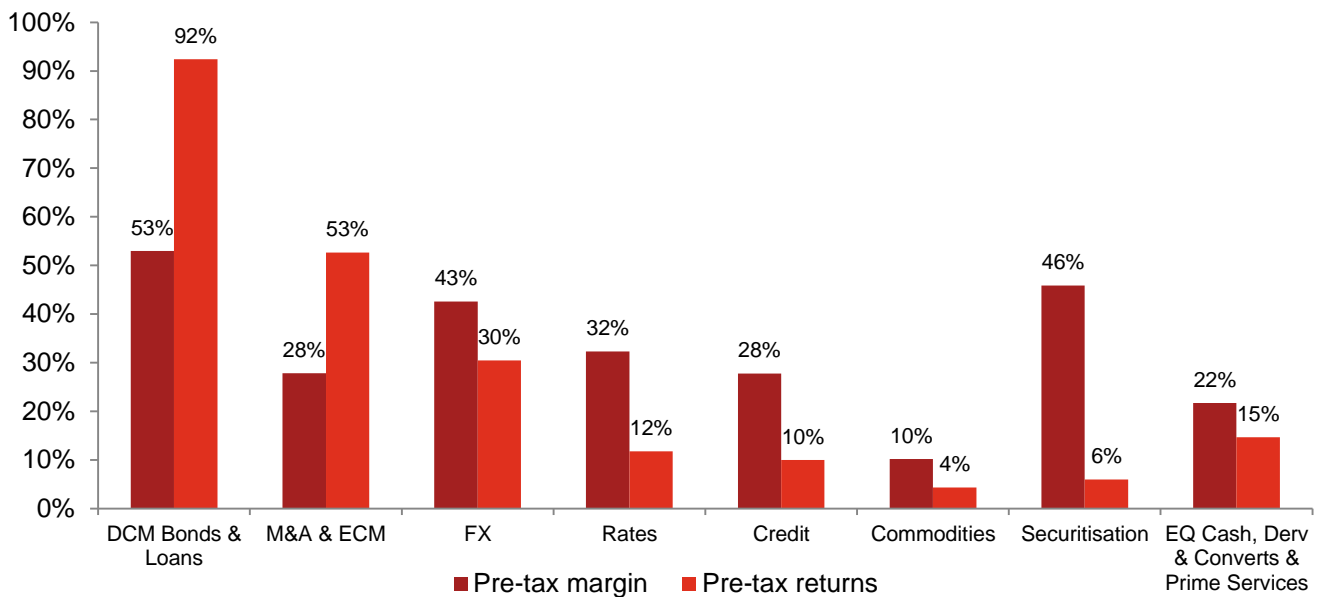
Source: Tricumen, PwC analysis

4.26. The pre-tax margins and returns for capital markets activities are shown in Figure 11.<sup>46</sup> We impute an equity value based on segment RWAs to calculate pre-tax returns on equity. Investment banking activities such as DCM and ECM (including M&A advisory) typically enjoy higher margins and returns in comparison to other activities, as these are more client-driven and require lower capital employed.

4.27. Regulatory pressure on capital-intensive FICC segments has dampened profitability, as shown in Figure 11. The changes to market infrastructure introduced by MiFID II and EMIR have increased trade transparency by encouraging central clearing for OTC derivatives. The shift to central clearing also necessitates the posting of increased amounts of collateral and margins, which have added to operational costs. The increasing dominance of electronic trading also marks the shift towards more passive investment strategies which generate lower margins.

<sup>46</sup> Pre-tax margins are calculated as the ratio of pre-tax profits to revenues. Returns are calculated as the ratio of pre-tax profits to equity capital within each segment. Revenues consist of net interest income and other income. Pre-tax margins and returns are calculated after operational costs and before tax and one-off/exceptional costs. Operational costs exclude one-off non-operational items (e.g. fines and restructuring costs), insurance-related benefits & claims, and credit expense/recovery/provisions for non-performing loans. Equity is imputed from segment RWAs and each bank's equity capital ratio.

Figure 11: Pre-tax returns and margins for capital markets activities



Source: Tricumen, PwC analysis

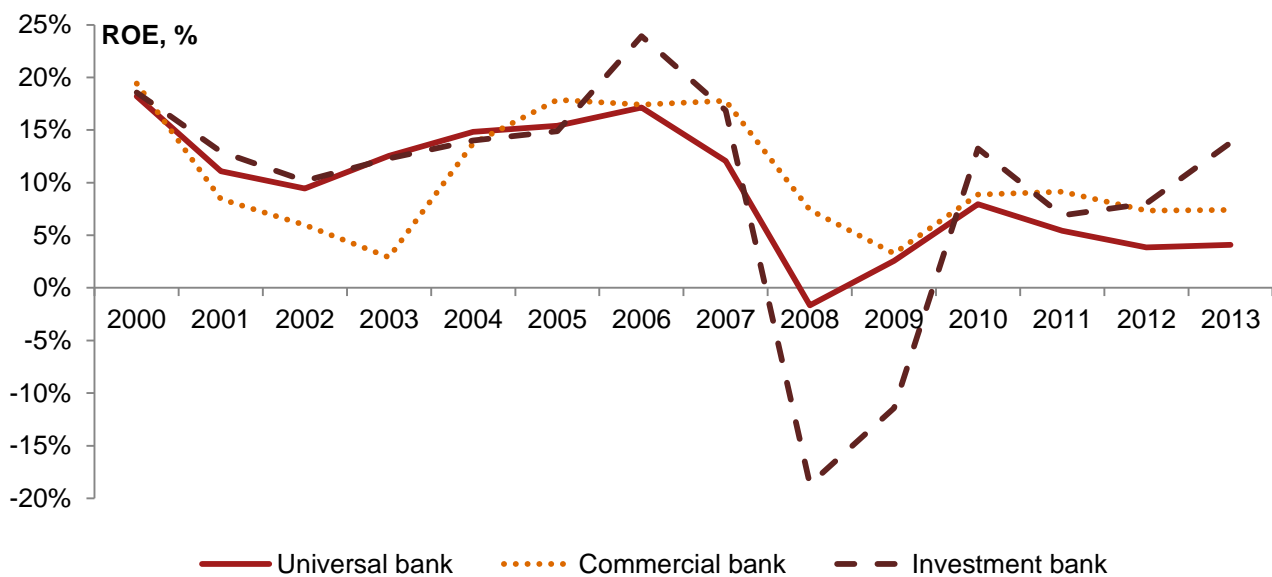
4.28. In the next section we review the impact of structural reform on bank funding costs, capital costs and operational costs.

### Funding costs

4.29. Standalone markets entities are likely to face an increase in funding costs. A more diversified business model and income streams mean that universal banks should be more resilient to shocks than standalone entities. Casalin and Dia (2011) provide empirical evidence for the ability of universal banks to mitigate the pro-cyclicality of revenues from lending activities with fees from underwriting bonds, which are typically counter-cyclical. The authors also state that “the diversification benefits that universal banks can achieve cannot be easily obtained by the banking system through other instruments, and a system based on universal banking can potentially be safer and more efficient than one in which institutions undertake separate banking activities”. Elsas, Hackethal and Holzhauser (2010) also provide evidence to show that revenue diversification increases bank profitability and is associated with higher market valuations.

4.30. Figure 12 illustrates the benefits of revenue diversification enjoyed by universal banks. The chart shows the return on equity of a representative sample of large universal and specialist banks in Europe and the US. The returns over time for universal banks are generally more stable than those of commercial and investment banks, and this is borne out by the fact that the standard deviation of annual return on equity (ROE) is lowest for universal banks, followed by commercial and investment banks. This suggests that the activity restrictions on both the core credit institution and markets entities as a result of separation could lead to a loss of revenue diversification, which is likely to lead to greater volatility in revenues and an increase in risk.

Figure 12: Average post-tax return on equity



Source: S&P Capital IQ

- 4.31. The restrictions on the fungibility of capital and liquidity as a result of separation could therefore undermine the benefits from funding diversification. First, because the markets entity no longer has access to internal sources of finance, it must seek funding from wholesale markets to fill any funding gap left by deposits, and the cost of additional funding is likely to be higher than the cost of internal sources of finance. Second, the markets entity's funding position will also be negatively affected due to the lack of a stable funding base (i.e. deposits) and its sole reliance on sources of wholesale funding.
- 4.32. These factors mean that although the banks in our sample all currently have investment grade ratings, the creditworthiness of standalone markets entities could be weaker than those of investment banking divisions which benefit and contribute to diverse universal banks. This is likely to result in an adverse impact on the credit ratings of standalone markets entities. Credit rating agencies have also indicated that structural separation could lead to ratings downgrades of several notches for the markets entity, with a potentially smaller impact on the core credit institution.<sup>47</sup> Deng, Elyasiani and Mao (2006) also show that activity diversification is negatively associated with banks' bond yield spread.<sup>48</sup>
- 4.33. To put this into perspective, we show the relative diversification of banks' standalone markets entities against their assets in Figure 13. If the banks' capital markets revenue streams are more diversified, it would appear higher along the Y-axis.<sup>49</sup> The average universal bank is indicated separately to show that it has a good typical credit rating due to its size and relative diversification. However, the separated markets entities of our sample of EU banks will be a significantly smaller fraction of the size of their banking groups compared to the average universal bank. Consistent with the views of credit ratings agencies, we expect these smaller standalone entities could struggle to retain their investment-grade ratings.

<sup>47</sup> For example, Standard and Poor's have said that "banking groups whose systemically-important retail banking units that have ratings around the A category, could under our criteria, have markets entities with ratings around the BB category, or at best, the BBB category." See Standard and Poor's (2013) response to the European Commission's consultation paper on "Reforming the structure of the EU banking sector."

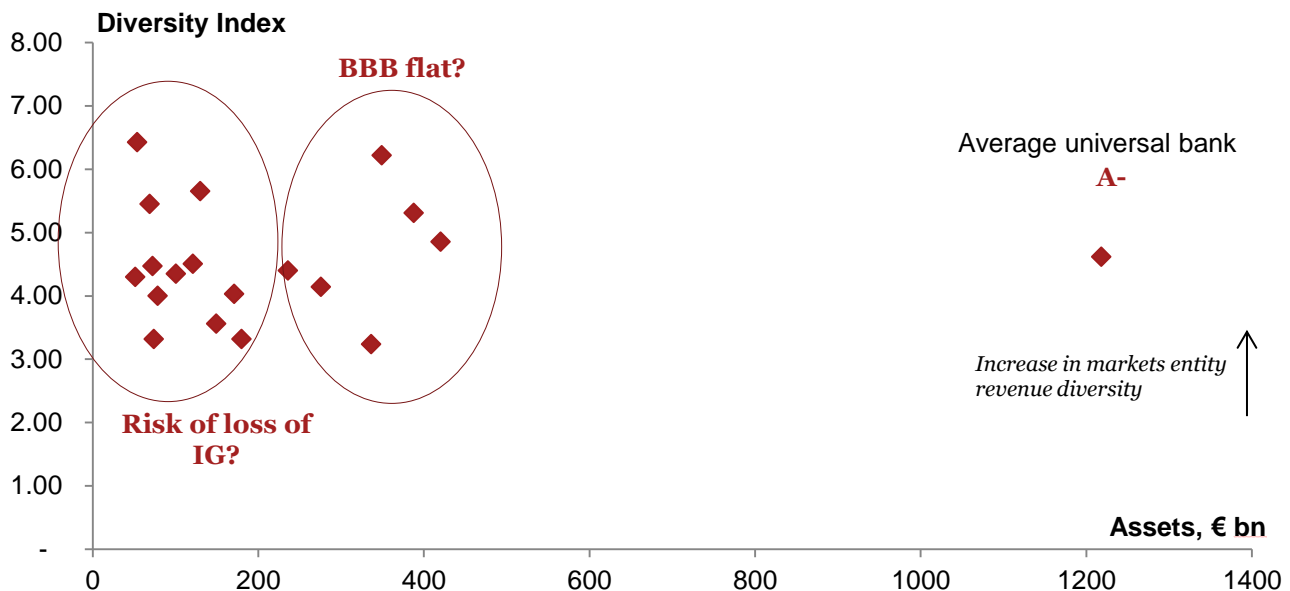
<sup>48</sup> This is true when yield spread and activity diversification is estimated in a simultaneous equation framework. The authors also note that medium-sized bank holding companies also experience a greater reduction in the bond yield spread relative to small- and large-sized bank holding companies.

<sup>49</sup> Banks' diversification is measured as the inverse of banks' HHI. The HHI is the sum of the squared revenue shares across segments in the markets entity (i.e. investment banking, FICC and cash equities).



4.34. We estimate the change in banks' funding costs by quantifying the difference in average yields as a result of the expected number of rating downgrades experienced by the standalone markets entities. We consider banks whose standalone markets entities are in excess of €200 billion to have medium credit quality (or downgraded to BBB), whereas we assume smaller markets entities with total assets below €200 billion experience a loss of their investment grade rating (downgraded to BB).

Figure 13: Banks Diversity Index vs size



Source: PwC analysis

4.35. There is a typical relationship between credit ratings and funding costs. Appendix 5 contains more information on the relationship between average yields associated with different ratings for sterling- and euro-denominated bonds respectively. A one-notch downgrade from A- to BBB for a sterling-denominated bond results in an increase in funding costs of 69 bps. Banks' standalone markets entities could face around 1-5 notch downgrades, and additional funding costs of around 35-138 bps.

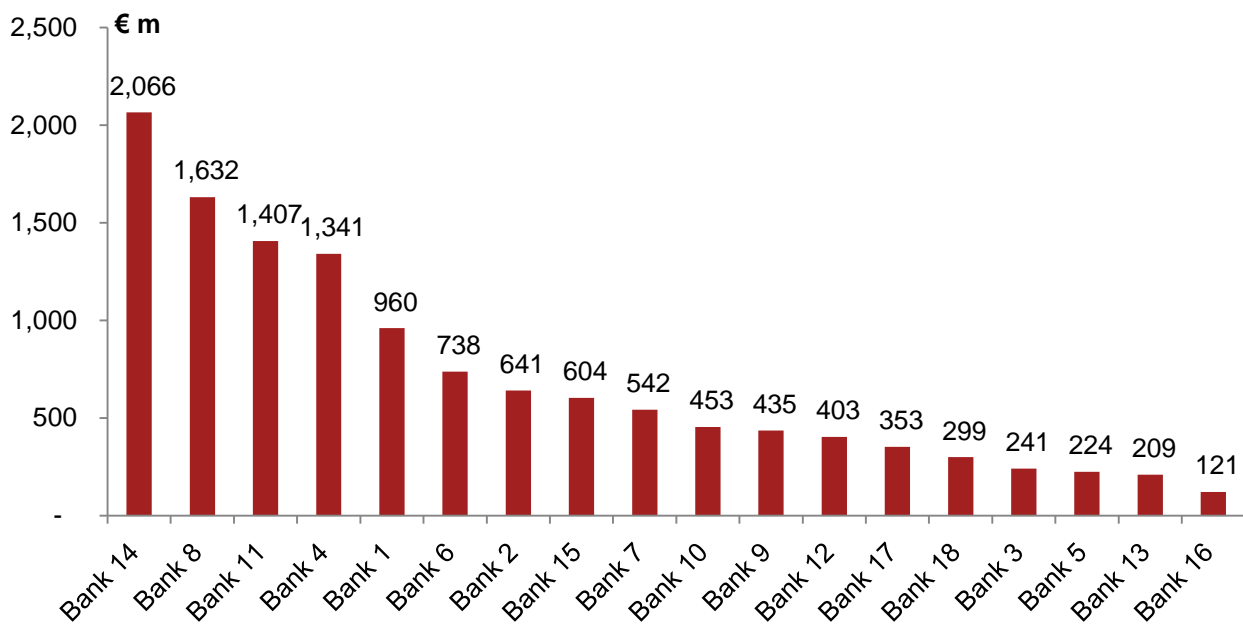
4.36. Our estimates of funding cost increases are similar to those in other studies. Deutsche Bank (2012) estimates that the pure broker-dealer investment banks in the US have 100-150 bps higher funding costs than for an integrated universal bank, which will result in increased interest costs in the order of €70 billion in Europe. In its assessment of the UK Financial Services Bill on the impact of ringfencing, HM Treasury estimated the increase in funding costs for the standalone markets entity to be of the following magnitudes<sup>50</sup>:

- a. Subordinated debt: +75 -150bps.
- b. Long-term senior unsecured debt: +25-100bps.

4.37. We estimate the markets entity's total funding requirements by allocating group-level liabilities to each segment based on each segment's RWAs. The total funding requirement (excluding equity) of the separated markets entities at the EU level amounts to €1.9 trillion, of which deposits account for 45% of total funding. We quantify any funding shortfall for the markets entity due to the loss of deposits funding, which the markets entity will need to cover at a cost that corresponds to its new credit rating. The markets entity will also experience higher overall funding costs on the remainder of its funding. We show the additional funding costs for each bank's standalone markets entity at the EU level in Figure 14. The markets entity for the banks in our analysis will face additional funding costs of around €12.7 billion as a result of structural reform.

<sup>50</sup> HM Treasury (2013) Impact assessment of the Financial Services (Banking Reform) Bill

Figure 14: Additional funding costs for markets entity



Source: PwC analysis

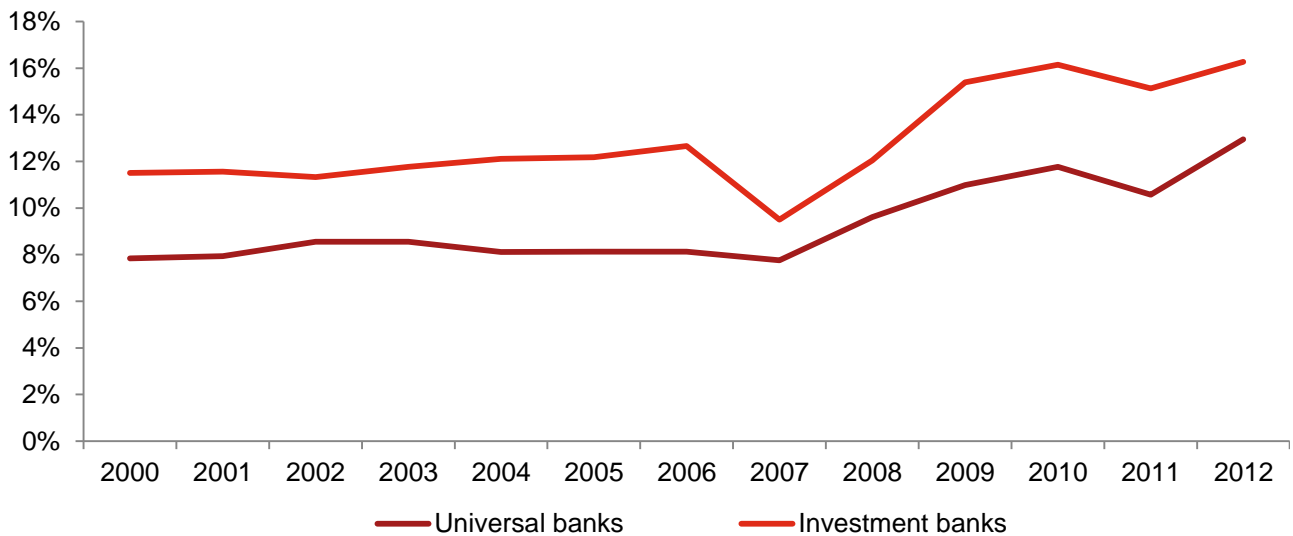
- 4.38. Finally we assess the impact on the core credit institution. Following separation, all deposits are assumed to be placed within the core credit institution. Within universal banks, maturity transformation is generally controlled using a transfer pricing process to incentivise balance sheet consumption in the interests of the whole bank. The core credit institution will also no longer have access to internal capital markets and could lead to a position of excess deposits, which are likely to be invested in low-risk, low return assets. However, we expect this effect to be transitional and can be mitigated over time by reducing deposit and/or increasing lending.
- 4.39. The loss of revenue and funding diversification (including the increase in revenue volatility) could lead to an increase in funding costs for the core credit institution. However, as we set out in Section 3, some smaller retail banks are able to achieve lower funding costs (provided they have the appropriate risk appetite – e.g. lower loan-to-value (LTV) ratio limits in residential mortgages). This means there could be small impacts on the core credit institution’s funding costs. However, these have not been explicitly quantified.
- 4.40. We have not looked specifically at the incremental impact of meeting liquidity requirements such as the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR) in the post-structural reform environment, due to the lack of up-to-date and consistent data on banks’ LCR and NSFR ratios. We expect that the liquidity effects will be less marked than the impact of meeting the leverage ratio requirement as separate entities (see next section), as liquid assets are less constrained by multiple regulations and can be allocated across the entities as needed. However, there could be a need for higher liquidity buffers to meet internal operational or management requirements, in a similar way to holding additional capital as management buffers.

### Capital costs

- 4.41. Functional separation could also constrain the efficient deployment of capital resources. Multiple entities are likely to require more capital in aggregate than a single entity to meet regulatory capital requirements. For instance, the management of the two separate entities are likely to require higher management capital buffers as each no longer benefits from diversification across the group. The separation of entities across geographic lines could also require higher management buffers. Partly for these reasons, investment banks historically have higher capital levels than universal banks to reflect elevated levels of risk within the business, and higher capital buffers can also benefit the bank in

attracting wholesale funding at comparable rates to universal banks. Figure 15 compares Core Tier 1 capital ratios for universal banks and investment banks over the period 2000 to 2012.

Figure 15: Core Tier 1 ratios for universal banks vs investment banks



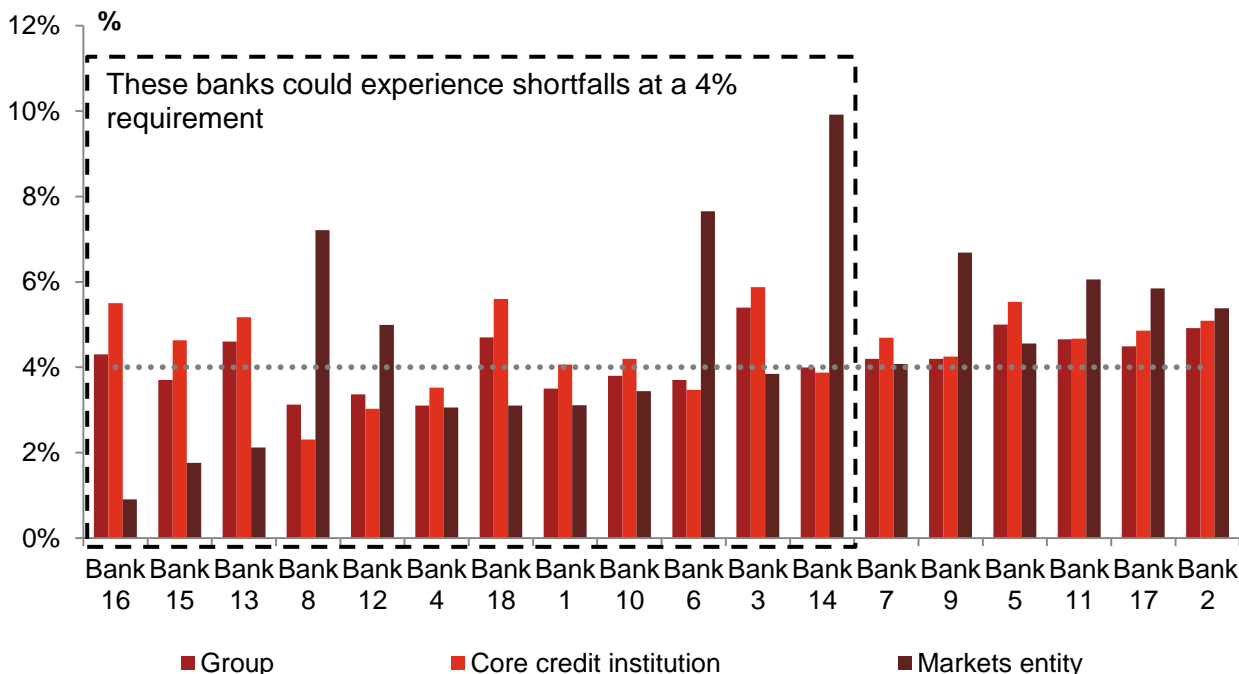
Source: S&P Capital IQ

- 4.42. Regulators are also seeking higher capital buffers: in the UK, the Independent Commission on Banking recommended that the ring-fenced bank should be required to hold an additional buffer of up to 3% of RWAs, but this will be net of any G-SIB or D-SIB buffer the group holds. It also recommended large ring-fenced banks and UK G-SIBs should also be required to hold primary loss-absorbing capital of at least 17% RWAs.
- 4.43. Our analysis therefore assumes that banks will require additional capital of 1% of RWAs for both the separated core credit institution and markets entity. On this basis, the banks in our sample will be required to hold €48 billion in additional common equity tier 1 (CET1) capital. The cost of this additional capital is estimated to be around 10% for the banking sector based on various academic studies.<sup>51</sup> However, the Modigliani-Miller theorem suggests that as more equity capital is used, the volatility of return on equity falls and the riskiness of debt declines, so that the required rate of return on both sources of funding declines, so that the overall weighted average cost of capital remains the same (Modigliani and Miller, 1958); in short, changes in a bank's capital structure should not affect its overall cost of capital.
- 4.44. There are various reasons why this does not always hold exactly; one obvious reason is the difference in the tax treatment of debt and equity financing. Companies can deduct interest payments but not dividends against corporate tax payments. Furthermore financial market frictions and empirical analysis of required equity returns suggests this relationship does not hold perfectly. Miles, Yang and Marcheggiano (2011) show that the offset effect is about 70% of what it would be if the Modigliani-Miller theorem held precisely, therefore we discount the additional cost of equity capital by 70%. Based on this, banks will face an additional annual cost of €1.4 billion due to additional equity capital requirements.

