INTERNATIONAL MONETARY FUND

IMF Country Report No. 17/344

SPAIN

FINANCIAL SECTOR ASSESSMENT PROGRAM

November 2017

TECHNICAL NOTE—INTERCONNECTEDNESS AND SPILLOVER ANALYSIS IN SPAIN'S FINANCIAL SYSTEM

This Technical Note on Interconnectedness and Spillover Analysis in Spain's Financial System was prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with the member country. It is based on the information available at the time it was completed in October 2017.

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International Monetary Fund
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October 31, 2017

TECHNICAL NOTE

INTERCONNECTEDNESS AND SPILLOVER IN SPAIN'S FINANCIAL SYSTEM

Prepared By
Monetary and Capital Markets Department

This Technical Note was prepared by IMF staff in the context of the Financial Sector Assessment Program in Spain. It contains technical analysis and detailed information underpinning the FSAP's findings and recommendations. Please also see the Financial System Stability Assessment at http://www.imf.org/~/media/Files/Publications/CR/2017/cr17321.ashx
Further information on the FSAP can be found at http://www.imf.org/external/np/fsap/fssa.aspx

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Glossary

BdE	Bank of Spain (Banco de España)
BIS	Bank for International Settlements
BME	Bolsas y Mercados Españoles
BRRD	Bank Recovery and Resolution Directive
CET1	Common Equity Tier-1
CNMV	Comisión Nacional del Mercado de Valores (National Securities Market Commission)
CRR	Capital Requirements Regulation
CRD IV	Capital Requirements Directive
DGF	Deposit Guarantee Fund
DGFSP	Directorate General for Insurance and Pension Funds (Dirección General de Seguros y Fondos de Pensiones)
DTA	Deferred Tax Asset
EBA	European Banking Authority
ECB	European Central Bank
EFSF	European Financial Stability Facility
ESM	European Stability Mechanism
ESRB	European Systemic Risk Board
FGD	Deposit Guarantee Fund (Fondos de Garantía de Depósitos)
FMSI	Financial Markets Stress Index
FROB	Fund for Orderly Bank Restructuring
FSB	Financial Stability Board
FSR	Financial Stability Report
GSIB	Global Systemically Important Bank
LSI	Less Significant Institution
MdE	Ministry of Economy, Industry, and Competitiveness (Ministerio de Economía, Industria y Competitividad)
MPE	Multiple Point of Entry