<sup>51</sup> See Zimmer, S. and McCauley, R. (1991), "Bank cost of capital and international competition", FRBILLION Quarterly Review, Winter, pp. 33–59; King, M. (2009), "The cost of equity for global banks: a CAPM perspective from 1990 to 2009", BIS Quarterly Review; and Capie, F and Billings, M (2004), "Evidence on competition in English commercial banking, 1920–70", Financial History Review, Vol. 11(1), pp. 69–104.

- 4.45. This is lower than the HM Treasury’s estimates of the cost of additional equity capital as a result of UK ringfencing, which is around £1.3-2.6 billion for 5 UK banks.<sup>52</sup> It is unclear whether the HM Treasury’s estimates took into account the Modigliani-Miller offset, which could explain the difference in the cost of additional equity capital estimated in our analysis and by HM Treasury.
- 4.46. The CRD IV package of reforms in Europe also requires banks to hold sufficient capital to meet a minimum leverage ratio requirement of 3% from 2018 onwards.<sup>53</sup> The leverage ratio requirement serves as a non-risk based ‘backstop’ to the existing risk-based capital requirements. The European Commission is currently consulting on the appropriate level of the leverage ratio, but the UK Financial Policy Committee has recommended a leverage ratio which depends upon the cycle of the economy, but reaches up to 4.95%.<sup>54</sup>
- 4.47. If a high leverage ratio requirement is set, then it is more likely to constrain one entity when the overall group would not have been constrained in an integrated bank. Figure 16 shows the leverage ratio for each banking group (pre-structural reform), and for the separated EU core credit institutions and markets entities (post-structural reform).

Figure 16: Leverage ratios at the current group level and for separated entities<sup>55</sup>



Source: Banks’ annual reports and regulatory disclosures

<sup>52</sup> HM Treasury estimates the additional equity capital required to be around £16.4 billion as a result of UK ringfencing.

<sup>53</sup> The CRD IV framework also requires leverage ratio reporting from January 2014, with public reporting from 2015

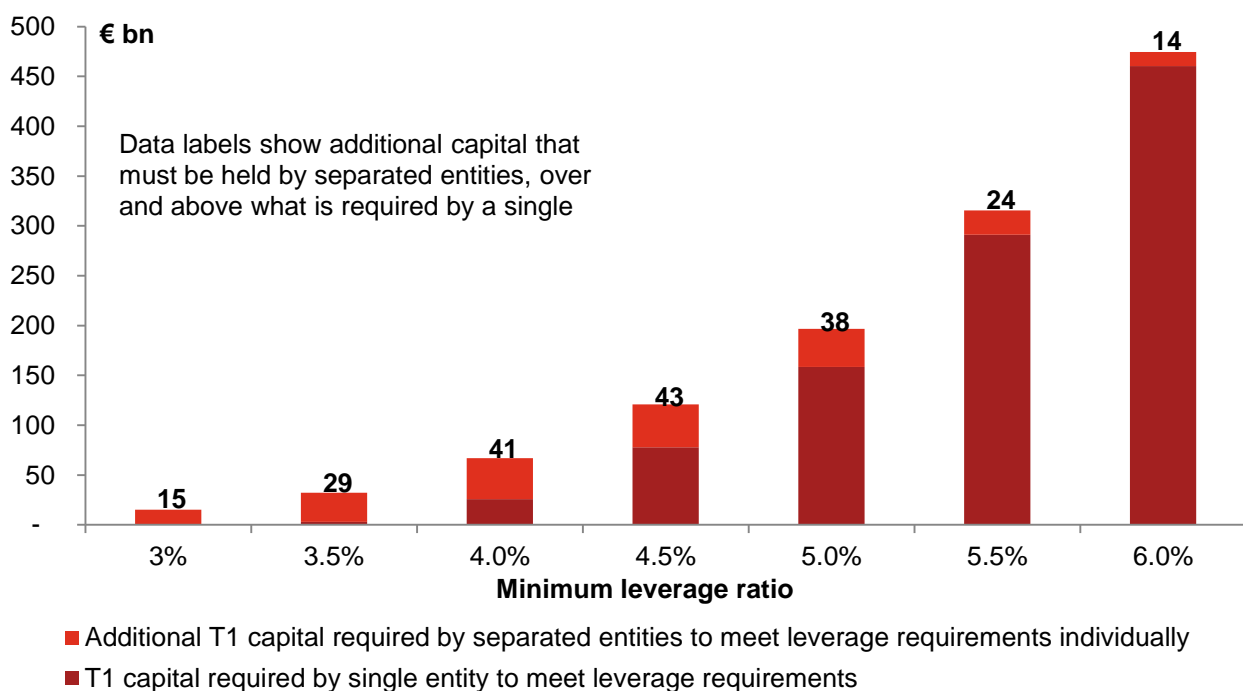
<sup>54</sup> The 4.95% figure is the maximum requirement and includes both 35% G-SIB and countercyclical buffers and applies to G-SIBs and ringfenced D-SIBs rather than all local banks.

<sup>55</sup> Leverage ratios defined as Tier 1 capital divided by total leverage exposure. CRD IV/Basel III fully-loaded leverage ratios shown where available. FRB supplementary leverage ratios shown for US banks

4.48. The chart shows that although more than half of banks will meet a leverage ratio requirement that is set at 4% as a group, once separated, banks could experience capital shortfalls in either the core credit institution or markets entity. If the leverage ratio requirement must be met separately by the core credit institution and markets entity, banks must therefore hold more capital in order to plug the shortfalls that occur on either side of the bank.<sup>56</sup> The application of the leverage ratio at the entity level could therefore add further capital costs for banks that fall short of regulatory requirements. Most of the shortfalls experienced by banks are within the markets entity. However, for some banks the shortfall is within the core credit institution, which shows that the benefit of being in a universal bank can be created by either core credit institution, or markets entity.

4.49. Figure 17 shows the additional capital required for the EU entities of the banks in our analysis at different levels of minimum leverage requirements. The lower bar on the chart shows the additional Tier 1 capital that is required to be held by banking groups (pre-structural reform) in order to meet the leverage ratio requirement and the upper bar shows the additional capital required by separated entities.

Figure 17: Additional capital required for the 18 banking groups due to leverage ratio



Source: Tricumen, bank annual reports and regulatory disclosures, PwC analysis

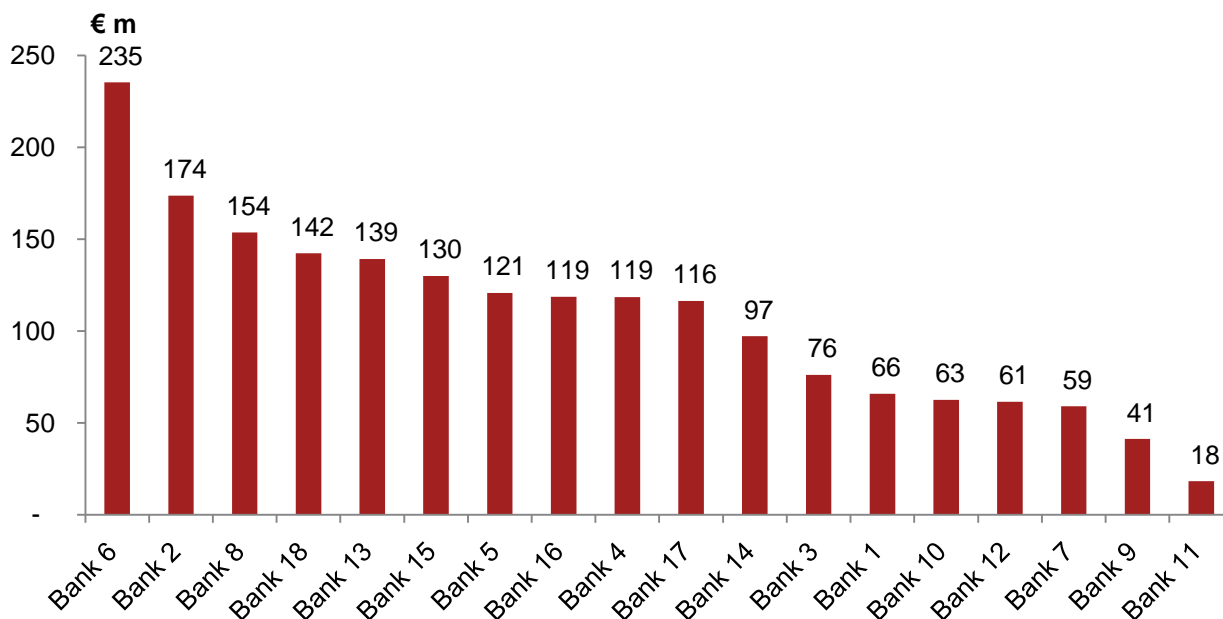
4.50. If the leverage ratio requirement is at 4%, as single entities, the G-SIBs in our analysis will have to hold €26 billion of additional capital. However, as separated entities, the sector will have to hold additional capital of €67 billion to meet the leverage requirement separately. Therefore separated entities will have to hold €41 billion more Tier 1 capital than for a single entity. Separated entities will have to hold additional capital over and above what is required by a single entity to comply with leverage ratio requirements.

4.51. Although the minimum leverage ratio requirement is likely to be 3% in Europe, investment banks (and by extension, markets entities) tend to overcapitalise to meet internal operational needs and exceed the leverage ratio requirement (in a similar way to holding buffers over regulatory capital requirements). Therefore we analyse the impact of the leverage ratio requirement of 4%.

<sup>56</sup> The additional capital required to meet the leverage ratio is also net of the additional capital buffers (1% RWAs) that may be required within the separated core credit institution and markets entity.

4.52. We assume that the cost of additional Tier 1 capital to be in the order of 7-8%.<sup>57</sup> This is based on the yield of contingent convertible capital bonds, which are currently being traded at this value.<sup>58</sup> 50% of these bonds issued in 2014 also qualify as Tier 1 capital, therefore it is reasonable to proxy for the cost of additional equity capital based on the yield of these instruments.<sup>59</sup> We also apply the same Modigliani-Miller offset of 70% for the reasons discussed previously. On this basis, the cost of additional Tier 1 capital for the banks in our sample amount to €0.5 billion. Figure 18 shows the cost of additional equity and Tier 1 capital required within EU entities. The total cost of additional capital for banks amounts to €1.9 billion.

Figure 18: Cost of additional equity and Tier 1 capital required within EU entities



Source: PwC analysis

### One-off implementation costs

4.53. Banks could incur significant one-off costs as a result of structural separation. These costs are primarily: programme management, legal and consultancy costs, finance and IT infrastructure, human resource management, procurement functions and contract novation, and re-documenting client relationships as part of know-your-client (KYC) procedures for the newly-separated entities. These are set out in more detail in Table 3.

<sup>57</sup> FT (2012) “Barclays tests zest for total-loss bond”, 14 November 2012 and RBS Macro Credit Research (2014) “Cocos: Investors call for standardisation, more consistency”, 12 May 2014

<sup>58</sup> Contingent convertible capital bonds are hybrid capital securities that absorb losses when the capital of the issuing bank falls below certain capital levels. When this level is reached, these securities can be used to absorb losses either by converting into equity or suffering a writedown.

<sup>59</sup> RBS Macro Credit Research (2014) “Cocos: Investors call for standardisation, more consistency”, 12 May 2014

Table 3: One-off implementation costs as a result of structural reform

Area	One-off implementation costs
<b>Programme management, legal and consultancy costs</b>	<ul style="list-style-type: none"> <li>Establishment of new separate legal entities to accommodate structural reforms, and strategic decisions over the split of segments into the new entity/entities.</li> <li>New legal structures established to reduce the risk of the services provided by the markets entity disrupting the rest of the group.</li> <li>Establishment of governance arrangements and new structure for shared services.</li> </ul>
<b>Finance/IT infrastructure</b>	<ul style="list-style-type: none"> <li>Initial one-off costs of setting up separate systems for core credit institution and markets entity, split of general ledgers and finance, management and procurement functions.</li> </ul>
<b>HR management</b>	<ul style="list-style-type: none"> <li>Establishment of separate HR governance (separate remuneration governance processes and regulatory disclosures) and processes.</li> <li>Separation of pension funds, assessment of shared/joint liabilities.</li> <li>Redrafting and renegotiation of employment contracts (incl. transition of long-term incentive awards and share plans).</li> </ul>
<b>Procurement functions and contract novation</b>	<ul style="list-style-type: none"> <li>One-off novation of existing contracts with suppliers and renegotiation of terms of agreements.</li> </ul>
<b>Re-documenting client relationships</b>	<ul style="list-style-type: none"> <li>One-off re-documentation of know-your-client contracts and renegotiation of terms of agreements.</li> </ul>

- 4.54. The one-off implementation costs will vary based on the complexity of banks' existing operational structure, their new operating structure and resolution strategies. Banks that currently have more centralised operations are likely to be more affected than banks which have a more decentralised/subsidiarised structure – more specifically, banks which are currently operating shared services from an entity from which the markets entity will not be permitted to receive said services are likely to face higher implementation costs.
- 4.55. Estimates of implementation costs are high-level at this stage, because banks are yet to carry out detailed planning of the scope of activities required, and they have little experience of implementing substantial structural changes of the nature proposed by the EU. For this reason we have relied on a number of benchmarks in order to provide implementation cost estimates.
- 4.56. Banks have already begun implementing change programmes in order to meet new regulatory requirements. IT is likely to account for a significant share of programme costs. Below we provide an illustration of the costs associated with banks' IT transformation programmes based on programmes that PwC has been involved in<sup>60</sup>:
- The cost of a multi-year transformation programme for a large global retail bank, which involved the long-term separation of IT systems, amounted to £450 million. This included the IT transformation of financial, payments and IT management processes.
  - A global retail bank engaged in a £350 million programme to implement mandatory financial sector regulations and to streamline and simplify all front and back office finance operations. This programme involved simplifying the legal structure, demerging subsidiaries, integrating business units, systems architecture, simplify the group's legal structure, and improve the quality of management information.
  - A European multi-national bank engaged in a £93 million programme to redesign their IT system and HR processes.

<sup>60</sup> Source: PwC PPM benchmarking tool

- 4.57. In addition, the separation of Lloyds Banking Group’s retail branch network (Project Verde) and subsequent creation of TSB is estimated to have cost £1.3 billion.<sup>61</sup> The creation of the Williams and Glynn retail bank by RBS has required a £600 million investment, with over half spent on the IT platform.<sup>62</sup>
- 4.58. Based upon the benchmarks above, we consider the IT implementation costs for a large bank could be €480 million. This is below the cost of a retail bank separation, which requires separation of retail banking systems, but is at the high end of the programme costs we have seen as a consequence of the complexity of finance transformation required.
- 4.59. Our experience of HR transformation programmes also suggests that the costs of re-designing and implementing staff transfers and new HR processes and systems could be significant: the cost of a HR transformation programme for a large global retail bank which involved implementing new HR systems and processes amounted to £120 million. A smaller bank also engaged in a £60 million programme to establish a HR function.
- 4.60. Our estimate for other implementation costs are smaller than IT costs. We estimate HR costs (employee contracting, consultation and pension) to be the next most significant item at 25% of IT costs. We estimate a €40 million cost for overall programme costs based upon costs of other large scale implementations, which are typically in the range of 5-10% of overall programme costs. We estimate client re-documentation costs based upon similar costs from other re-documentation exercises<sup>63</sup> and estimate a similar amount for re-procurement and re-contracting. These assumptions are set out in Table 4 below.

*Table 4: Transformation programme costs for a large bank*

<b>Programme costs for large bank</b>	<b>€m</b>
IT	480
HR	120
Programme	40
Procurements and contracts	60
Client re-documentation	60
<b>Total</b>	<b>744</b>

*Source: PwC PPM benchmarking tool and PwC assumptions*

- 4.61. Our review of transformation programmes suggests that these programmes run the risk of substantial overruns, which have the potential to double the original programme budget. Some European banks could also be at risk of multiple ring-fencing due to separate EU and national rules, which could further add to the cost and complexity of complying with structural reform requirements. Some banks are in the process of integrating shared services in order to generate cost savings – gains which would be reversed as a result of separation requirements and causing duplication of services and infrastructure.

<sup>61</sup> <http://www.cityam.com/article/lloyds-stats-show-project-verde-will-remain-red>

<sup>62</sup> <http://www.rbs.com/news/2013/09/return-of-williams-glyns-moves-closer.html>

<sup>63</sup> JP Morgan estimates that the one-off implementation costs to large multinational banks for systems to achieve FATCA compliance could reach US\$ 100 million per institution. Source: Forbes (2011) “FATCA Carries Fat Price Tag”, 30 November 2011



- 4.62. By way of comparison, HM Treasury estimates that each bank could face implementation costs around £100-600 million per bank in order to comply with UK ringfencing requirements, so our estimate is at the top end of the HM Treasury estimate. Banks have also suggested significant one-off implementation costs as a result of structural reform: HSBC estimates that the cost of the complying with ringfencing could cost around £1-2 billion.<sup>64</sup>
- 4.63. We extrapolate these costs for the 18 banks in our analysis based on each banks' asset size. We assume that the transformation programme budget has a linear relationship with the bank's asset size. This could be a conservative assumption, as the transformation costs for smaller banks could be disproportionately higher due to the high fixed cost component of structural transformation. Based on this approach, the banks in our analysis will face one-off implementation costs of €5.4 billion in total.

### *Ongoing operational costs*

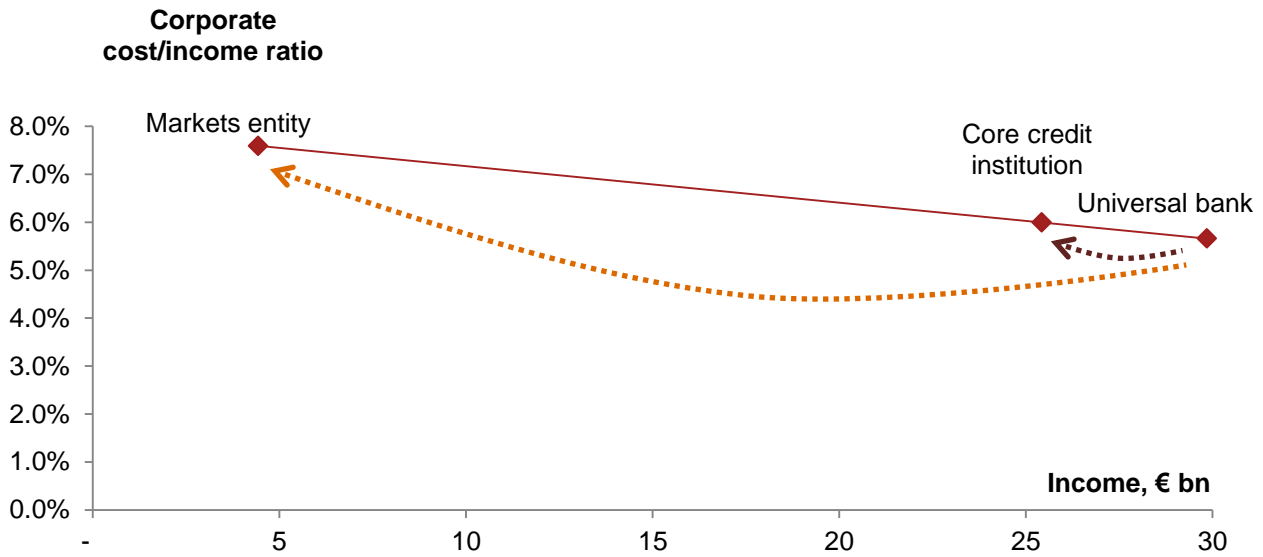
- 4.64. Banks could also face an increase in ongoing operational costs as a result of separation. The increase in costs primarily arises from the loss of synergies and economies of scale as functions are now duplicated across the two entities (and still required at the corporate level).
- 4.65. Following structural separation, both the core credit institution and markets entity must have their own treasury and risk management functions. As a result, banks' risk management and credit risk assessment will become less efficient when taking place for two separate entities rather than one. Human resources functions will also need to be duplicated, as separated entities will each need to maintain their own remuneration governance processes, regulatory disclosures and processes. Banks will also face an increase in operational costs due to the duplication of procurement functions as the procurement process is duplicated for each new vendor that engages with separate parts of the bank.
- 4.66. Banks will also need to establish new governance structures for the separated entity, such as the establishment of new boards and board committees for risk governance, internal audit processes and remuneration. The establishment of new boards will require the recruitment of non-executive directors (NED), whose remuneration the PRA has suggested to be within the range of £50,000-£100,000 per year per NED based on current levels of remuneration. Each board committee member is likely to be paid £15,000-£30,000 a year, with committee chairs costing an additional £30,000 to £70,000.
- 4.67. Universal banks only need to obtain customer information once, such as information on credit history, financial and management information and income and asset levels. In addition, the broader the interaction between banks and their clients, the better the banks' knowledge of the risk profile of their clients. Following separation, banks will need to duplicate the efforts required to gather the relevant information as separate know-your-client procedures are required for new clients engaging with different parts of the bank. The loss of the broader interaction (due to the separate provision of these services) also means that banks may have incomplete knowledge about their clients' financial needs and their potential risks.
- 4.68. We expect that the bulk of the loss of synergies will be the duplication of central functions within the corporate layer (e.g. finance, treasury and risk management, human resources, procurement etc.). Individual bank corporate costs are heavily influenced by their corporate structure and operational model. However, a key determinant of banks' corporate cost/income ratio is its size, due to the relatively large fixed cost component of the cost base, which means that larger banks tend to have a lower corporate cost/income ratio compared to smaller banks as they benefit from higher economies of scale.
- 4.69. We have analysed banks' corporate costs relative to their income to quantify the relationship between banks' cost-to-income ratios and how these change with revenues. A simple analysis shows that a €100 million reduction in revenues is associated with a 0.01 percentage point increase in the corporate cost/income ratio. As a result of separation, the size (and therefore revenues) of the separated core credit institution and markets entity are now smaller relative to the whole banking group. As Figure 19 shows, separated entities with smaller revenues are likely to face higher corporate costs as a proportion of their

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<sup>64</sup> The Times (2014) "HSBC puts price of building banking ring-fence at £2 billion", 22 October 2014

revenues in comparison to the banking group. This is likely to affect the markets entity more as it is much smaller relative to the banking group than the core credit institution.

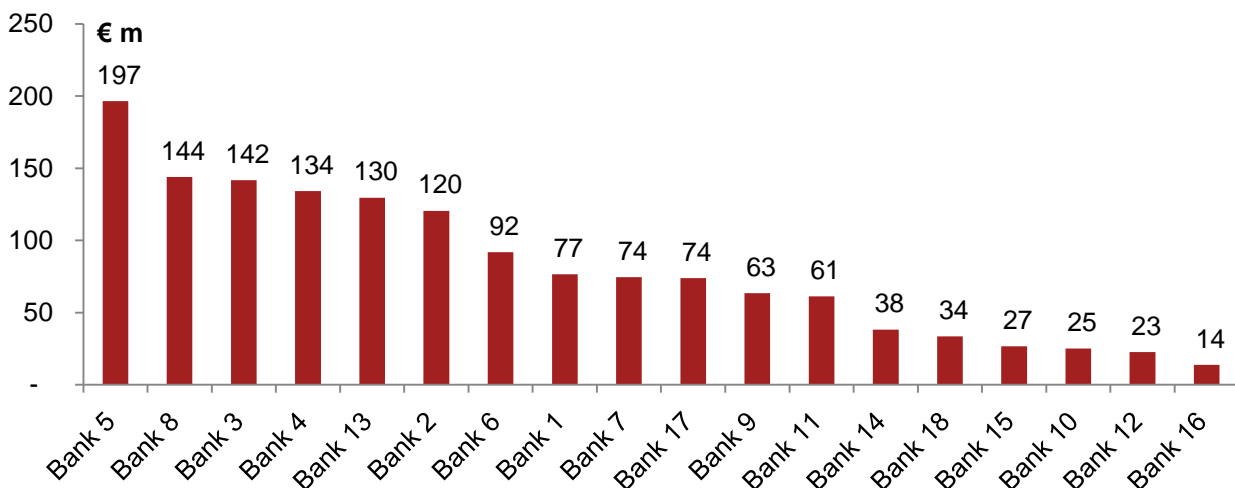
Figure 19: Banks' corporate cost/income ratio vs revenues



Source: PwC analysis

4.70. We model the impact on banks' ongoing operational costs by estimating the increase in the corporate cost/income ratio associated with the separation of operating revenues within the core credit institution and markets entity. As Figure 19 shows, the average universal bank has a cost/income ratio of 5.7%. Following separation however, the core credit institution faces a higher cost/income ratio of around 6%, and for the markets entity it is 7.6%. We then quantify the increase in corporate costs, based on the new level of revenues within the core credit institution and markets entity. These additional corporate costs are then allocated to the segments within each entity based on their shares of operating costs. Figure 20 shows the additional ongoing operational costs that banks face as a result of structural reforms. The additional costs amount to €1.5 billion in total for the 18 banks in our analysis.

Figure 20: Additional ongoing operational costs within EU entities



Source: PwC analysis

- 4.71. Our estimate is broadly in line with HM Treasury's estimates of the additional operational costs of UK ringfencing, which is estimated to be within the range of £30-£105 million per bank. The UK Prudential Regulatory Authority also estimates the additional compliance cost borne by UK banks as a result of changing their booking and business models to be in the range between £150 million and £530 million per year across the industry.
- 4.72. Structural reforms could also lead to significant changes to banks' tax liabilities. Box 1 explores this in further detail. These costs have not yet been quantified as potential changes to the tax structure to accommodate separation are yet to be determined.

*Box 1: Impact of the structural reforms on tax liabilities*

After regulatory and capital efficiencies, tax is often a key consideration in establishing the preferred corporate structure in any industry, including in banking. A change from the preferred legal structure is likely to generate increased tax costs.

The structural reforms, as well as the domestic legislation being enacted in the UK, France and Germany, are all expected to drive additional tax costs for the banking sector, although the exact magnitude and nature of those costs will depend on the domestic tax legislation in point and the extent of separation required. The likely tax impact can be considered under five broad headings:

- **VAT:** under existing structures, banking groups often form one group for VAT purposes whereby transactions between members of the group are not subject to VAT and the irrecoverable VAT costs can be managed by combining high recovery businesses with low recovery businesses. However, a VAT group requires that each member of the group is jointly and severally<sup>65</sup> liable for the VAT liabilities of other members. There is a question therefore as to whether separate parts of a group will be permitted to form a VAT group following the separation of activities under the Liikanen reforms. The absence of a VAT grouping would create significant additional costs in terms of VAT on intra-group services and an increase in the amount of irrecoverable VAT.
- **Tax costs associated with migration to the new structure:** putting any new structure in place will likely require the transfer of significant volumes of business, assets and liabilities across the territories in which the banking group operates. In the absence of any specific reliefs, the transfer of assets could give rise to tax costs on any unrealised profits, transfer taxes in respect of certain assets as well as transaction costs which may not be deductible for tax purposes.
- **Impact on deferred tax assets:** many institutions have significant deferred tax assets with respect to losses generated during the financial crisis which are recoverable against taxes on future profits. Significant changes in the structure of businesses will require institutions to revisit profit forecasts and may result in a change the level of deferred tax assets that would have otherwise been recoverable. This is likely to result in impairments of deferred tax assets.
- **Transfer pricing:** all transactions between the two parts of the group will need to be on arm's length terms. This will have implications for funding and hedging costs, and also for integrated businesses which may be required to be split as a result of the separation rules – for example under the UK proposals certain offerings to private banking customers may need to be within the ring fence and others will be outside the ring fence.
- **Tax grouping:** many tax regimes currently permit the transfer of tax losses between different parts of the group either by way of a tax consolidation or a surrender of losses to other group members. The extent to which banking groups will continue to be permitted to distribute losses in this way will depend on the required extent of separation. Any restriction on the sharing of losses or on the tax free transfers of assets around the group will result in increased tax costs.

Domestic tax policy decisions will also have further impacts on the tax consequences noted above. For example, the UK Government has clearly indicated that they are considering the impact of VAT grouping on banks.

- 4.73. Some shared services may be permitted under structural reform, which could allow banks to mitigate against additional ongoing costs by having ancillary services which are housed in a separate entity from

<sup>65</sup> Separately or individually

the markets entity and core credit institution (operational subsidiarisation). These shared services are provided to all parts of the group under service level agreements (SLAs). Although this may be the most efficient method by which to maintain some synergies between the entities, there is some concern as to whether the regulators would agree to this as a structure, and would depend on the nature of ancillary services provided across the ring-fence. Independent management may also prefer greater control over standalone services. Banks are also in the process of integrating shared services in order to generate cost savings – gains which would be reversed as a result of separation requirements and causing duplication of services and infrastructure.

### *The impact of structural reforms on banks' returns*

4.74. According to our analysis, the total costs of structural reforms to EU banks could be significant. The total ongoing costs of structural reform (funding, capital and operational costs) for the European operations of the largest 18 G-SIBs could amount to €16.1 billion per annum. These costs are summarised in Table 5. The total costs to the EU banking sector for all affected banks could amount to €21 billion at an average of €0.9 billion.<sup>66</sup> The industry could also face one-off implementation costs of around €9.2 billion. By way of comparison, HM Treasury estimates that UK ringfencing would result in total additional ongoing costs across the UK banking sector of €2.3-€5.0 billion, which is around €0.5 -€1.0 billion per bank.

*Table 5: Summary of costs for the 18 banks in our analysis and costs to the EU banking sector*

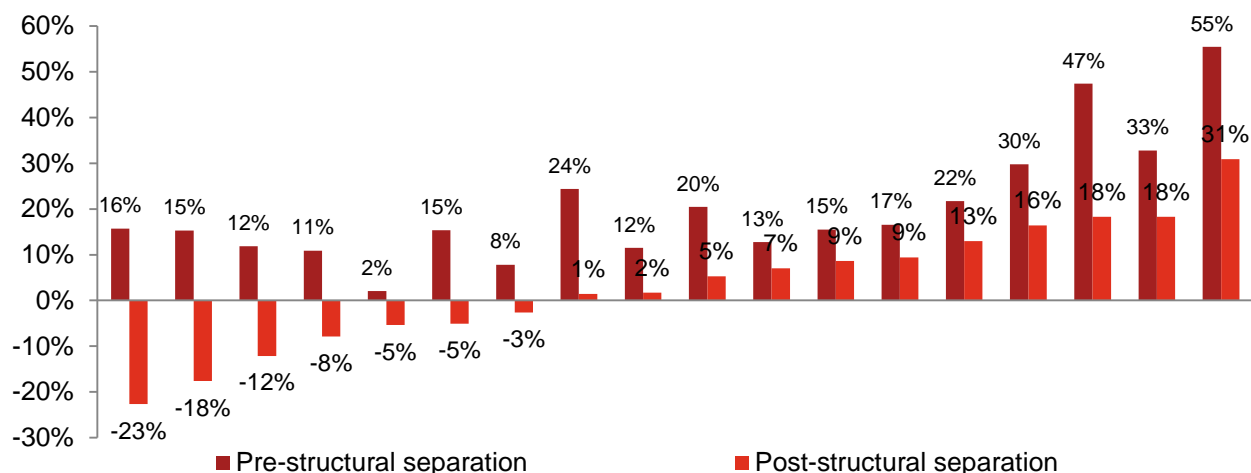
Total costs of structural reform to banks (€ billion)	Total – 18 banks	Total – Impacted EU banks
Funding costs	12.7	16.8
Equity capital costs	1.4	1.8
Capital costs (leverage ratio)	0.5	0.6
Additional operational costs	1.5	1.9
<b>Total ongoing costs</b>	<b>16.1</b>	<b>21.1</b>
One-off implementation costs	5.4	9.3
	(or 1.1 p.a. over 5 years)	(or 1.9 p.a. over 5 years)

Source: PwC analysis

4.75. The returns to banks' European operations could fall substantially. Figure 21 shows the pre-tax returns of separated markets entities pre- and post-structural reform. The standalone markets entities for seven out of 18 of the G-SIBs could experience negative returns following structural reforms in the absence of any mitigating action. Group-level returns could fall by 2 percentage points on average as a result of structural reforms. Pre-tax returns to banks' investment banking and trading activities could fall by almost 15 percentage points, significantly impacting the commercial performance of the entire industry and the economic viability of some operations. This impact on banks' returns excludes the impact of one-off implementation costs and capital costs.

<sup>66</sup> Funding costs, one-off implementation costs and additional operational costs scaled to the industry based on the total assets of banks affected by structural reforms as provided in the European Commission's impact assessment of structural reforms (see Appendix 2 for a list of these banks). Equity capital costs scaled based on the total amount of CET1 capital for all affected banks.

Figure 21: Pre-tax returns – EU separated markets entity

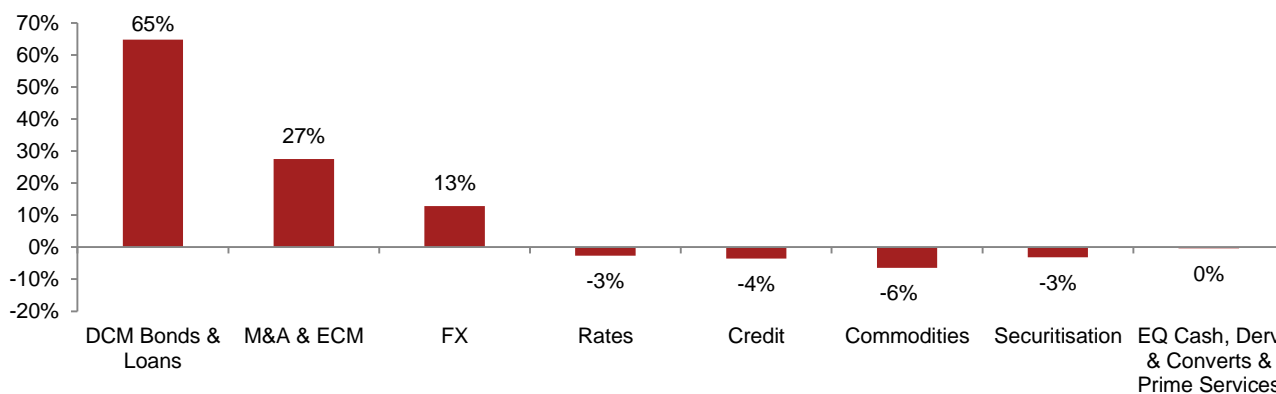


Source: Tricumen, PwC analysis

4.76. Other studies have also found large impacts of bank structural reforms: Oliver Wyman and Morgan Stanley estimate ringfencing and resolution requirements across jurisdictions will add \$10-15 billion in recurring costs each year, which would reduce industry-wide ROE by 2-3% without mitigating actions. Analysts’ estimates of potential costs for UK banks as a result of Vickers are in the order of £2-10 billion for major UK banks, with an average of around £6 billion.<sup>67</sup>

4.77. Fixed-income trading activities are likely to be most heavily impacted. Figure 22 shows the pre-tax returns for segments within the trading entity: FICC segments such as rates, credit, commodities and securitisation could experience negative returns following structural reforms. This is because fixed income activities are both funding and capital intensive because they operate through over-the-counter markets and rely on holding inventory and therefore require banks’ balance sheets (as opposed to exchange traded instruments).<sup>68</sup> Equity and derivatives trading will experience some impact, particularly in prime services. Investment banking advisory services (ECM, DCM and M&A) will be the least impacted. More than half of EU banks could experience negative post-reform returns for most of their FICC businesses, which raises serious questions about the viability of these segments in EU banks after structural reforms.

Figure 22: Pre-tax returns for EU markets entity segments



Source: PwC analysis

<sup>67</sup> Gambacorta and van Rixtel (2013)

<sup>68</sup> See Appendix 4.

## 4.3 Impact of structural reforms on markets

### Key points

- *Quantitative Easing has enhanced global liquidity, but this is masking structural illiquidity across non-sovereign bond markets. Across a range of indicators, such as corporate bond trading volumes, investment bank inventory holdings and failed repo trades, liquidity in non-government capital markets is deteriorating. There may be further deterioration as quantitative easing is reversed. Structural reform in the banking sector is likely to exacerbate reductions in capital markets liquidity. This runs counter to the policy objective of moving activity from banking markets to capital markets.*
- *Fixed income currencies and commodities (FICC) is the fastest falling segment of investment banking by revenues (down 15% in 2013). The global revenue share for the top 3 banks in FICC has risen from 32% in 2009 to 45% in 2013. The increase for EMEA has been from 40% in 2009 to 42% in 2013.*
- *The impact of structural reform is likely to be concentrated on fixed income capital markets. This is because fixed income capital markets operate 'over-the-counter' and require banks' balance sheets to hold the inventory necessary to support trading activities. This means fixed income capital markets are both funding and capital intensive and therefore most impacted when EU banks' markets entities face higher funding and capital costs on an economically separate basis.*
- *Liquidity matters in corporate bond markets. A reduction in the number of market makers and those banks contribution to liquidity through their inventory holdings may reduce liquidity. This in-turn increases the liquidity risk premium and therefore costs to borrowers.*
- *If banks with sub-economic performance withdraw from FICC markets following structural reform, then market liquidity could contract costing corporate borrowers c.30bps. This will be higher for borrowers of lower credit quality using less liquid financial instruments - i.e. a mid-sized company raising €100 million through corporate bond markets.*
- *There will be smaller impacts across other capital markets, mostly through re-pricing. Higher funding costs would impact companies' purchase of advisory services across debt and equity issuance markets and M&A activities. It would also impact the cost of institutional investors' use of banks' equity market trading services and business use of FX services.*

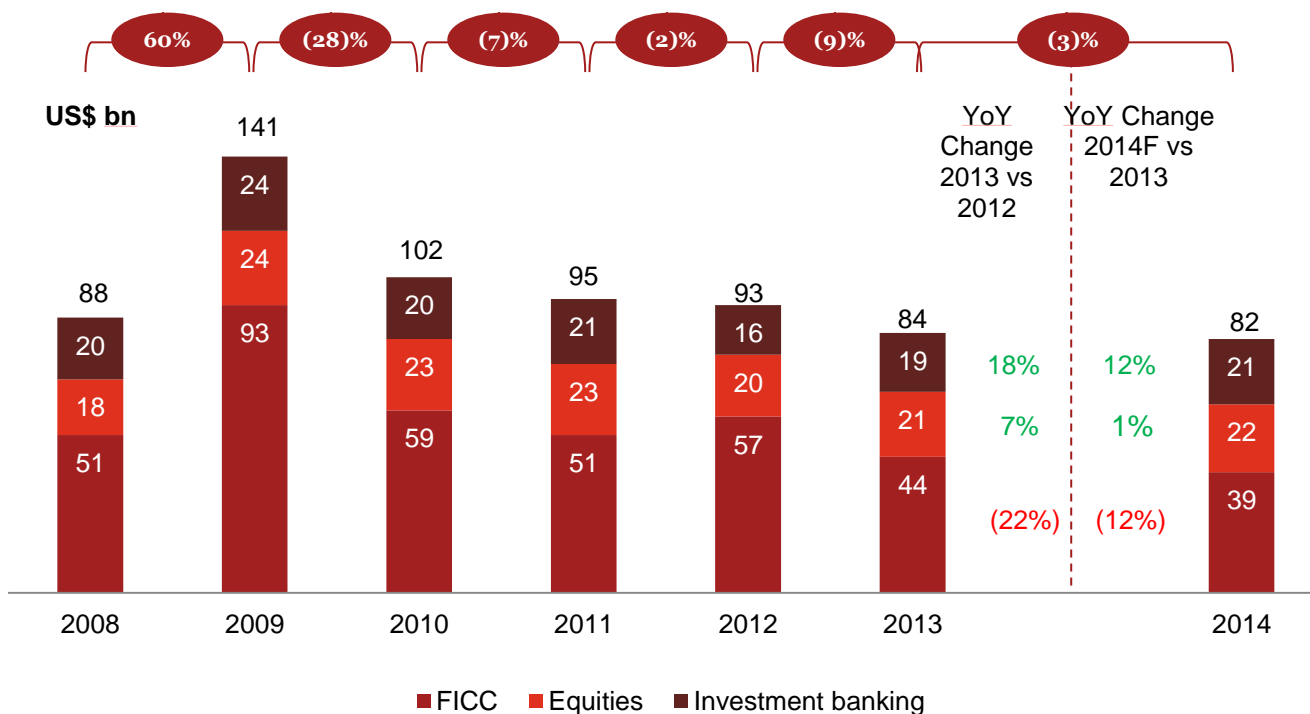
4.78. This section assesses the impact on capital markets from structural reform. This section is set out as follows:

- a. **Review of capital markets:** in this section, we first review each capital market segment in turn. Specifically, we discuss the trends in liquidity and the role of banks within each market. Building on our analysis of bank impacts, we then discuss the likely mitigation response to structural reform by market, such as re-pricing or exit, and subsequent implications on capital markets liquidity.
- b. **The impact of structural reform on corporate credit markets:** Structural reform is likely to have a significant impact on FICC segments that rely on the ability of banks to perform the role of market-makers, and are funding- and capital-intensive, particularly secondary trading in corporate credit. We explore, in more detail, the impact of banks' withdrawal from the corporate credit market and the likely impacts on the liquidity risk premia and how this translates into higher cost of credit for corporates.

### Market review

4.79. In Figure 23, we set out the evolution of the broader capital markets activity in the Europe, Middle East and Asia (EMEA) region, by revenues.

Figure 23: EMEA revenue pools for investment banking, FICC and equities



Source: Coalition

4.80. After a strong performance in 2009, overall investment banking, FICC and equities markets have fallen. In 2013 the overall market fell by 9%, and according to Coalition, this fall is set to continue with an expected reduction of 3% in 2014.<sup>69</sup> These trends are also observed at the global level and are shown in more detail in Appendix 5.

4.81. Investment banking advisory services have shown a stable performance over the previous six years, after very strong performance in the years leading up to the financial crisis. Revenue in this segment grew by 18% in 2013, and Coalition anticipate this will continue with a strong backdrop of new debt and equity listings.

4.82. The fixed income, commodities and currencies (FICC) segment still contributes more than half of banks’ capital markets revenues, but there has been an overall shrinkage in EMEA FICC revenues of 22% between 2012 and 2013, and Coalition expect further declines in 2014 (See Figure 23). Revenues within the EMEA region are projected to fall at 12% in 2014. This is also partly driven by low client flows low and low market volatility.<sup>70</sup>

4.83. Securitisation and commodities contribute a smaller proportion of banks’ capital markets revenues. Commodities revenues in particular are on a downward trend – revenues from the EMEA region have declined 23% since 2012, reflecting recent bank exits from this segment and trading activity shifting outside the banking sector.<sup>71</sup> Revenues from commodities account for only around 5% of total EU capital markets revenues for the 18 banks in our analysis, and securitisation accounts for only 1% of total revenues.

<sup>69</sup> Source: Coalition

<sup>70</sup> Source: Coalition

<sup>71</sup> Source: Coalition

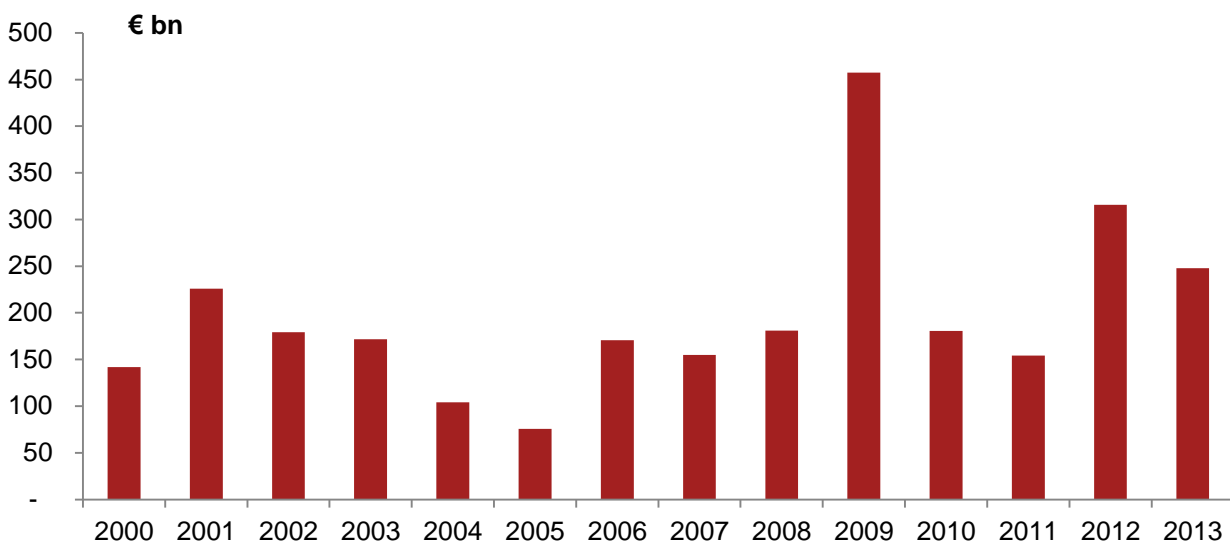
4.84. Revenues in the equities segment have supported overall capital markets revenues, rising by 7% in EMEA between 2012 and 2013, particularly driven by prime services and equity derivatives. Revenues in equities account for more than a quarter of capital markets revenues for banks in our analysis.

**Debt capital markets (DCM) advisory**

4.85. Universal banks and investment banks have a leading role in providing advisory services to support DCM issuance, both bonds and syndicated loans. These services are advisory in nature and earn revenue through issuance and associated fees. This means that these services do not consume much capital or funding (relative to other trading areas).

4.86. Figure 24 shows the trends in corporate bond issuance in Europe. As the availability of bank lending declined during the crisis, larger and mid-sized corporates increasingly turned to debt capital markets for funding.

*Figure 24: Corporate bond gross issuance in Europe*



Source: Dealogic

4.87. We estimate the cost of structural reform to the DCM business for the 18 banks in our analysis is likely to amount to €1 billion. Banks currently achieve reasonable margins in their DCM advisory businesses and it is unlikely for banks to be substituted by boutique advisory firms (without underwriting capacity) or elsewhere from outside the banking industry. Therefore, we do not expect there to be significant exits from this segment as a direct consequence of structural reform, but we would expect to see small increases in the fees charged to banking clients for DCM advisory services, as banks' additional costs are passed on to end-users. We estimate price increases of around 10% would be required to restore margins to their current level. Such pricing impacts are unlikely to have a dramatic demand effect, as the issuance fees are a small proportion of the overall cost of a corporate bond. Based upon a 40 bps issuance fee for a 10 year corporate bond, a fee increase of 10% or 4 bps, when amortised over the 10 year life of the loan is equivalent to a 0.4bps increase in the annual effective cost of borrowing, which is unlikely to deter borrowing decisions. However, the loss of secondary market-making capacity in corporate credit markets could have negative feedback effects on the cost and capacity of primary debt issuance for banks.

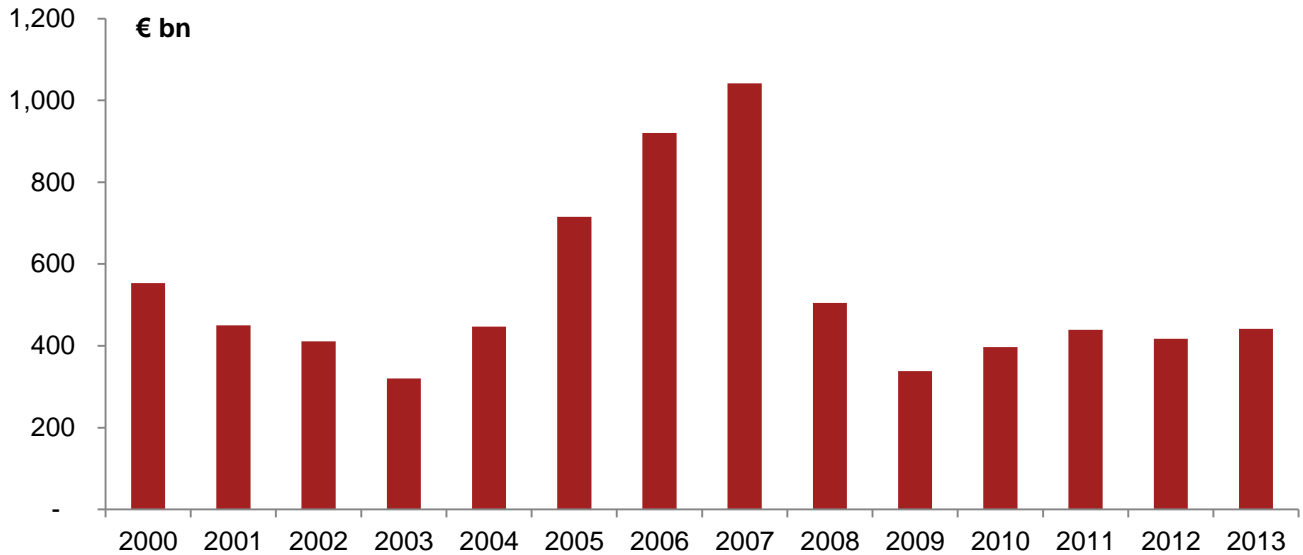
**Mergers and acquisitions (M&A) and equity capital markets (ECM) advisory**

4.88. Similar to DCM activities, universal banks and investment banks have a leading role in providing advisory services to support M&A and ECM activities, with additional market capacity provided by smaller advisory boutiques. These services are again advisory in nature and earn revenue through transaction fees. This means that these services do not consume much capital or funding (relative to other trading areas).



4.89. Figure 25 shows the deal values for all mergers and acquisitions transactions for targets based in Europe. Deal values rapidly increased between 2003 and 2007, and peaked in 2007 with €1 trillion of deal values. Total transactions more than halved during the crisis, and are yet to recover to pre-crisis levels, mainly due to continuing weak growth in Europe.

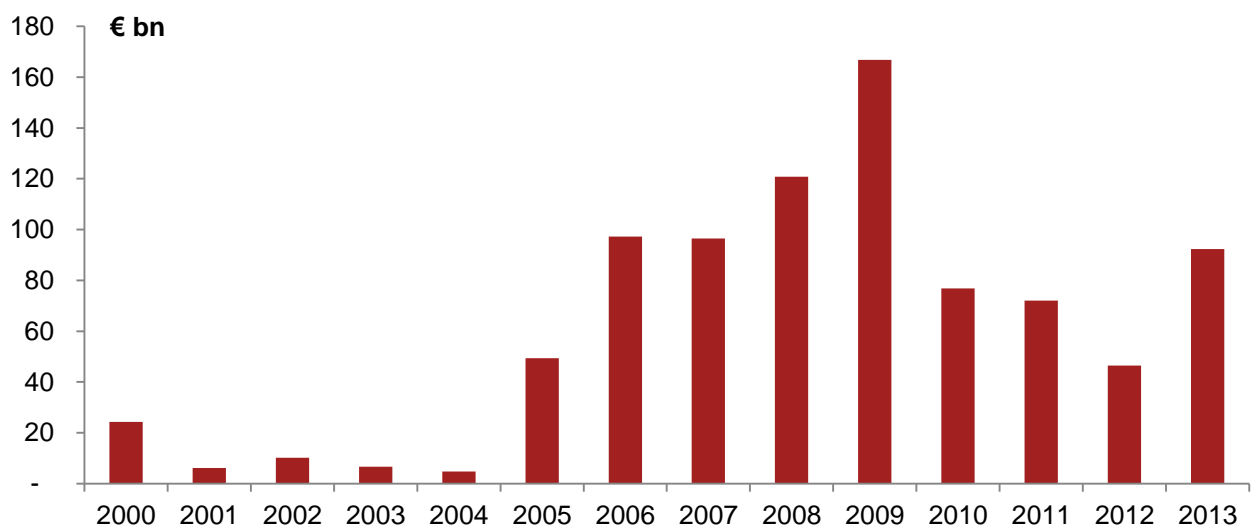
Figure 25: Total M&A transaction values in Europe



Source: S&P Capital IQ

4.90. Figure 26 shows trends in equity issuance in Europe. Equity issuance also grew rapidly between 2004 and 2005, and then more than quadrupled between 2005 and 2009, reaching €167 billion. Similar to M&A activity, equity issuance has yet to recover to pre-crisis levels, but have increased more recently in 2013.

Figure 26: Equity issuance in Europe



Source: S&P Capital IQ

- 4.91. Structural reform is likely to result in an increase in costs to the M&A and ECM business for the 18 banks of around €0.6 billion. However, similar to DCM, banks are likely to continue providing advisory services in the ECM segment, so we do not expect to see further exits as a direct consequence of structural reform but we are likely to observe increases in issuance fees of around 10% to restore bank margins. In a similar way to DCM, a price increase of this magnitude is unlikely to deter M&A or equity listing activity. Any effect would be concentrated at the smaller end of the public equity markets, where the benefits of a public listing are more easily outweighed by the higher costs of disclosure and maintaining a public register of shareholders.

#### *Box 2: Measuring liquidity*

Liquidity is a key feature financial markets efficiency, and refers to the ability to sell (or buy) large volumes of financial instruments speedily, easily, with low transaction costs and without having a significant impact on asset prices. However, there is little consensus among academics or regulators regarding the exact definition of such liquidity. This is because liquidity is multi-dimensional and can be captured in different ways, with some measures more suited to capturing liquidity in certain capital markets segments.

ESMA (2014) proposes a definition of liquidity that takes into account its multi-dimensional nature, which suggests that liquidity is “the likelihood of being able to trade at a price equal or close to the price of the last transaction”. This definition means that in deep and liquid markets, the last transaction should not have an effect on overall price and trading volumes (breadth and depth), nor should it affect the transaction cost (tightness of spread) or inhibit the ability of new buyers to transact in the instrument (market resilience). These different dimensions and their measures are described in *Table 6* (IMF 2002) and the ways to capture them in the data. The market review section draws from these different dimensions of liquidity to assess recent trends in liquidity across different capital markets segments.

*Table 6: Dimensions of liquidity*

Dimensions of liquidity	Measures and description
Tightness	Transaction cost measures: bid ask spreads may reflect (i) order-processing costs; (ii) asymmetric information costs; (iii) inventory-carrying costs; and (iv) oligopolistic market structure costs
Immediacy	Efficiency of the trading, clearing and settlement systems
Depth	Amounts outstanding: existence of abundant orders both above and below the price at which the security now trades
Breadth	Volume based measures: existence of both numerous and large orders in volume with minimal transaction price impact.
Resiliency	Characteristic of markets in which new orders flow quickly to correct order imbalances
All dimensions	Price based measures: inter-period volatility measures Market impact measures: residual liquidity risk premia (LRP). LRP is reflective of investors' perception of conditions in secondary markets and the probability of having to take a large price discount at the point of sale)

Source: IMF (2002)

#### **Foreign exchange**

- 4.92. The foreign exchange (FX) markets are characterised by a high degree of integration between cash and derivatives. FX markets are used for wide range of purposes, such as providing foreign currency to businesses to facilitate the import or export of goods and services, for corporate and financial hedging or investment, to facilitate the flow of capital across different currency zones within the EU, and to facilitate the implementation of monetary policy by central banks. Traded FX products can be classified generally into six instruments. These are summarised in *Table 7*, which also sets out the average daily turnover and percentage of activity for each instrument.

Table 7: Foreign exchange instruments

Instrument	Description	Average daily turnover, US\$ billion	% of total daily turnover
FX spot	The exchange of two currencies at a rate agreed today for delivery (cash settlement) within two business days.	2,046	38
Outright forwards	The exchange of two currencies at a rate agreed today for delivery at some time in the future (i.e. more than two business days).	553	10
Non-deliverable forwards (NDF)	A forward that is settled with single cash payment for the net value, rather than through the exchange of the two currencies.	127	2
FX swaps	The combination of an FX spot and outright forward in a single transaction.	2,228	42
Currency swaps	The exchange of the principal and interest (say, of a loan) in one currency for the same in another currency.	54	1
FX options	An option gives the option buyer the right (but not the obligation) to exchange one currency for another currency at a pre-agreed exchange rate with the option seller during or at the end of a specified period.	337	6

Source: BIS Triennial Survey 2013, Bank of England October 2014

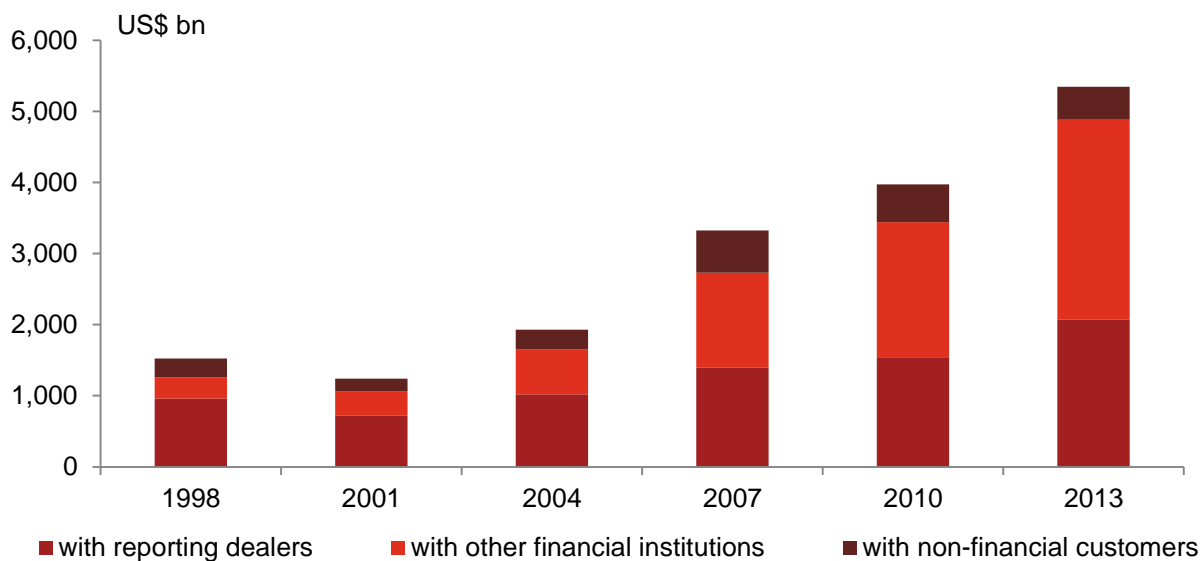
- 4.93. The need to exchange one currency for another physically when spot, swap and forward transactions settle, involves the risk of paying away the full notional in one currency without receiving the full notional in the other. The need to manage this risk, referred to as settlement risk, is one of the most important drivers of market structure in the FX markets and led to the development of the Continuous Linked Settlement (CLS) system used by many major market participants to mitigate this risk. CLS group, which is owned by its member banks, now accounts for 46% of daily FX volumes across all products. One of the main benefits of CLS has been a significant reduction in the funding and capital required to support FX market-making activities. This means that the FX business is also less funding intensive compared to other FICC segments.
- 4.94. FX markets remain predominantly quote-driven ‘over-the-counter’ (OTC) markets, due to the need for flexibility on the settlement and maturity for most FX products which limits the possibility of standardisation. The increasing electronic of FX markets means that more end-users access FX markets via single- or multi-dealer platforms offered by banks. These trends are also putting more pressure on revenue pools: FX revenues in 2013 have fallen by 36% since 2009, and are likely to shrink by a further 22% in 2014.<sup>72</sup>
- 4.95. Figure 27 shows the value of global market turnover<sup>73</sup> and share of turnover for FX spot transactions and derivatives, and reflects the depth of the forex markets. Turnover for FX instruments has gradually risen over time, reaching US\$5.3 trillion in 2013, of which European contracts make up at least 45% of total FX contracts.<sup>74</sup>

<sup>72</sup> More detailed information on FICC revenue trends in the EMEA region is available in Appendix 5.

<sup>73</sup> The total instrument values traded.

<sup>74</sup> The UK accounts for 41% of total FX contracts globally, while France and the Netherlands account for the remaining 4%. Source: BIS Triennial Central Bank Survey: Global foreign exchange market turnover in 2013.

Figure 27: Global market turnover and share of turnover for FX spot transactions and derivatives



Source: Triennial Central Bank Survey, BIS 2013

4.96. The costs of structural reform to the FX business for the 18 banks in our analysis could amount to €2.1 billion. After incorporating this impact, our analysis suggests that FX activities will remain commercially viable and we do not expect significant bank exits as a direct consequence of structural reform. We are likely to observe bank re-pricing in this segment through a general widening of bid-ask spreads, especially for currencies outside the major currency blocks. These changes may impact the ability of market makers to continue offering the breadth of FX products to corporate clients. Because of high FX trading volumes, the impact of structural reform costs on any individual FX transaction will be small, but for large users of foreign exchange there will be a cumulative impact of higher bid-ask spreads. In addition, the trend of increasing consolidation and concentration in FX markets could exacerbate the increase in spreads.<sup>75</sup> Any reduction in the number of domestic banks in these markets could also have an impact on the ability of central banks to use monetary policy as an effective policy tool.

## Rates

4.97. The fixed income rates market is split into cash and derivatives. The cash market provides financing for government and government related agencies. The governments of the EU countries together have over €9 trillion of outstanding debt securities. In Europe, the cash market comprises of long-term instruments such as government-issued debt, municipal bonds and agencies; and short-term instruments such as repurchase (repo) and reverse repurchase agreements (reverse repo). The size of the European repo and reverse repo market in June 2014 was €5.8 trillion.<sup>76</sup>

4.98. In developed economies, government debt securities are generally regarded as low-risk investments, bearing little or no credit risk. Purchasers of government debt range from small retail investors to large institutional investors. Pension funds, insurance companies and money market funds buy government debt to hedge their long term liabilities, and banks use government securities for liquidity management, as collateral, and for hedging debt and other derivative instruments. In addition, central banks often hold debt of other governments for currency reserve management, and many sovereign wealth funds are active investors in this market.

4.99. Most European governments securities are traded OTC. The market is most concentrated around market benchmark issues and large trading volumes, which makes the market very deep, allowing traders to

<sup>75</sup> Euromoney's FX survey for 2014 shows that the combined market share of the top five banks in FX markets exceeded 60% for the first time since 2009.

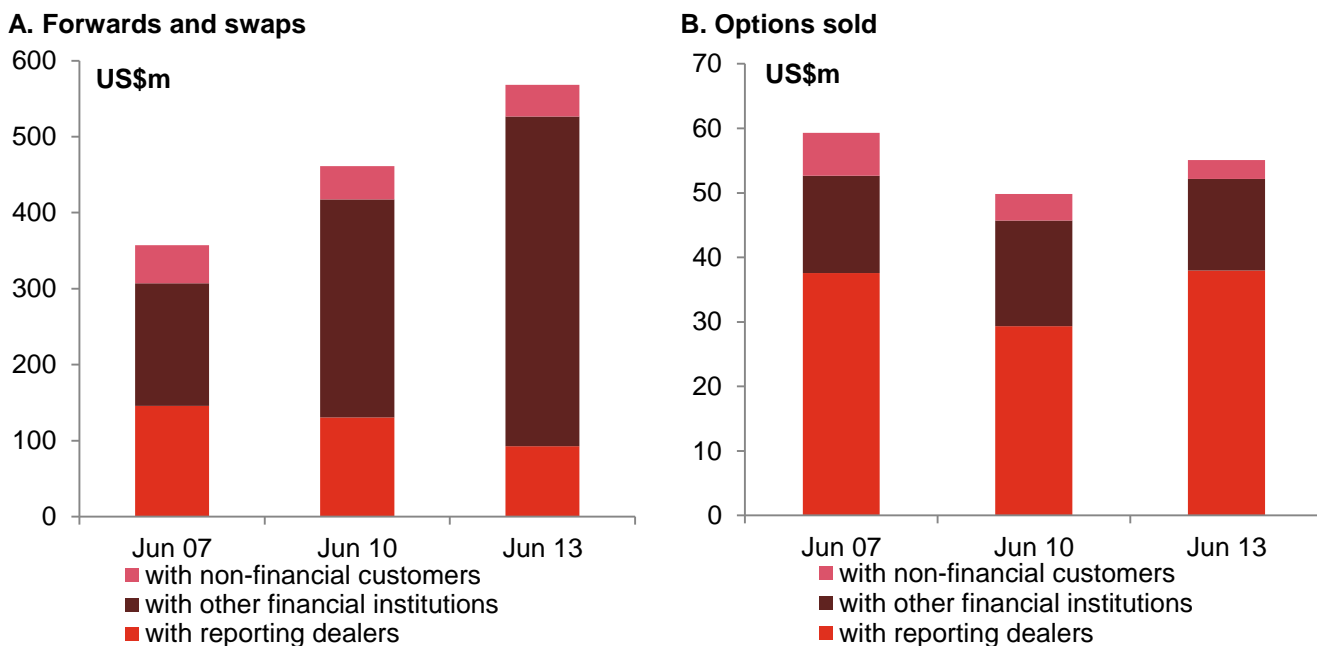
<sup>76</sup> ICMA European repo market survey, June 2014.

trade large amounts. While an increasing amount of trading is now facilitated through electronic OTC platforms, there remains an important role for banks as market makers.

4.100. Derivatives also play an important role in the fixed income rates market, principally to switch fixed for floating rate risk between counterparties. The majority of the interest rate derivative market is traded OTC, reflecting end-users’ needs for specific hedging products. A study by the International Swaps and Derivatives Association (ISDA)<sup>77</sup> shows that 65% of the turnover in the OTC derivatives market involves a reporting dealer and an end-user, such as non-financial customers or non-dealer financial institutions, which suggests that interest rate derivatives serve a critical function by allowing market participants to hedge against risks and volatility. The total outstanding notional of OTC interest rate derivatives amounts US\$577 trillion in 2013, with almost 50% of the market located in London. A smaller, but still significant, proportion of the interest rate derivatives market consists of standardised contracts that trade on exchanges. The total notional amount of exchange-traded interest rate derivatives is US\$66 trillion in 2013.

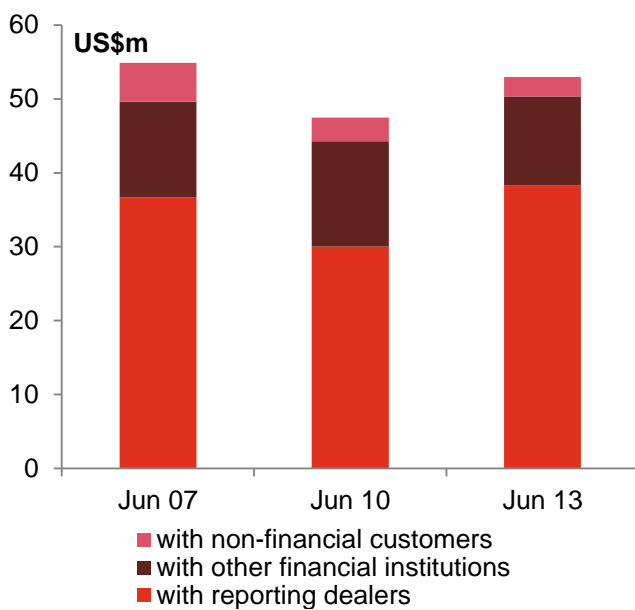
4.101. Global notional amount outstanding in OTC derivative markets for rates reflects the quantity of the instruments and hence the depth of these markets. Figure 28 shows the outstanding amounts of OTC derivatives for rates, in particular, forwards and swaps, options sold, options bought and single currency interest rate forward rate agreement (FRA).

Figure 28: Outstanding amounts of OTC derivatives

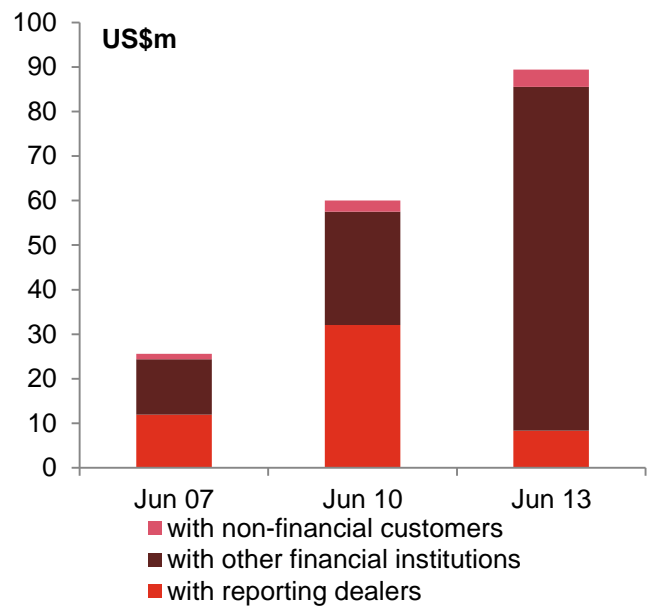


<sup>77</sup> ISDA (2014) “Dispelling Myths: End-User Activity in OTC Derivatives”, August 2014

**C. Options bought**



**D. Single currency interest rate FRA**



Source: Triennial Central Bank Survey, BIS 2013

4.102. The costs of structural reform to the rates business for the 18 banks in our analysis could amount to €5.8 billion (based upon 2013 trading volumes). This is driven by the funding and capital costs of holding inventory. However, the derivatives market is undergoing significant change as a consequence of the move to central clearing on exchanges. Although the move of activity to centralised exchanges could improve transparency and liquidity in this market, the higher collateral and margin requirements and will also increase funding costs for banks, which will also increase transaction costs for market participants. Banks are also likely to experience margin erosion, which could make some existing contracts uneconomic for banks.

**Credit**

4.103. Credit markets provide banks and non-financial companies with access to short-term and long-term funding. Short-term fixed income credit markets include the issuance of certificates of deposit by banks, and commercial paper by banks and non-banks with relatively high credit ratings. The market for short-term unsecured inter-bank loans has declined in recent years as concerns about counterparty credit risk have led to greater reliance on secured lending. However, the unsecured lending market continues to have wider significance for the fixed income markets as the basis for Libor, which is the dominant benchmark for most interest rate swaps and other derivatives. Long-term bonds provide long-term finance to financial institutions and other companies in both developed and emerging markets.

4.104. More than 80% of the market does not involve standardised products and most corporate bonds are traded OTC, which means that market participants often rely on market makers to provide quotes. Market makers such as banks provide liquidity by holding inventory and absorbing temporary order imbalances. The need to be compensated for undertaking principal risk means that banks introduce a bid-ask spread in bond transactions<sup>78</sup>. Market makers tend to be banks, as banks have sufficiently large balance sheets to take on significant principal risks.

<sup>78</sup> However, banks absorb temporary order imbalances for market making, resulting in a profit by matching trades and holding **inventory** (Kyle (1985) and Grossman and Miller (1988)). Kyle (1985) shows that market makers transact against net (informed plus uninformed) trade demand, with a price impact due to the potential information content embedded in net demand. Grossman and Miller show that in the absence of informational issues, market makers are willing to accommodate temporary order imbalances if they can transact at advantageous prices. Therefore, the market-makers' profits are made up of profits for matching supply and demand; and that due to the

- 4.105. FICC markets are becoming increasingly concentrated – the global share of revenues for the top 3 banks in FICC has risen from 32% in 2009 to 45% in 2013.
- 4.106. The costs of structural reform to the credit business for the 18 banks in our analysis could amount to €4.1 billion. The high funding and capital needs in the credit business and falling profitability means that we show around 9 banks' FICC businesses would become commercially unviable with pressure to exit.<sup>79</sup> Given the reliance on banks to make markets in the credit space, there is likely to be a significant reduction in liquidity and an increase in the liquidity risk premium. We explore the impact on liquidity in the corporate credit market in more detail in the following section.

## Commodities

- 4.107. Commodities markets determine the prices of food and raw materials that are relied upon by producers and consumers across the globe. The four main sectors of the commodities markets are energy, agriculture, precious metals, and industrial metals. Most spot transactions have a variety of derivatives contracts. These derivatives markets are linked to underlying physical markets which are typically global in scope.
- 4.108. Most trading in the physical market is conducted on an OTC basis and, in many cases, there are few published data on such transactions. As a consequence, market participants who also have physical businesses often have an information advantage over those who only participate in the derivative markets. However, the importance of banks in these markets are waning: a recent trend across many commodity markets has been the transfer of market share in commodities trading from the major investment banks to vertically-integrated commodity firms that combine both a physical business and a trading arm. The market has also been characterised by high-profile exits or downscaling by investment banks due to regulatory pressures, such as UBS, RBS, Barclays, Deutsche Bank, Credit Suisse and Morgan Stanley.<sup>80</sup> The increase in the number of new players in the market has also led to stronger competition and erosion of trading margins.
- 4.109. Structural reform is likely to increase the costs to the commodities business across the 18 banks in our analysis by €1 billion. The funding- and capital-intensive nature of the commodities business means that regulatory pressures are also making it much more challenging for banks to maintain profitability in this segment. We are therefore likely to observe an acceleration of bank exits from this segment as a consequence of structural reform. The overall impact on liquidity in this market could be small, as activity is shifted to commodities trading houses and other non-bank financial institutions.

## Securitisation

- 4.110. The securitisation of assets into products such as collateralised debt obligations (CDOs), asset-backed securities (ABS) including mortgage-backed securities (MBS) distributes risks connected with the underlying pool of assets by enabling many investors to buy the different tranches associated with different risk levels. Securitisation also permits investors to diversify geographically and reduce exposure to correlated financial shocks.
- 4.111. The size of the European securitisation market has declined in recent years - aggregate issuance of securitised products was US\$239 billion in 2013 (including retained issuance), which is equivalent to only 40% of pre-crisis levels.<sup>81</sup> The outstanding amount of securitisations in the EU at the end of 2013 was about US\$2 trillion, or around one fifth of the size of the US securitisation market. Like the

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superior information profits. Wherein, economic literature has found that banks' quoted bid ask spread is half attributable to the information advantage and half attributable to matching supply and demand (Wang and Chae 2003, Glosten and Milgrom 1985).

<sup>79</sup> Any decision to exit the credit market will be informed by a range of factors, such as long-term growth prospects, competitive positioning and synergies across the business. However, sub-economic returns are unsustainable in the long-term and absent remedial action, banks are likely to exit from this market.

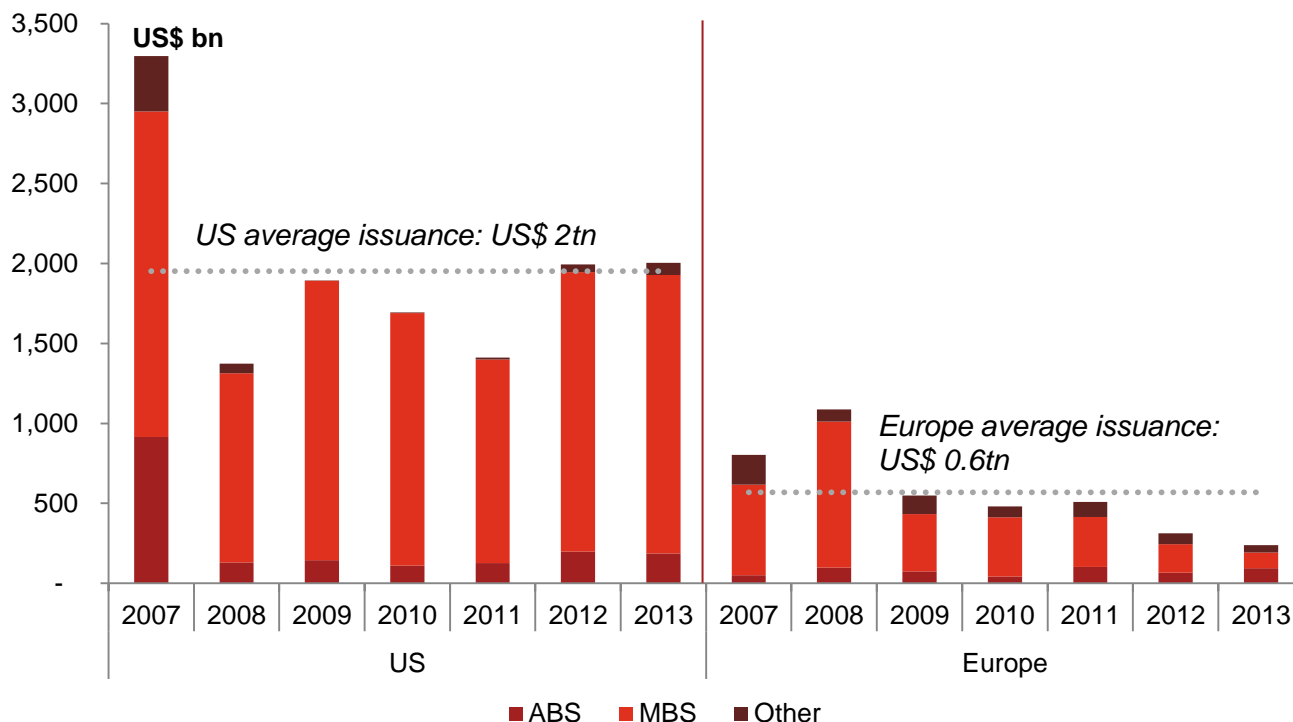
<sup>80</sup> See the "Supplementary Report 2: Inventory of Bank responses" which accompanies this report

<sup>81</sup> SIFMA and AFME

underlying bonds, securitised products are also traded OTC and require the support of banks to facilitate liquidity in the market.

4.112. Figure 29 shows the issuance amounts of securitised products in Europe and the US. Issuance has yet to recover since the crisis, but the chart shows that in comparison to the US, European markets are much shallower and less liquid. The average total issuance of securitised products between 2007 and 2013 in the US is more than three times higher than for Europe. Issuance amounts are yet to recover to pre-crisis levels, but are on the rise in the US, whereas growth has stalled in Europe.

Figure 29: Securitisation issuance in Europe and the US



Source: SIFMA, AFME

4.113. The costs of structural reform to the securitisation business for the 18 banks in our analysis could amount to €5.8 billion. Banks are central to the securitisation market, by originating loans and other debt and selling these on to investors. However, given the relatively high funding and capital needs in the rates business, and the smaller market shares enjoyed by banks, it is likely that a number of banks will exit the securitisation business, which will reinforce the trend of weak securitisation in Europe. This could also put pressure on originate-and-sell lending businesses.

**Cash equities, equity derivatives and prime services<sup>82</sup>**

4.114. Equity and related derivatives are mostly standardised and are traded more frequently than most FICC asset classes. The total market turnover in Europe for equities amounted to €6.3 trillion in 2013. OTC derivatives trades make up only 16% of total European equities trading. A study by ISDA showed that 92% of the world’s 500 largest companies manage their price risks using derivatives.<sup>83</sup>

4.115. Equity and equity derivatives are traded on exchanges by a variety of ‘agents’; namely banks, brokerage firms and other financial institutions. Banks support the depth of the secondary equity markets through

<sup>82</sup> Over-The-Counter and listed derivatives for flow equity derivatives as well as structured equity derivatives. Flow equity derivatives include: single stock options, index options, delta 1, variance swaps, volatility swaps, sector swaps.

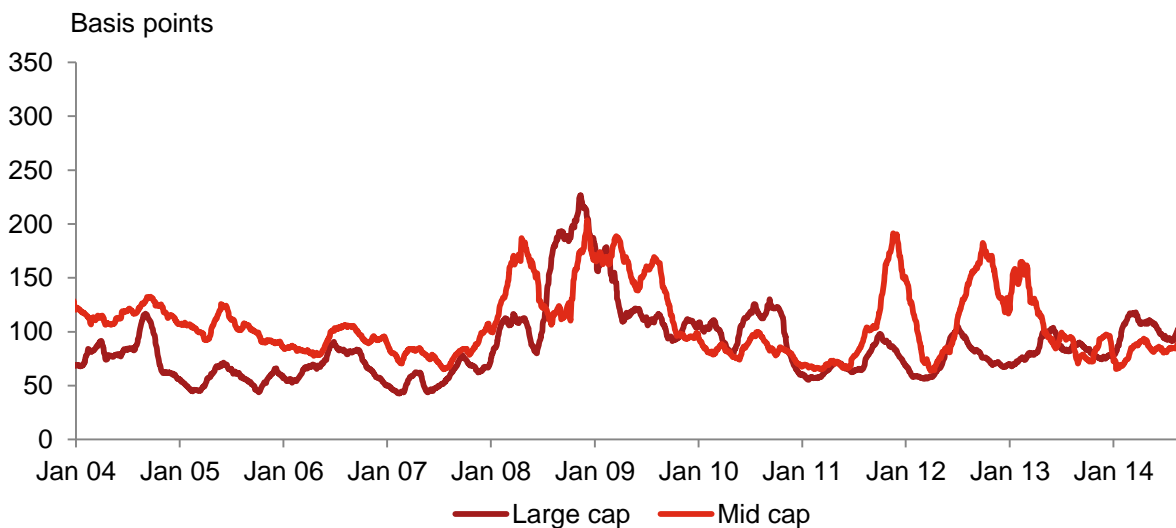
<sup>83</sup> ISDA (2003) “Survey of Derivatives Usage by the World’s 500 Largest Companies”



market making and executing large block trades on behalf of clients. However, their role is limited to filling the gap between demand and supply of what is already an efficient market, due to the prevalence of exchanges.

- 4.116. Prime services encompass the bundled package of services, either in FICC or equities markets, which are offered to institutional investors and hedge funds and allow them to borrow securities and cash, and invest on a netted basis and achieve an absolute return. Prime brokers, such as banks, typically provide financing and credit facilities to clients, alongside trade execution, clearing and settlement to large institutional clients. These investors range from traditional fund managers such as hedge funds, mutual funds, pension funds, sovereign wealth funds and other asset managers. Banks are able to offer efficiency gains to such clients because of their size, which are important to the profitability of such investors.
- 4.117. Bid ask spreads for the top 10 equities in most liquid European markets, in Figure 30<sup>84</sup>, spiked during the financial crises (2008-09) and the European debt crisis (2012). Although the spreads are now lower than what they were during the crisis, recent data suggests that spreads are increasing again.

Figure 30: Bid-ask spreads for top 10 equities in UK, France and Germany, 7 day moving average



Source: Thomson Reuters, PwC analysis

- 4.118. Bank structural reform is likely to increase the costs to the equities business across the 18 banks in our analysis by €3.9 billion. However, we expect few banks to leave the market (beyond those that have already) as banks are likely to continue providing clients with a full-service offering rather than partially exit. The impact on market liquidity is likely to be small, as most transactions are conducted over exchanges, which limits the role of banks as market-makers. However, it will become harder for banks to support the trading of smaller- and mid-cap equities with lower levels of liquidity on exchanges. Over the longer-term, banks are likely to re-price equity trading services, which will impact institutional investors' costs and end-investor returns. The impact on returns is likely to be gradual, akin to the impact of fund fees on long-term investment performance.

### *The impact of structural reform on corporate credit markets*

#### **The importance of corporate bond markets**

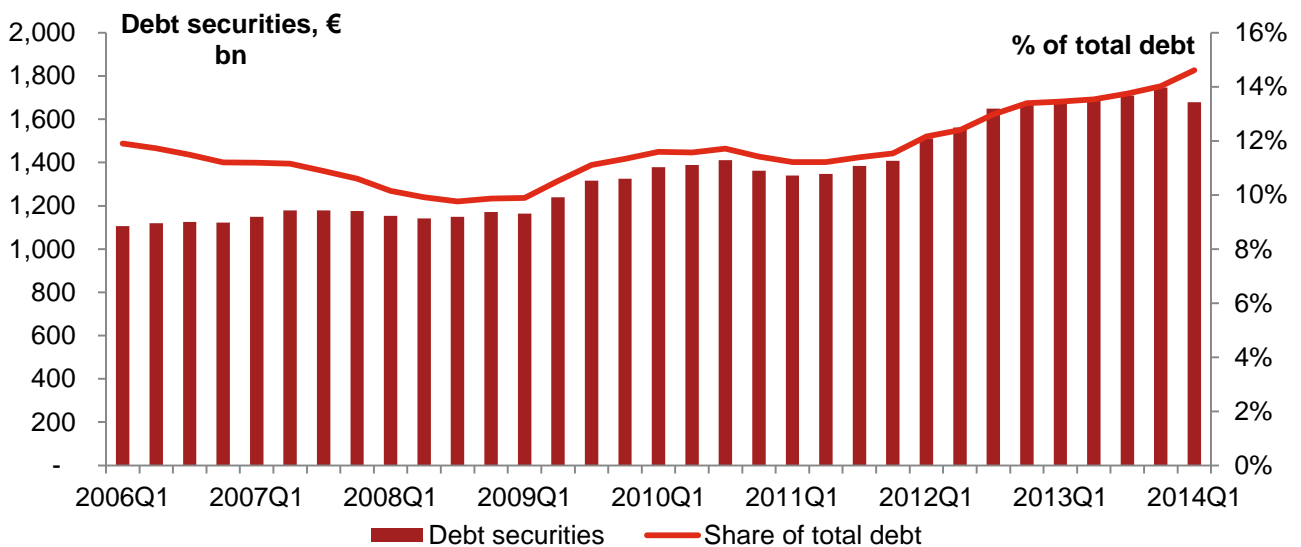
- 4.119. The impact of structural reform is likely to be concentrated on fixed income capital markets. This is because fixed income capital markets operate 'over-the-counter' and require banks' balance sheets to hold the inventory necessary to support trading activities. This means fixed income capital markets are

<sup>84</sup> The large cap sample covers top 10 equities by market capitalisation for UK, France and Germany. The mid cap sample covers top 10 equities in market cap band between £3 billion and £1 billion by market capitalisation for UK, France and Germany.

both funding and capital intensive and therefore most impacted when EU banks' markets entities face higher funding and capital costs on an economically separate basis.

- 4.120. Corporate bonds in particular, which are transferable debt securities issued by corporates – are one of the ways in which corporates can raise finance to fund investments and expansion, in addition to equity capital, bank lending and others financing means. Although European corporates have been historically reliant on bank lending, the importance of corporate bonds as a form of financing has increased over time in tandem with the decline in banks' lending capacity due to post-crisis deleveraging and regulatory pressures such as more stringent capital requirements. Figure 31 shows the outstanding amount of non-financial corporate bonds and securities as a percentage of total debt. Outstanding corporate bonds as of the first quarter of 2014 reached €1.7 trillion and account for around 15% of total corporate debt, while bank lending has declined by around 10% since 2012.

Figure 31: Outstanding bonds issued by non-financial corporates and as a percentage of total debt



Source: ECB

- 4.121. Corporate bond markets offer corporates several advantages, including providing secure, stable and flexible funding, access to an international pool of investors and allow corporates to reduce reliance on bank funding for growth and expansion. Issuers will typically only issue a limited number of different equity securities, but will usually issue a large number of different bond securities. Investors, including institutional investors like pension funds and insurance companies, benefit by receiving consistent and reliable cash flows and security of invested capital.

### Liquidity in corporate bond markets

- 4.122. Estimates suggest that liquidity in the credit market has dropped by 70% since the 2008 crisis and has continued to decline. For instance, a European bond issue now trades once a day on average compared with almost five times a day a decade ago.<sup>85</sup> A study by the BIS (2014) also reports that the decline in dealers' risk tolerance is a major driver of the reduction in market-making, which is driving up the risk premia demanded by market-makers as the cost of taking risk is now higher. Banks are allocating less capital to market-making activities and are reducing inventories by offloading less liquid assets.
- 4.123. Liquidity in corporate bond markets is lower than for equity markets. Investors typically hold corporate bonds to maturity to finance long-term cash flow commitments, which means that secondary market activity tends to be lower in the corporate bond market compared to equity markets. A study by TABB group shows that the number of equity trades between Q4 2011 and Q1 2012 was 167 times higher than for debt transactions. Mahanti et al. (2008) analysed liquidity in US corporate bonds and found that the

<sup>85</sup> <http://www.bloomberg.com/news/2014-08-05/bond-liquidity-falls-70-in-europe-as-sales-soar-credit-markets.html>

median corporate bond trades every 12-18 days, out of 22 trading days per month. The average trade size for corporate bonds are also higher – a study by ICMA shows that average equity trade sizes are typically 100 times smaller than the average for corporate bond trades.<sup>86</sup>

4.124. Liquidity also varies significantly across different FICC asset classes. Using data from Trax, we show in Table 8 the average, median and standard deviation of issuance sizes by asset class, based on a representative sample of 2,400 bonds. We observe that corporate bonds are much less liquid than government bonds. They tend to have smaller issue sizes in comparison to government bonds – the average issuance size being 20 times smaller than government bonds.

*Table 8: Comparison of fixed income average issuance sizes*

Asset class	Average issue size (€m)	Median issue size (€m)	Standard deviation of issue size (€m)
Government bonds	15,124	14,231	8,410
Supranational bonds	3,165	3,000	2,001
Investment grade Corporate bonds	722	560	528
High yield corporate bonds	488	404	308
Securitisation	415	176	485

Source: Trax

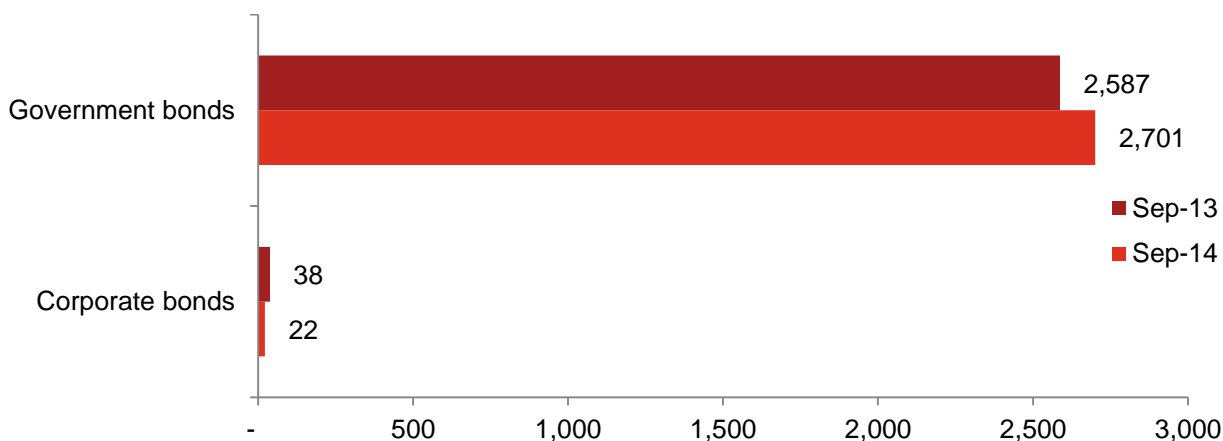
4.125. Corporate bonds also tend to have lower turnover. Our analysis of Trax data suggests that total turnover value and average outstanding amount of European government bonds' was 185 and 26 times respectively higher than that of investment grade corporate bonds in September 2014. A study by AFME shows that around two-thirds of government bonds in their sample traded less than 400 times a month with an average trade size of €21 million, while two-thirds of corporate bonds traded less than 20 times a month, with trade sizes of around €1-2 million.<sup>87</sup>

4.126. Figure 32 show more recent trends in trading volumes for government and corporate bonds. Monthly trading volumes in government bond markets have risen but volumes in corporate bond markets are falling, suggesting that quantitative easing may be masking signs of structural liquidity.

<sup>86</sup> ICMA "Economic importance of corporate bonds markets"

<sup>87</sup> AFME (2012) "An analysis of fixed income trading activity in the context of MiFID II", September 2012

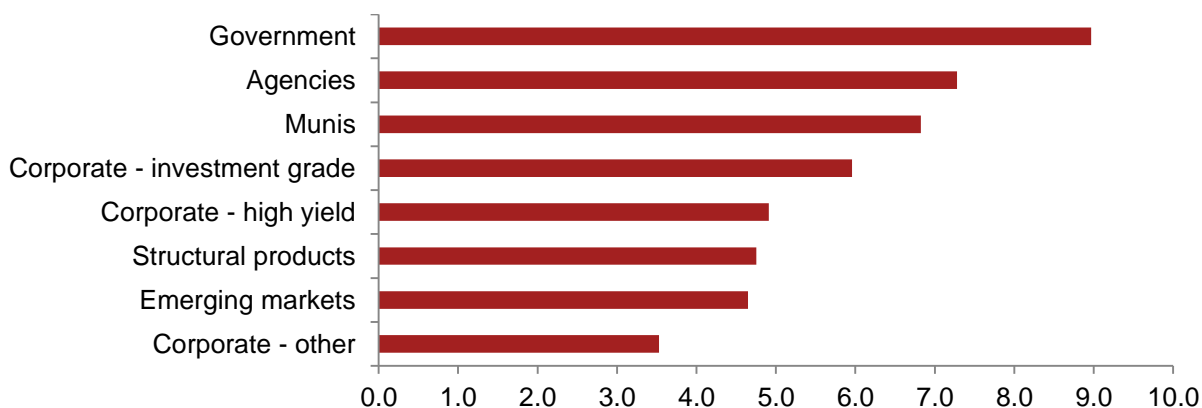
Figure 32: Average monthly volumes traded



Source: Trax, PwC analysis

4.127. This observation on corporate bond liquidity is also supported by evidence from other sources. Figure 33 shows the UBS Delta liquidity scores across different asset classes.<sup>88</sup> The UBS Delta liquidity score attempts to capture all facets of liquidity by integrating measures such as issuance amount, amounts outstanding, volumes traded and number of trade enquiries into a single liquidity measure. The data shows that government bonds have the highest liquidity score, followed by agency debt, corporate debt and emerging market debt. The variability of transaction costs – a measure of liquidity risk- was nine times lower in government bond markets than for investment grade corporate bonds in September 2014.

Figure 33: Liquidity scores by FICC asset class<sup>89</sup>



Source: UBS Delta

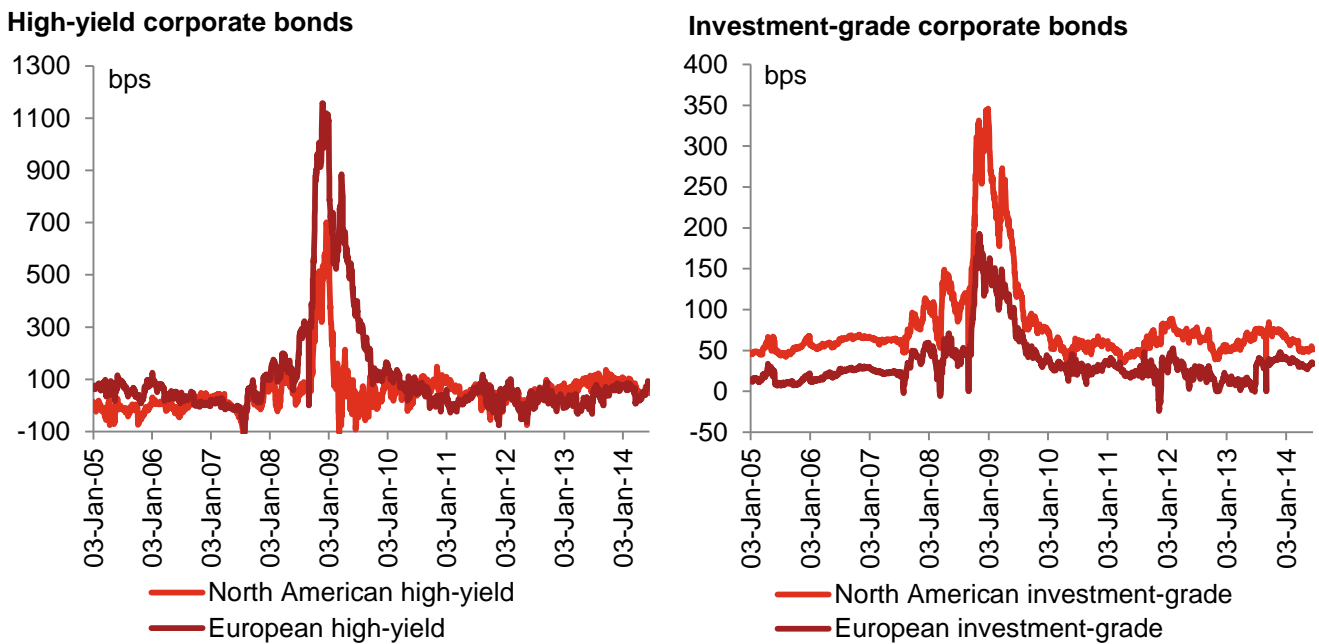
4.128. A number of academics have decomposed corporate bond yields into the credit risk premia and the liquidity risk premia.<sup>90</sup> Figure 34 shows the liquidity risk premia for high-yield and investment-grade corporate bonds in Europe and North America, which show a clear spike in liquidity risk during the crisis. Over this period, the liquidity risk premia rose by around 1000 bps for high-yield bonds, and around 300 bps for investment grade bonds. Subsequently, liquidity risk premia have fallen to historical levels, but this may be currently masked by central bank measures such as quantitative easing.

<sup>88</sup> UBS Delta liquidity scores take into account for a bond universe of 100,000 securities.

<sup>89</sup> Corporate bonds shown in this figure excludes financials.

<sup>90</sup> Similar risk premia can be estimated using the difference between option-adjusted non-financial bond spreads and CDS premia for investment-grade and high-yield corporate bonds, on the basis that maturity and composition are approximately matched. See among others, Leland and Toft (1996)

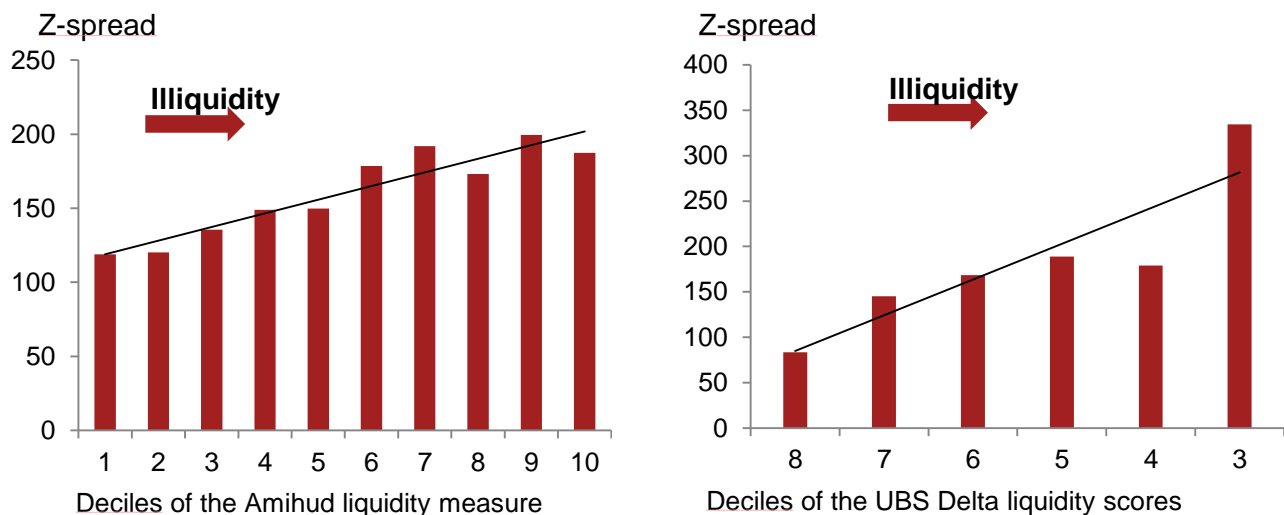
Figure 34: Liquidity risk premia in high yield and investment grade corporate bond markets



Sources: BofA Merrill Lynch Global Research, JPMorgan Chase and Bank of England calculations

4.129. Figure 35 shows two measures of illiquidity: the Amihud measure of liquidity<sup>91</sup> and the UBS Delta liquidity scores against the z-spread. The z-spread is the spread that would be captured by the investor over the entire Treasury spot-rate yield curve if the bond is held to maturity. Both measures of illiquidity show that as illiquidity rises (i.e. liquidity falls), spreads increase as investors demand a higher compensation for holding less liquid assets. This is the liquidity risk premia, which is explored in the literature in various structural models and asset pricing literature.

Figure 35: Illiquidity costs



Source: Trax, UBS Delta, Thomson Reuters, PwC analysis

<sup>91</sup> The Amihud (2002) measure of liquidity is a price impact measure that captures the “daily price response associated with one dollar of trading volume.” Specifically, the following ratio is used: Average (absolute daily return/trading volumes).

4.130. Policymakers across the globe are also increasingly concerned about structural changes in market liquidity, which could have serious implications for liquidity risks and borrowing costs. The Bank of England’s Financial Stability Report states that “[A] shock could cause risk premia ... to move sharply and adversely affect the supply of market-based finance to the economy”.<sup>92</sup> The ECB have also raised similar concerns about the exit of market-makers and what this means for liquidity: “As banks withdraw from market-making activities, liquidity has fallen”. A recent report by the Bank for International Settlements (BIS) also states that “Diverging trends for market-making supply and demand generally imply upward pressure on trading costs, reduced market liquidity in secondary markets and potentially, higher costs of financing primary markets.”<sup>93</sup>

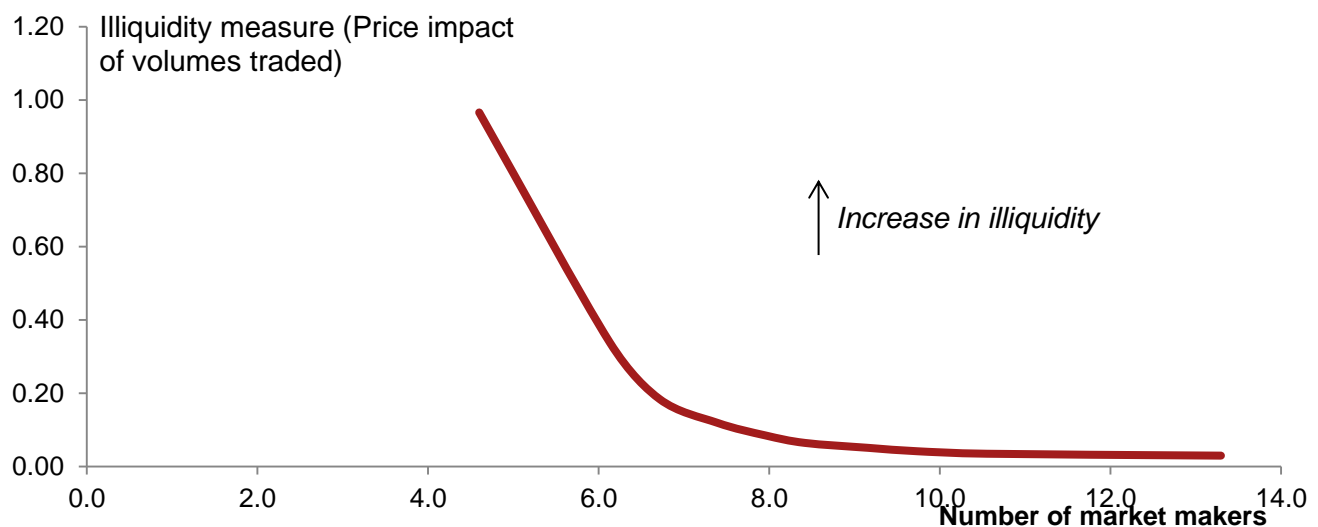
**The impact of structural reform on liquidity in corporate bond markets**

4.131. We analyse the impact of structural reform by using an econometric approach to analyse the relationship between the number of market makers, market liquidity and the liquidity risk premia. Using monthly bond trading data from Trax and UBS Delta for a representative sample of 2,400 corporate bonds, our panel estimation approach decomposes corporate bond spreads into the credit risk premia and liquidity risk premia, while controlling for bond-specific factors such as maturity. For our analysis, we have focused on longer term bonds with maturities greater than 3 years

4.132. Our econometric results show that market makers play an important role in providing liquidity in European corporate bond markets. We find a statistically significant relationship between the number of market makers and the liquidity risk premia. Our methodology and results are set out in more detail in the Appendix 4.

4.133. Figure 36 shows the relationship between the number of market makers and liquidity for our sample of bonds. We find that the most liquid corporate bonds have an average of 13 market makers, whereas the less liquid investment grade bonds, which are still more liquid than high yield bonds, have around 5 market makers. A study by ICMA (2013) shows that for the most traded high-yield corporate bonds, which hold higher risk than investment grade bonds, 10 to 15 market makers would regularly make the market. For less frequently traded high-yield bonds, the number of active market makers may range between 1 and 3.

Figure 36: Relationship between the number of market makers and liquidity



Source: Trax, PwC analysis

<sup>92</sup> Bank of England (2014) “Financial Stability Report – June 2014”.

<sup>93</sup> Bank of International Settlements (2014) “Market-making and proprietary trading: industry trends, drivers and policy implications”, CGFS Publications No. 52, November 2014.

- 4.134. Market makers are catalysts in corporate bond markets. They absorb order imbalances by holding inventory, which results in an increase of speed and probability of buyers and/or sellers meeting a match i.e. liquidity. Quoted bid-ask spreads capture market makers' expectations of the cost and risk associated with a change in inventory. A higher number of market makers therefore increases competition, reduces concentration, which result in smaller spreads and lower liquidity risk.
- 4.135. The analysis on the bank impacts of structural reforms suggests that around half of the banks in our analysis are likely to exit the credit business. These are likely to be banks that experience unsustainable levels of returns following structural reform and lower market share in the credit business. An exit of 9 market makers would result in the decline in market liquidity and an increase in liquidity risks. Therefore, the results from our econometric analysis suggests that the combined effect of 9 bank exits would result in an increase in corporate bond spreads around 30 basis points. In performing our analysis, we recognise that there are several areas of uncertainty relating to the number of expected market maker exits. Any decision to exit the credit market will be informed by a range of factors, such as long-term growth prospects, competitive positioning and synergies across the business.
- 4.136. Liquidity therefore matters to corporate bond markets, which rely on market makers to hold sufficient inventory to support liquidity. Reduced tolerance for risk at the firm level will influence the amount of capital for market-making activities. Less liquid markets are most likely to be affected, as these require market-makers to warehouse securities for longer periods of time, giving rise to inventory risks.<sup>94</sup> Given that corporate bonds are traded relatively infrequently and in large sizes, market makers are required to immediately offer a market to investors who wish to trade these securities and to take on large risk positions. Because of the importance of corporate bonds as a means of financing for corporates and the reliance of banks to perform the role of market-makers to provide liquidity in this market, a change in the liquidity premia that is triggered by bank exits from the credit business could have significant impacts on the corporate bond spreads, which translate into a higher cost of debt for corporates.

## 4.4 Impact of structural reforms on end-users

### Key points

- *The biggest impact of structural reform for customers is likely to be an increase in the cost of finance for corporate borrowers. This will be concentrated on the smaller users of debt capital markets where liquidity is already weakest and cost is already higher. Based upon a typical corporate borrowing spread of 125 basis points, a 30 basis point increase represents a near 25% increase in borrowing spread. Higher-leveraged firms face a disproportionate share of higher borrowing costs. This additional cost could amount to 5% of total profits for such corporates.*
- *Pension and fund investors will face higher transaction costs (bid-ask spreads) of trading capital market instruments. We estimate investors of European corporate debt will have to pay an additional 12 bps to trade in corporate debt. This will impact long-term returns. When compounded over a corporate bond investment portfolio accumulated over a 40-year working life, this cost amounts to a 5% reduction in the value of the investment. Higher corporate yields also translate into value losses. Investors could face mark-to-market losses of 2% on their corporate bond holdings.*
- *Pension funds and other investors, corporates and smaller businesses are likely to lose the ability to use a single EU provider of banking services, if they want to use hedging and other risk management tools.*
- *Retail customers will face fewer impacts, but core credit institutions may need to reduce their risk appetite to maintain strong ratings and sources of funding. This is likely to require lower LTV residential mortgages making it more difficult and more expensive for first-time buyers to obtain mortgages.*

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<sup>94</sup> BIS (2014) "Market-making and proprietary trading: industry trends, drivers and policy implications"

- 4.137. We have gathered views on the impacts of users of banking services from directly from businesses and through business representative groups. These are combined with our own analysis of the impact on end-users. We analyse the impact on the following end-users:
- a. Large and medium sized corporates
  - b. Pension funds and other investors
  - c. Small businesses and retail customers

**Impact on large and medium sized corporates**

4.138. The biggest impact of structural reform is likely to be an increase in the cost of credit to corporate borrowers. This will be concentrated in the smaller users of debt capital markets. This increase is driven by the rise in prices of banking products and services and the reduction in market liquidity due to retrenchment of bank activity in capital markets.

4.139. In addition, corporates will face a 30 bps increase in the cost of borrowing through capital markets. This change represents a 25% increase on typical corporate borrowing spreads of 125 bps. This impact is likely to be higher for corporates with higher credit risk and lower borrowing amounts. Highly-leveraged firms will also bear a disproportionate share of higher borrowing costs to corporates. We estimate that the top 10% of firms most sensitive to changes to the cost of debt will experience a reduction in profits of at least 5%. This translates into an increase in annual borrowing costs to corporates of around €5 billion across the EU, or €2 million on average per issuer.

*Figure 37: Additional borrowing costs as a percentage of profits for a sample of firms<sup>95</sup>*



Source: Thomson Reuters, PwC analysis

- 4.140. We estimate an increase in investment banking fees of around 10%, which feed directly into debt and equity issuance costs and the cost of IPO and M&A services.
- 4.141. The loss of banks’ broader interaction with their clients due to the separate provision bank lending and other forms of financing also means that banks and corporates no longer benefit from the potential efficiency gains. These are the gains that result from the informational economies of scope due to the joint delivery of services, such as lending and underwriting. These efficiencies could lower overall costs for banks, which benefit issuers if banks pass these savings on to clients. Drucker and Puri (2005) find that issuers who have concurrent lending and underwriting relationships with banks, particularly for noninvestment grade issuers for whom informational economies are likely to be large, benefit from lower underwriter fees and discounted loan yield spreads than those without the benefit of these relationships.

<sup>95</sup> Sample of firms include companies that are listed on the FTSE350, DAX and CAC.



<sup>96</sup> Similarly, Schenone (2004) show that firms with a pre-IPO banking relationship (e.g. lending activity) with a prospective underwriter face about 17% lower pricing than firms without this prior relationship.

- 4.142. Large transactions require the support of sufficiently large bank positions in order for these to be carried out. The separation of entities mean that the balance sheet of the separated entity is a fraction of the size of the universal banks they reside within, meaning that banks are increasingly constrained by regulatory large exposures rules and internal concentration risk limits, which undermine their ability to finance large transactions. Bank credit ratings could worsen following separation due to the loss of product and geographic diversification, putting pressure on the banks' ability to support trade financing and provide guarantees on other financing.
- 4.143. Although the core credit institution can continue to provide hedging products to corporates, the core credit institution may need to hedge against these risks itself if it is no longer able to retain these risks on its smaller balance sheets. If these risks are transferred to the markets entity, the cost of the hedge will increase in line with the higher funding costs faced by the markets entity following separation. This will compound the impact of the credit valuation adjustment (CVA) risk charge to banks, which is likely to be passed on to corporates.<sup>97</sup> In addition, the core credit institution is prohibited from hedging using non-cleared derivatives, which is inconsistent with the clearing exemption for non-financial corporates as set out in Article 10 of EMIR, and means that corporates are also likely to bear the cost of the additional CVA charge, regardless of the exemption.
- 4.144. The study by the Macroeconomic Assessment Group on Derivatives (2013) show that the OTC derivatives reforms will lead to an increase in costs to dealers, particularly in less liquid markets, due to the increase in capital and collateral requirements and operational costs. Structural reform could therefore further reduce bank sector capacity for market-making, leading to negative impacts on the pricing and liquidity of OTC derivatives markets, and impair their ability to support corporates' hedging requirements.
- 4.145. Financial institutions with open contracts with clients would also need to transfer these contracts to markets entity within the group, which is a major logistical exercise. The lower credit ratings of the standalone market entities and its reduced ability to provide guarantees also mean that banks need to hold more collateral and re-price their offering to corporates, which could lead to the termination of valuable hedging arrangements as contract novation becomes uneconomic.
- 4.146. The separation of entities also means that large companies can no longer reduce their credit risk and funding requirements by netting their exposures within the same bank, which increases their credit position and their cost of capital. Businesses can no longer reduce their operational risk by using a single banking relationship for a range of services, nor benefit from a simplified process for monitoring positions and more flexible negotiating arrangements.
- 4.147. Potential bank exits from certain FICC segments and increasing specialisation could mean that larger businesses must face the increased cost and complexity of having to deal with multiple entities for different banking needs. In addition, businesses will also need to engage in time-consuming client re-documentation processes with new markets entities or in establishing new banking relationships.
- 4.148. Banks are also less likely to be able to absorb additional costs as banks are already in a low returns environment, and are therefore more likely to pass on costs to end users. Recently-introduced reforms (e.g. CRD IV) are also putting pressure on direct retail financing/lending. The increase in the challenges to corporates in managing their risks, combined with an increase in the cost of borrowing, will make it more difficult for companies to grow and expand. The ability of banks to provide trade finance and guarantees could be impaired, which could have significant impacts on the ability of export firms to engage in international trade. These impacts could also undermine the EU's growth agenda, especially in driving jobs growth and investment in research and development.

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<sup>96</sup> Businesses which obtain their loans and underwriting services from the same bank enjoy a discount on equity underwriter spreads of around 18-36 bps.

<sup>97</sup> The CVA risk charge represents an adjustment made to the value of the derivative to account for the credit risk of the counterparty.

### *Impact on pension funds and other investors*

- 4.149. The transaction costs (e.g. the bid-ask spread) of trading capital markets instruments are likely to increase as a result of the impact of banks' re-pricing. We estimate that investor of European corporate debt will have to pay an additional 12 bps to trade in European corporate debt, which will have an impact on long-term returns.<sup>98</sup> When this increase in transaction costs are compounded over a corporate bond investment portfolio accumulated over a 40-year working life, this cost amounts to a 5% reduction in the value of the investment.
- 4.150. Higher corporate yields also translate into value losses for investors who currently hold corporate debt. Investors could face mark-to-market losses of around 2% in their corporate bond holdings.<sup>99</sup> The total value losses when applied to all outstanding corporate bonds holdings amount to €82 billion.
- 4.151. The reduction in market liquidity associated with bank exits particularly in corporate bonds will make portfolio optimisation more costly for investors. The withdrawal of banks from certain asset classes (especially for less liquid corporate and emerging market debt) will reduce the range of asset classes for investors to choose from and to diversify their portfolio. Similarly, investors will have to engage with more than one entity in order to serve their needs as banks exit from certain FICC segments and specialise.
- 4.152. In addition, the prohibition on using non-cleared derivatives by the core credit institution also undermines the ability of pension funds to use non-cleared products that are more appropriate for their risk management strategy in comparison to cleared derivatives. An example is inflation swaps, which are typically non-cleared but tend to be used as an effective tool for pension schemes adjustments.

### *Impact on small businesses and retail customers*

- 4.153. Small- and medium-sized businesses and retail customers are likely to face modest pricing pressures for the banking services they consume.
- 4.154. However, if the core credit institutions cannot access OTC markets, their own risk management capabilities are undermined as they cannot hedge interest rates exposures arising from mortgages, which in turn make it difficult to offer fixed rate mortgages and other financial products which require hedges/derivatives. In addition, if small businesses are less able to properly manage and mitigate their risks, this could result in an increase in future market and economic volatility. Investment and exports could be discouraged if it becomes excessively costly for businesses to manage exchange rates, commodity and interest rate risks.
- 4.155. Securitisation is also important to facilitate firm's access to funding, especially for small- to medium-sized firms. Drucker and Puri (2006) also show that bank securitisation activity help to reduce buyer-seller agency problems.<sup>100</sup> When loans are securitised and sold to other investors, borrowers benefit from increased access to private debt capital and a wider pool of investors who can provide additional funding to borrowers. Empirical evidence from Gande and Saunders (2005) and Guner (2006) show that borrowers whose loans are sold benefit from lower loan yield spreads. However, securitisation markets will be impacted by structural reforms, and it will be harder to realise the benefits from a revitalised securitisation market. SME loan and residential mortgage securitisations could be impacted, with feedback to retail loan origination.

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<sup>98</sup> The increase in transaction costs are estimated as follows: we quantify the increase in cost to banks in credit activities, and expressed this as a percentage of total outstanding stock of corporate debt, which yields 12 bps. Investors will earn a higher return on bonds (of 30bps), but in compensation for bearing higher liquidity risk.

<sup>99</sup> This is calculated as the change in the value of the instrument due to an increase in the discount rate that is equal to the increase in the transaction cost.

<sup>100</sup> By separating loan origination from funding (via securitisation), loan securitisation could create a buyer-seller agency problems as banks have less incentives to engage in screening and monitoring if this risk is later offloaded from their balance sheets. However, the authors show that these loans are structured to reduce agency problems, which means that securitised loans have more restrictive covenant packages than unsecuritised loans, which enables buyers of securitised loans to limit losses if a borrower performs unexpectedly poorly.

- 4.156. The increase in bank capitalisation could also have an impact on banks' lending capacity. The EU banking sector will need to hold around €85 billion in additional capital in order to hold additional capital buffers and meet leverage ratio requirements. This could be otherwise available to support around €408 billion in banks' lending capacity, which will impact users of bank credit, such as SMEs and households.<sup>101</sup>
- 4.157. Retail customers do not typically have relationships with markets entities, so it is unlikely that they will incur administrative costs of establishing banking relationships with the markets entity. However, although small businesses typically use a narrow range of banking products and have one main banking relationship, as they grow in size, so do the range and sophistication of the products they need. The responses to our feedback from businesses suggest that businesses place a lot of importance of having access to a range of banking services within a single banking provider. As a result of separation, small businesses are no longer able to leverage on their longstanding relationships in order to gain access to more sophisticated products that are now only provided in the separated markets entity.
- 4.158. Policymakers have identified improving SME's access to finance as a key priority, as highlighted in the Commission's Communication on long term financing of the European economy, specifically on the improvement of access to capital markets. However, the changes introduced by structural reforms is likely to have significant adverse effects on capital market liquidity, and could undermine policymakers' objectives for making the transition from predominantly bank-funded corporates to a broader role for capital markets.

## 4.5 Impact of structural reforms on the EU economy

### Key points

- *The economic cost of proposed EU banking structural reform could be significant. Our analysis shows that the total economic costs could amount to €19 billion across the EU (0.15% of 2013 GDP). Economic costs are greater in the case of bank withdrawal from certain FICC markets and consequential loss of market liquidity. This would exacerbate current trends which show reducing secondary market liquidity in corporate capital markets.*
- *Our analysis of the costs to GDP and employment are summarised below:*

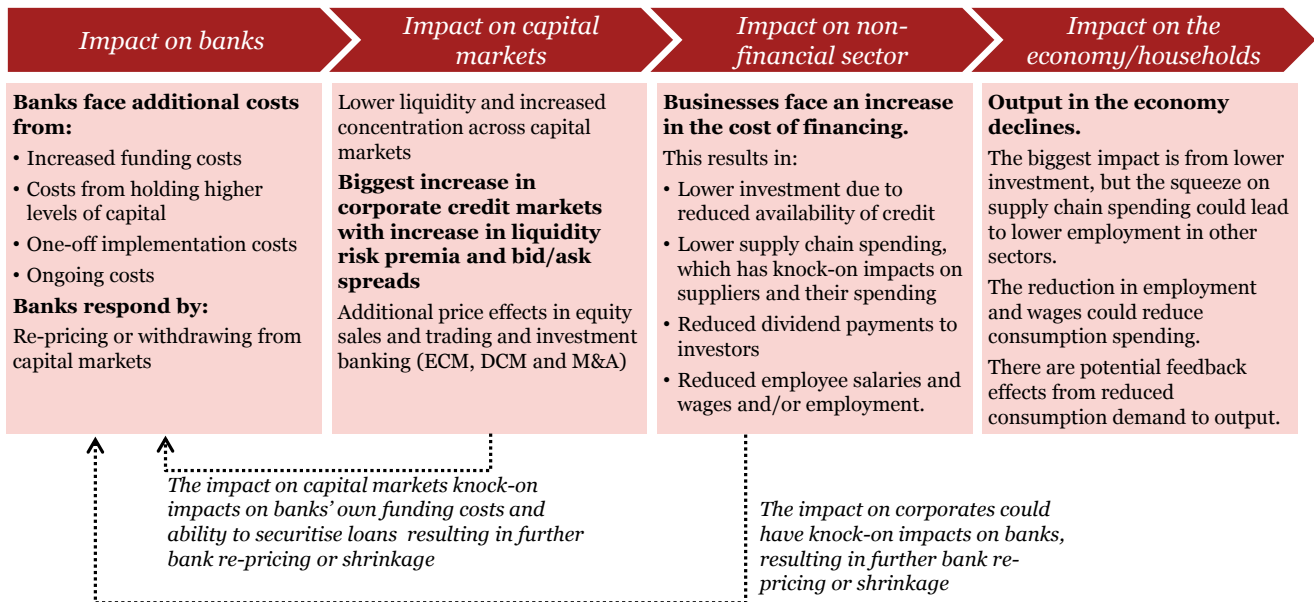
	Impact of structural reform
GDP	€19.4 billion (0.15% of EU 2013 GDP)
Employment	316,000 (0.15% of total employment)

- 4.159. The impact of structural reforms will have knock-on impacts on the non-financial sector and the wider EU economy. As shown in Figure 38, banks are likely to re-price the products and services of their markets entities, or withdraw from certain FICC segments due to higher funding and capital costs as well as ongoing operational costs as a result of structural reform. The increase in concentration in key capital market segments combined with the withdrawal of liquidity will increase the cost of financing for non-financial corporates' as liquidity risk premia increases and corporate borrowing spreads widen. This will be particularly pronounced for those businesses at the end of the liquidity and credit spectrum – i.e. medium-sized businesses who are borrowing amounts just large enough to issue corporate bonds.
- 4.160. The shrinkage of the banking sector due to market exits will also result in job losses and reduced supply chain spending by banks.

<sup>101</sup> We estimate that banks' loan to Tier 1 capital ratios are around 4.8 in the EU. Source: S&P Capital IQ

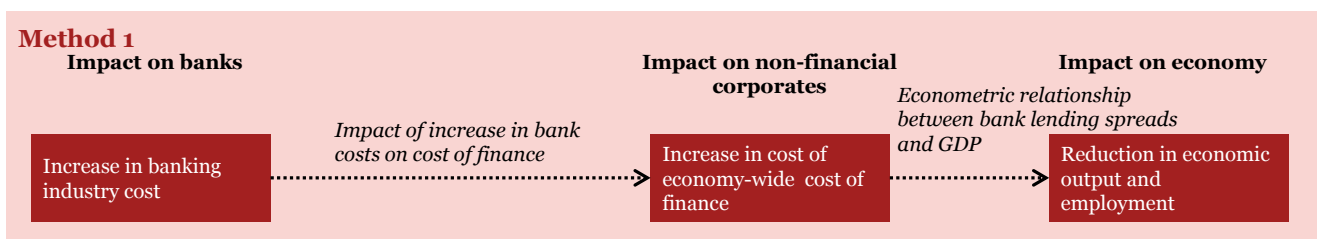
4.161. Higher borrowing costs have knock-on impacts on the ability of businesses to borrow and invest, and to expand output and employment, which, in-turn have a negative impact on the size and productivity of the non-financial sector. These impacts will result in lower overall levels of output and employment in the economy. Feedback effects could also materialise, as the shrinkage in the non-financial sector could result in further reduction in demand from the banking sector. Similarly, the reduction in overall liquidity in capital markets could exacerbate banks' funding costs, prompting further shrinkage or re-pricing of banking services.

Figure 38: Transmission of the bank impact of structural reform to the wider economy



4.162. We estimate the economic costs using two methods. The first, **Method 1** (summarised in Figure 39) captures the impact of banks passing through all of the costs of structural reform to users of banking services, resulting in higher cost of finance for non-financial corporates. As discussed in the previous section on bank impact, the total cost to the banking sector is around €21 billion per annum. When taken as the proportion of total outstanding non-financial sector debt in EU, this figure can be expressed as an increase in the overall economy-wide cost of debt, i.e. 17 bps.<sup>102</sup>

Figure 39: Method 1 approach to quantifying economic costs

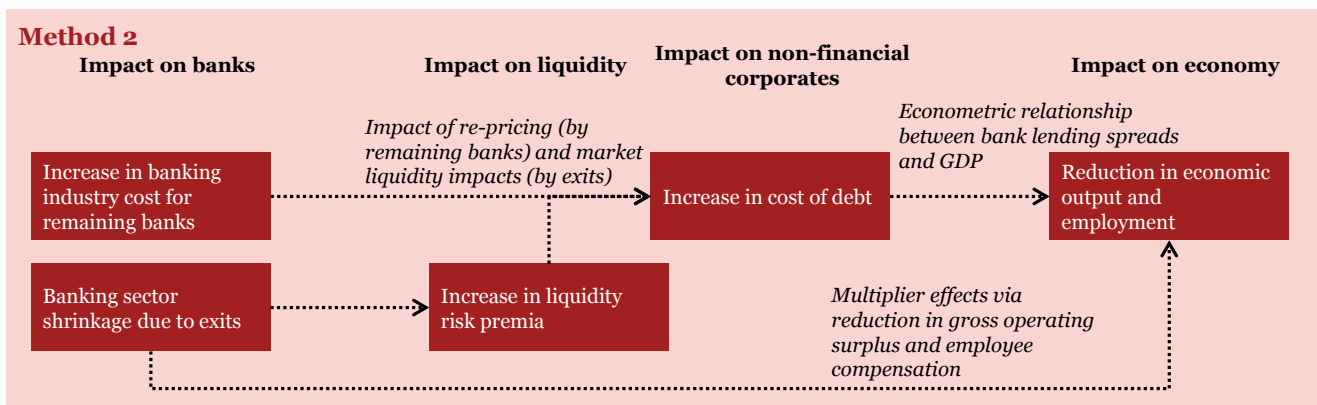


4.163. Method 1 is typically used by government and regulators in assessing the cost of financial reforms. It ensures that costs on the banking system are transmitted into the economy, but avoids specifying in detail how these costs are transmitted through the economy. In reality, the costs of reform will be borne through different markets, such as FX, equities, derivatives and credit. Method 1 captures all the costs but incorporates them into the economic framework as a change to the cost of debt finance. This approach also does not specify the amount of costs absorbed by the financial sector, the different behavioural responses of banks (shrink vs re-price), the different impacts on the cost of equity finance and debt finance and the differences between the costs to investors, companies and individuals.

<sup>102</sup> Outstanding non-financial sector debt in EU amounts to €12.5 tr, of which debt securities account for 14%. Source: ECB

- 4.164. Using this approach, we translate the increase in the overall cost of finance into an impact on the long-term (steady-state) level of output. To do this, we use the econometric relationship between cost of debt and economic output underpinned by academic studies and macroeconomic models to quantify the impact on GDP. The study by the BCBS' Macroeconomic Assessment Group (2010) reviewed over 90 macro-economic models and found that a 10 bp increase in the lending spread is associated with a reduction in the level of GDP of 0.02-0.27%.<sup>103</sup> We use the median of the MAG (2010) estimates, which show that a 10 bp increase in the lending spread results in a reduction in the steady-state level of GDP of 0.07%. Based on this approach, Method 1 yields total economic costs of €15 billion across the EU (or 0.12% of 2013 GDP). This impact also translates into job losses of around 249,000 across the EU, or 0.12% of total EU employment in 2013.<sup>104</sup>
- 4.165. Method 1 does not capture the associated market liquidity impacts and shrinkage of the banking sector that result from bank exits from capital markets activity. Therefore, we use an alternative method, **Method 2** (summarised in Figure 40), in order to capture these additional impacts. This approach captures the impact of banking sector shrinkage (due to exits), which result in liquidity impacts and multiplier effects, in addition to the impact of re-pricing by banks that remain in capital markets.

Figure 40: Method 2 approach to quantifying economic costs



- 4.166. Using this approach, we quantify the change in non-financial corporates' cost of debt as a result of: 1) re-pricing of banking services by banks that remain in capital markets; and 2) the impact on the liquidity risk premia following the bank exits from capital markets. We quantify the total costs of banks that remain active in capital markets (i.e. excluding exits), which amount to €17 billion<sup>105</sup>. This is then expressed as an increase in the overall economy-wide cost of debt of 14 bps. Next, we take into account the increase in the liquidity risk premia of 30 bps that is associated with the reduction in bank activity in corporate bond capital markets. The liquidity risk premia has a direct impact on yields and firms' cost of debt, as low liquidity results in the inefficient allocation of capital, which results in additional trading costs for investors, for which they need to be compensated in the form of a higher rate of return or cost of capital (Garleanu and Pedersen, 2004). These two factors together increase the economy-wide corporate cost of debt (across all sources of finance) by 18 bps. This increase in the cost of debt translates into a loss of economic output of €17 billion (or 0.13% of 2013 EU GDP).
- 4.167. We then quantify the multiplier effect of banking sector shrinkage in terms of a reduction in output as banks withdraw from capital markets activity. The shrinkage to the banking sector has direct economic

<sup>103</sup> The studies on the relationship between lending spreads and output reviewed by MAG (2010) use a range of models, such as structural models (including DSGE models), semi-structural models, used by central banks for forecasting purposes, and reduced form models, such as vector error correction models (VECM)

<sup>104</sup> This is based on the ratio of GDP per worker in the EU of €61,455. Source: Eurostat. This estimate does not include the offsetting employment benefits from financial stability.

<sup>105</sup> This is calculated by taking the total costs to the banking industry, i.e. €21.3 billion, and deducting the capital and funding costs of banks that exit capital markets. We assume that banks that exit will still incur additional ongoing operational costs as their separated markets entities are expected to continue operating in other trading segments and investment banking activities.

impacts and leads to multiplier effects, i.e. reduced bank activity could lead to reduced supply chain spending, which in turn, could have knock-on impacts on banks' suppliers' spending on their suppliers and so on. Similarly, job losses in the banking sector could also reduce total employee wages and salaries, which have knock-on impacts on consumer spending in the economy.

- 4.168. The Gross Value Added (GVA) of the banking sector consists of gross operating surplus, compensation of employees and net taxes on products.<sup>106</sup> Using the results from our analysis of bank impacts, we estimate the reduction in gross operating surplus in the sector due to the loss of profits generated via capital markets activities following bank exits. We also quantify the impact of shrinkage in terms of a reduction in the compensation of employees following potential job losses in the sector. However, given that banking sector employees tend to be highly-skilled, we assume that these employees will find alternative employment opportunities in other parts of the banking sector that remunerate them at 75% of their original compensation. The total reduction in gross operating surplus and compensation of employees is then expressed as an economy-wide impact using the Type 2 multiplier for a banking sector.<sup>107</sup> This multiplier is 2.57, meaning that €100 of spending by the banking sector results in an increase in EU GDP of €257. Using this multiplier effect results in a loss of economic output of €3 billion (or 0.03% of EU 2013 GDP). The shrinkage of the banking sector also reduces the size of the banking sector by 0.3% of banking sector GVA.
- 4.169. Combining the impacts of banks' re-pricing, liquidity and shrinkage, Method 2 yields total economic costs of €19 billion (or 0.15% of 2013 EU GDP). This also translates into job losses of around 316,000 across the EU, or 0.15% of total EU employment in 2013. Table 9 summarises the economic costs of structural reform using both approaches. The estimated economic costs using Method 1 and Method 2 are shown in Figure 41.

*Table 9: Economic costs of structural reform using Method 1 and Method 2*

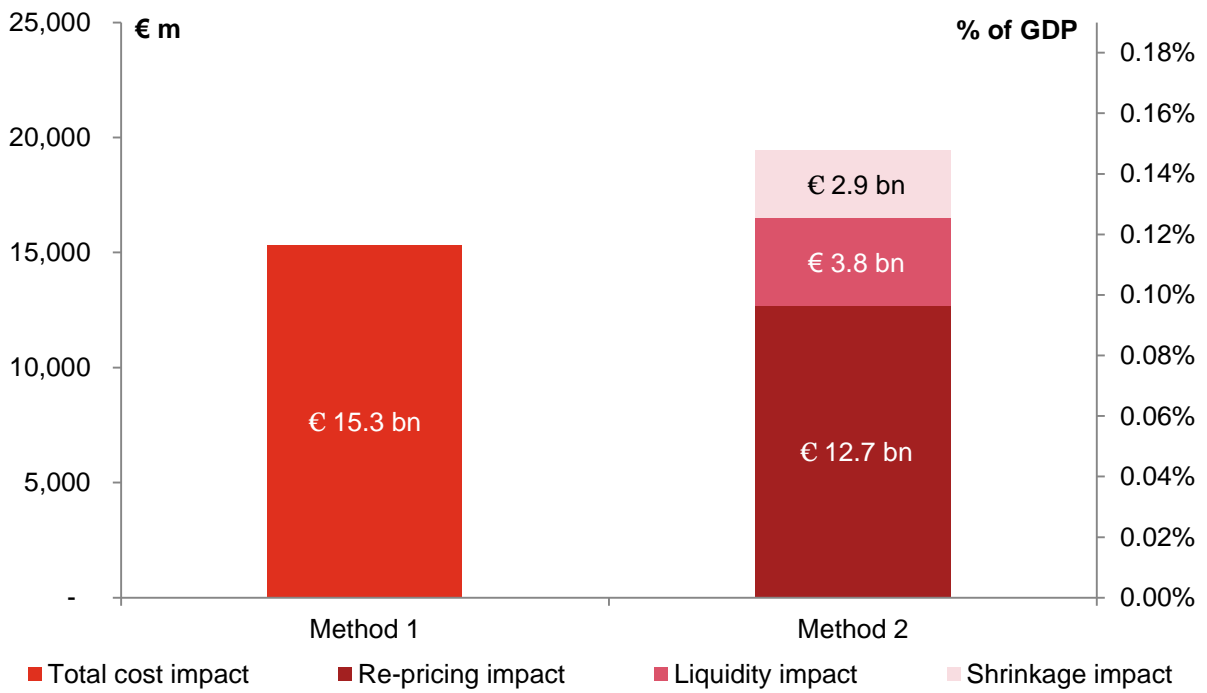
	<b>Method 1</b> <b>(% relative to baseline)</b>	<b>Method 2</b> <b>(% relative to baseline)</b>
GDP	€15.3 billion (0.12% of EU 2013 GDP)	€19.4 billion (0.15% of EU 2013 GDP)
Employment	249,000 (0.12% of total EU 2013 employment)	316,000 (0.15% of total EU 2013 employment)

Source: PwC analysis

<sup>106</sup> Gross value added (GVA) = gross operating surplus + compensation of employees + net taxes on production. Gross domestic product (GDP) = GVA + net taxes on products. Source: ONS <http://www.ons.gov.uk/ons/guide-method/method-quality/specific/economy/national-accounts/gva/relationship-gva-and-gdp/gross-value-added-and-gross-domestic-product.html>

<sup>107</sup> Type 2 multipliers capture the direct, indirect and induced economic impacts. The direct economic impact of the banking sector is the value generated by the banking sector's main business operations. The indirect economic impact is the value generated from the banking sector's upstream supply chain linkages as a result of spending by the banking sector. The induced economic impact is the value generated from the consumption patterns of the banking sector's employees as well as those of its suppliers. The Type 2 multiplier is calculated using Eurostat's supply and use tables for 2011 for the EU.

Figure 41: Economic costs of structural reforms



Source: PwC analysis

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# *Appendices*



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## Appendix 2: Banks considered in our study

- A1. We have considered the following selection of banks (in their EU operations) in our study. These are listed in Table 10.
- A2. We carried out a detailed analysis for the banks marked with an asterisk. We then scale the impacts to the rest of the banks listed in Table 10. Funding costs and one-off implementation costs are scaled based on their total assets, using data from S&P Capital IQ. The total assets for these additional banks amounted to €29 trillion. Equity capital costs have been scaled based on the total amount of CET1 capital for all affected banks. The additional operational costs are scaled based on banks' operational costs. Data on banks' CET1 capital was obtained from the results of the European Banking Authority's 2014 stress tests and banks' annual reports where available.

*Table 10: Sample of banks covered in our study*

Arbejdernes Landsbank	Handlowy w Warszawie
Banca Generali	Helaba
Banco Santander, S.A.*	HSBC Holdings plc*
Bank of America Corporation*	ING
Barclays PLC*	JPMorgan Chase & Co.*
Bayerische Landesbk	KBC
BBVA	Landsbk Baden-Württ.
Belfius Banque	Lloyds Banking Group plc*
BNP Paribas SA*	Mediobanca
Citigroup Inc.*	Monte Paschi Siena
Commerzbank AG*	Morgan Stanley*
Credit Agricole S.A.*	NIBC Bank NV
Credit Suisse Group AG*	Nordea
Danske Bank	Portigon
DekaBank Deutsche GZ	Royal Bank of Scotland Group plc*
Deutsche Bank AG*	SEB
DiBa Bank	Societe Generale Group*
DNB ASA	Spar Nord Bank A/S
DZ Bank AG	Standard Chartered
FIMBank	Swedbank
Goldman Sachs Group, Inc.*	UBS AG*
Groupe BPCE	UniCredit S.p.A.*
Handelsbanken	

*Note: \* indicates banks for which we undertook detailed bank segment analysis*

# Appendix 3: Business segment definitions

A3. Table 11 presents the definitions of business activities included in our segmental analysis.

*Table 11: Capital markets operations that will be placed in a separate markets entity*

Segment	Sub-segment	Activities covered	
<b>Investment banking</b>	DCM Bonds & Loans	<ul style="list-style-type: none"> <li>Fees (less any losses from product not placed) from HG, HY, Muni, Agency and Emerging Markets bond origination.</li> </ul>	
	M&A & ECM	<ul style="list-style-type: none"> <li>M&amp;A fees, fairness advisory fees, other advisory fees e.g. infrastructure.</li> <li>Fees from equity origination including convertibles.</li> </ul>	
<b>FICC</b>	FX	<ul style="list-style-type: none"> <li>Trading profits and losses and non-interest income from Spot and forward trading.</li> <li>Trading profits and losses and non-interest income from options trading and other instruments traded in exotics book.</li> <li>FX revenue from product sold via Transaction or Commercial Bank coverage staff.</li> </ul>	
	Rates	<ul style="list-style-type: none"> <li>Trading profits and losses and non-interest income from short-term interest rate (STIR), client repo and Treasury Bill activity.</li> <li>Trading profits and losses and non-interest income from government and agency bond trading.</li> <li>Trading profits and losses from STIR, swap and vanilla option trading.</li> <li>Commissions and non-interest income/margin from listed derivatives including embedded clearing fees.</li> </ul>	
	Credit	<ul style="list-style-type: none"> <li>Trading profits and losses and non-interest income from frequent borrower bonds, corporate bonds, emerging market bonds and flow credit derivatives such as CDS.</li> <li>Trading profits and losses and non-interest income from cash CDOs, synthetic CDOs, tranching product, other instruments booked in structured trading books, Cash CDO origination fees.</li> <li>Trading profits and losses, non-interest income and other gains from distressed bond and loan trading.</li> </ul>	
	Commodities	<ul style="list-style-type: none"> <li>All income from energy, metals and soft commodity products. Includes physical and financial and commodity principal investing.</li> </ul>	
	Securitisation	<ul style="list-style-type: none"> <li>Fees from agented ABS and MBS origination, all income from principal RMBS and CMBS securitisation including conduits and warehousing, MBS trading.</li> </ul>	
	<b>Cash equities, derivatives and convertibles, and prime services</b>		<ul style="list-style-type: none"> <li>Commissions and trading profits and losses from cash equities traded on exchange, through other market fora or by crossing.</li> <li>Commissions and trading profits and losses from single stock options, index options, delta 1, variance swaps, volatility swaps, sector swaps.</li> <li>Commissions and non-interest income/margin from listed derivatives including embedded clearing fees.</li> <li>Trading profits and losses from baskets or complex single stock options, baskets or complex index options, fund of mutual fund product, fund of hedge fund product and other instruments booked in structured trading books.</li> <li>Fees, commissions, Trading profits and losses and non-interest income from prime brokerage, stock lending and stock financing (excludes synthetic financing).</li> <li>Client revenue from sales made to CFOs/Treasurers at corporates.</li> </ul>

Source: Tricumen

# Appendix 4: Methodology for assessing liquidity impacts in corporate bond markets

## Introduction

A4. In this appendix we set out the approach used to analyse the drivers of corporate bond yields, with a particular focus on how liquidity impacts borrowing spreads. We use an econometric technique to specify these relationships and then use the analysis to assess the likely impact of reduced liquidity on higher corporate borrowing costs. This is then used in our analysis of the economic impact of structural reforms in the EU banking sector. Our approach is also underpinned by a review of key academic studies in this area, which we summarise below.

## Previous studies

- A5. There has been considerable research into the drivers of corporate bond spreads, stretching back to Merton (1974). While credit risk has been frequently identified as a key driver of bond spreads, other studies have suggested a range of additional drivers. Dick-Nielsen, Feldhütter, and Lando (2010) show that yield spreads above swap rates are explained, in part, by a liquidity component and a liquidity risk component, based on their analysis of corporate bonds from the US TRACE data. The liquidity component consists of the Amihud (2002) liquidity measure, two proxies for bid-ask spreads<sup>108</sup>, and turnover scaled by amounts outstanding. The liquidity risk component is captured by the standard deviation of the bid-ask spread and the Amihud liquidity measure<sup>109</sup>. The study shows that each component of liquidity is statistically significant and analysis of these drivers shows that they are individually important, but vary in importance.
- A6. Similarly, the Bank of England (Churm and Panigirtzoglou, 2005) decomposed credit spreads into a credit risk component and the liquidity risk premia. Their specification is based on structural models such as the Leland and Toft (1995) model and the Merton models (1974) of corporate bond spreads, which show that spreads are driven by the expected and unexpected loss of default of the issuer, and a residual term that captures the liquidity risk premia. The Bank of England have used two model specifications to decompose corporate bond spreads into the credit risk and liquidity risk premia: (i) the residual term after estimating credit risk component through price volatility and structural parameters for measuring corporate performance, and (ii) the residual term after using the cash CDS market spreads to estimate the credit risk component. Both of these approaches yielded consistent results on the liquidity risk premia.

## Overall approach

- A7. Overall approach to estimating the impact of liquidity on corporate bond spreads is based on the academic studies set out above. We have been able to use a broader set of data than some previous studies, by including data on the number of market makers for individual banks and proprietary liquidity scoring metrics.

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<sup>108</sup> Two proxies are used: (i) Imputed roundtrip trades are calculated by matching closest buys/sells to estimate the actual bid-ask spread. (ii) The roll measure (Roll 1984) is based on estimating bid-ask spreads through the covariance between consecutive returns.

<sup>109</sup> The model is a panel data regression, which controls for bond specific factors by running separate regressions for each rating class. Corporate specific factors and heteroskedasticity in residuals are taken into account by using two-dimensional cluster robust standard errors. The study also shows that liquidity is state dependent as the make-up of liquidity and its impact on spreads differs between pre-subprime crisis period and post-subprime crisis period.

- A8. Our main dependent variable is the z-spread, which is the spread that would be captured by the investor over the entire Treasury spot-rate yield curve if the bond is held to maturity.
- A9. We restricted our analysis to a representative sample of 745 investment-grade corporate bonds for 4 time periods in Europe, resulting in approximately 3000 data points. Capital markets data provider – Trax provided us with a representative sample from within their bond universe, by eliminating non-vanilla corporate bonds and those which has a trading history over our whole time period.
- A10. We specified a panel data econometric model that includes the drivers of corporate bond spreads which includes various metrics of liquidity, corporate credit quality and other bond-specific factors. The specification is set out below, and the definitions and sources of the variables in our analysis are set out in more detail in Table 12. We used various data sources to inform our analysis, including Trax, UBS Delta and Thomson Reuters.

$$Z - spread_{i,t} = \alpha + \beta_1 Liquidity\ variability_{it} + \beta_2 Amihud\ liquidity_{it} + \beta_3 Number\ of\ marketmakers_{it} + \beta_4 Liquidity\ score_{it} + \beta_5 Bid\ ask\ spread_{it} + \beta_6 Coupon\ rate_{it} + \beta_7 Hazard\ rate_{it} + \beta_8 Time\ to\ maturity_{it} + \varepsilon_{it} \quad (4)$$

Where  $\alpha$  is a constant, and  $i$  represents the bond issue at time  $t$ .

Table 12: Definition and sources of variables used in the analysis

Variable		Definition	Source
<b>Dependent variable</b>	Z-spread	The spread between the bond yield and the specific country's equivalent Libor curve.	UBS Delta
<b>Independent variables</b>			
Liquidity drivers	Liquidity variability	30-day standard deviation of bid-ask spreads.	Trax
	Amihud liquidity	The Amihud (2002) measure of liquidity is a price impact measure that captures the daily price response (in basis points) scaled to turnover. Specifically, the following ratio is used: Average of (absolute daily return/trading volumes).	Trax and Thomson Reuters
	Number of market makers	Number of market makers quoting bid and ask spreads for the specific bond in that month.	Trax
	Liquidity score	A weighted score for each bond issue that is aggregates quoted price, volumes traded, amounts issued, amounts outstanding and trade enquiries information.	UBS Delta
	Bid-ask spread	The spread quoted by market makers for buying and selling bonds, scaled to price.	Trax
Control variables: time varying bond-specific and firm specific characteristics	Coupon rate	The interest that is stated on the bond when it is issued.	Trax
	Hazard rate	Model-based measure of a firm's default risk.	UBS Delta
	Time to maturity	The time left, in years, before the bond matures and is redeemed.	Thomson Reuters

- A11. The summary statistics for the data used in our analysis are shown in Table 13.



Table 13: Summary statistics for variables used in the analysis

Variable	Observations (over the 4 time periods)	Mean	Std. Dev.	Min	Max
Z-spread	2938	113.2	98.5	-286.0	857.8
Liquidity variability	2955	6.0	6.2	0.0	42.2
Amihud liquidity	2947	1.0	16.6	0.0	777.9
Number of market makers	2968	7.7	2.5	0.2	15.8
Liquidity score	2963	5.9	1.1	2.0	8.0
Turnover volume	2980	28600000	166000000	10000	6990000000
Bid-ask spread	2969	55.1	40.8	0.3	439.4
Coupon rate	2980	5.1	1.3	0.5	9.8
Hazard rate	2967	256.8	144.9	-190.4	989.8
Amounts issued	2980	768766	1854495	13500	50000000
Yield	2938	2.6	1.6	-1.9	10.6
Time to maturity	2947	9.1	37.5	0.1	994.5

Source: PwC analysis

- A12. We used a panel data approach as it allows us to control for individual heterogeneity across our bond sample, such as time-invariant variables that cannot be observed or measured, e.g. differences in the business practices across the corporations that issues the bonds; or variables that change over time but not across bonds such as international market factors. This then allows us to isolate the impact of variables that vary over time on corporate bond spreads.<sup>110</sup>
- A13. We use a fixed effects approach with robust standard errors (so that the model is robust to heteroskedasticity) in our panel data model, which assumes that individual-specific effects are uncorrelated with the independent variables. Under the fixed effects approach, each unit (in this case, each bond issue) has its own systematic baseline. We used a number of specification tests all of which found the fixed effects model to be preferred over the random effects model.<sup>111</sup>

### Key findings

- A14. The results in Table 14 show that the number of market makers has a statistically-significant and negative relationship at the 10% significance level on the z-spread, or the corporate spread. These regression results show that, all other things being equal, a one-unit reduction in the number of market makers increases the z-spread by 1.9 basis points.

<sup>110</sup> “The key insight is that if the unobserved variable does not change over time, then any changes in the dependent variable must be due to influences other than these fixed characteristics.”, Stock and Watson, (2003)

<sup>111</sup> In order to test whether a fixed effects or random effects model is appropriate in this context, we use the Hausman test which compares the two models with a null hypothesis that the random effects model is preferred. We consistently get a p-value less than 0.05, which suggests that the fixed effects model is preferred to random effects. In addition, we also used the Sargan-Hansen test, which unlike the Hausman test, is robust to the presence of heteroskedasticity. The Sargan-Hansen test also found the fixed effects model to be the preferred model.

Table 14: Results for the impact of market makers on corporate bond spreads

Zspread	Coef.	Robust Std. Err.
Liquidity variability	0.334*	0.196
Amihud liquidity	0.646*	0.210
Number of market makers	-1.913*	0.681
Liquidity score	-4.95*	1.641
Bid-ask spread	0.227*	0.055
Coupon rate	60.333*	16.707
Hazard rate	0.554*	0.017
Time to maturity	-9.011*	1.152
Constant	-224.393*	84.488
Number of obs	2847	
Bond fixed-effects	Yes	
Wald chi2(27)	634.94	
Prob > chi2	0.000	

\*\*\* Significant at the 1% level; \*\* Significant at the 5% level; \*Significant at the 10% level

Source: PwC analysis

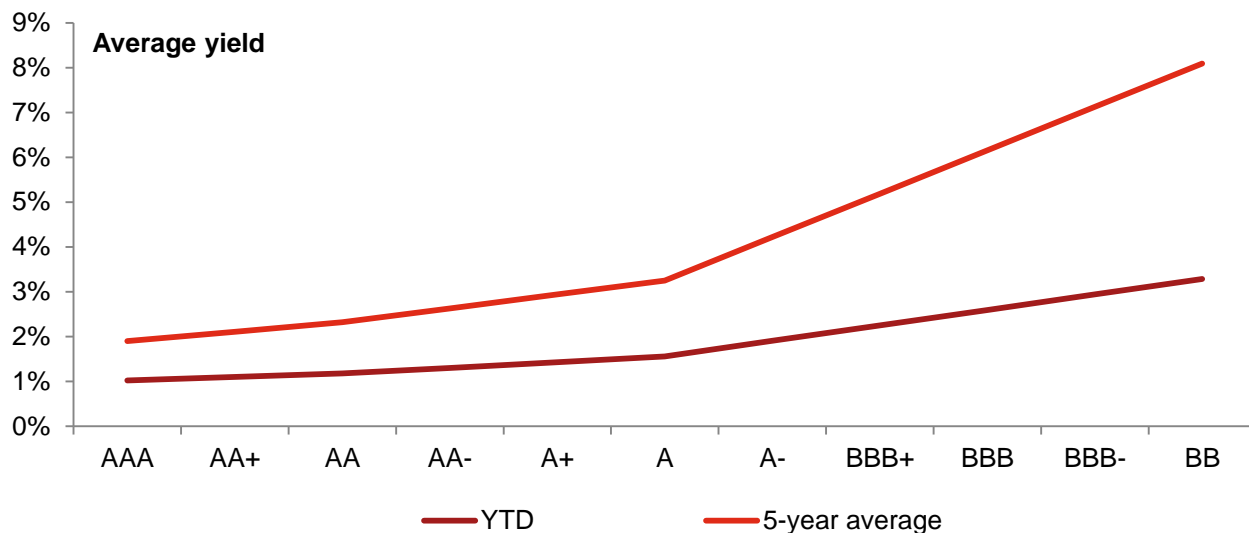
- A15. We then use the econometric regression to conduct sensitivity analysis, specifically a reduction of liquidity, as informed from our segmented bank analysis.
- A16. Because there are a number of liquidity variables, we need to calibrate reduction in liquidity to each of these liquidity variables. We therefore conduct univariate and correlation analysis between the number of market makers and various liquidity variables (liquidity variability, Amihud liquidity and Liquidity score), and we find that a change in the number of market makers is also correlated with changes in these liquidity variables. We therefore use the results in Table 14 to estimate the combined impact of:
- The direct impact on z-spreads of a change in the number of market makers; and
  - The indirect impact on z-spreads that results from a change in the liquidity variables that comes as a result of the change in market makers.
- A17. The combined impact of a change in the number of market makers is shown in Table 15. We show the reduction in the number of market makers down the rows of Table 15. Along the columns, we show the reductions in the other associated liquidity metrics. This means that the shaded diagonal area represents calibrated reductions in liquidity, which reductions in the number of market makers and consistent reductions in associated liquidity variables. While other factors or feedback mechanisms may result in higher or lower effects, we concentrate on the diagonal results.
- A18. Based upon our analysis of the potential reduction in market making capacity, we find that a reduction in the number of market makers by nine results in an approximately 30 bps change in the z-spread, as indicated by the outlined box in Table 15.

Table 15: Impact of a change in the number of market makers on liquidity variables and the z-spread

Amihud (percentage points)	0.0	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7.0	7.7
Liquidity score	0.0	-0.3	-0.5	-0.8	-1.0	-1.3	-1.5	-1.8	-2.0	-2.3	-2.5	-2.8
Liquidity variability (bps)	0.0	0.6	1.2	1.8	2.3	2.9	3.5	4.1	4.7	5.3	5.8	6.4
Change in number of market makers	Change in z-spread (bps)											
0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2
-1	1.9	3.8	5.7	7.6	9.5	11.4	13.2	15.1	17.0	18.9	20.8	22.7
-2	3.8	5.7	7.6	9.5	11.4	13.3	15.2	17.0	18.9	20.8	22.7	24.6
-3	5.7	7.6	9.5	11.4	13.3	15.2	17.1	19.0	20.8	22.7	24.6	26.5
-4	7.7	9.5	11.4	13.3	15.2	17.1	19.0	20.9	22.8	24.6	26.5	28.4
-5	9.6	11.5	13.3	15.2	17.1	19.0	20.9	22.8	24.7	26.6	28.4	30.3
-6	11.5	13.4	15.3	17.1	19.0	20.9	22.8	24.7	26.6	28.5	30.4	32.2
-7	13.4	15.3	17.2	19.1	20.9	22.8	24.7	26.6	28.5	30.4	32.3	34.2
-8	15.3	17.2	19.1	21.0	22.9	24.7	26.6	28.5	30.4	32.3	34.2	36.1
-9	17.2	19.1	21.0	22.9	24.8	26.7	28.5	30.4	32.3	34.2	36.1	38.0
-10	19.1	21.0	22.9	24.8	26.7	28.6	30.5	32.3	34.2	36.1	38.0	39.9
-11	21.0	22.9	24.8	26.7	28.6	30.5	32.4	34.3	36.1	38.0	39.9	41.8

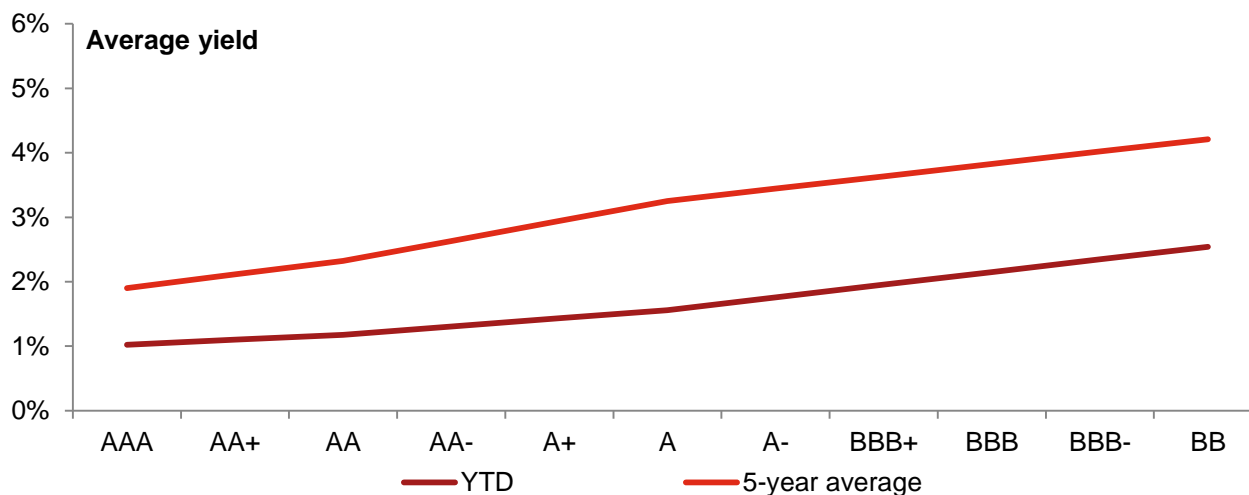
# Appendix 5: Additional supporting information

Figure 42: Funding cost associated with different ratings – UK financial<sup>112</sup>



Source: Bank of America Merrill Lynch, S&P Capital IQ, PwC analysis

Figure 43: Funding cost associated with different ratings – Euro financial<sup>113</sup>

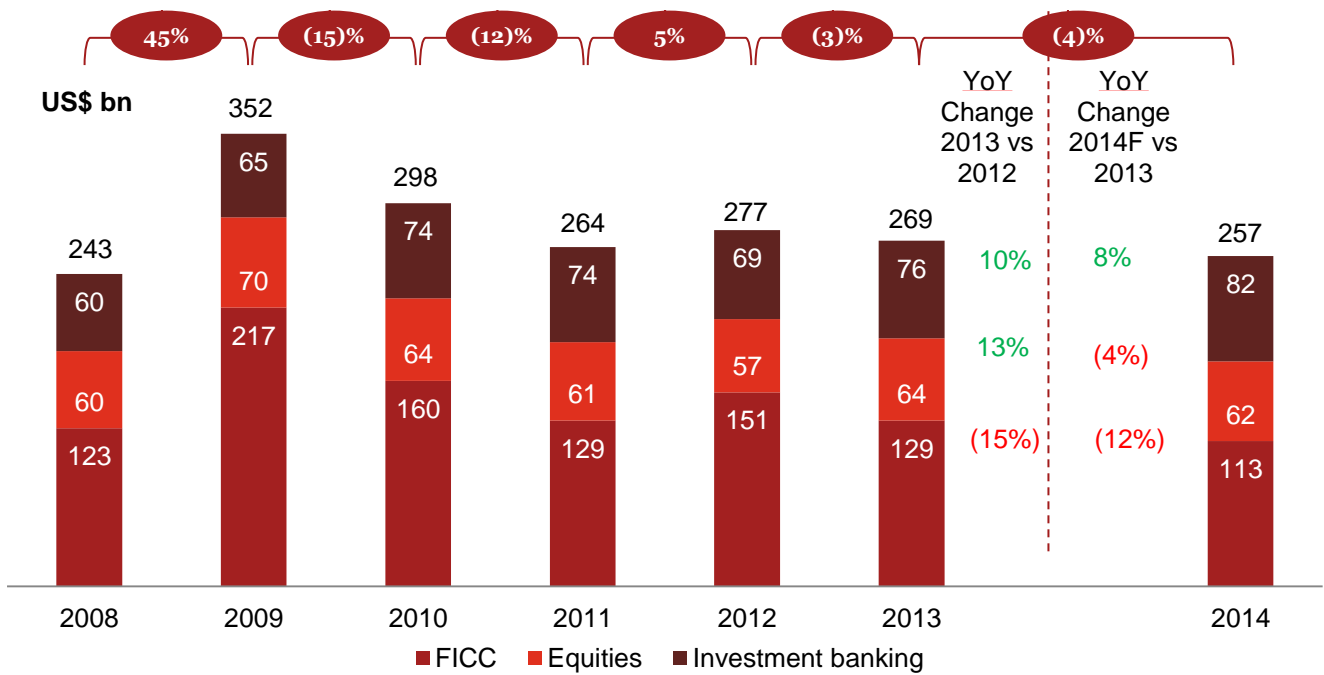


Source: Bank of America Merrill Lynch, S&P Capital IQ, PwC analysis

<sup>112</sup> Average yields of Bank of America Merrill Lynch Sterling Financials Index at each rating. Where a yield is unavailable for a particularly rating it is linearly interpolated.

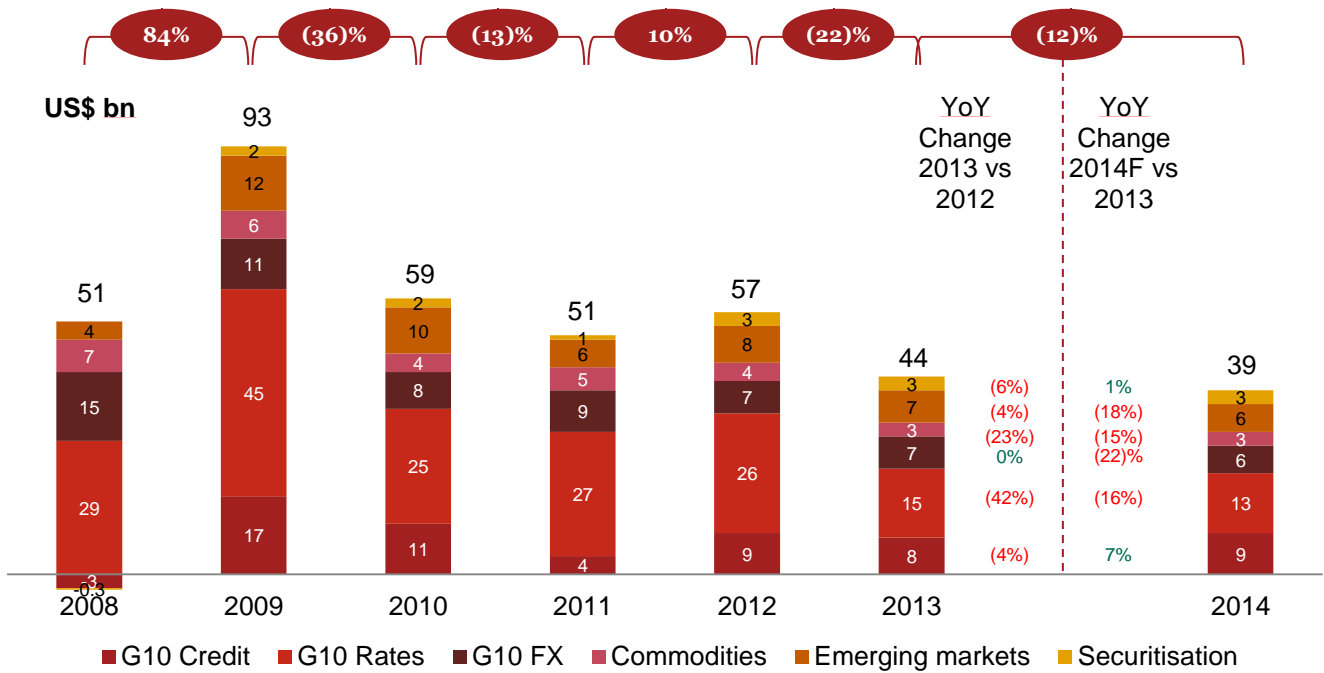
<sup>113</sup> Average yields of Bank of America Merrill Lynch Euro Financials Index at each rating. Where a yield is unavailable for a particularly rating it is linearly interpolated.

Figure 44: Global capital markets revenue pools



Source: Coalition

Figure 45: EMEA FICC revenue pools



Source: Coalition

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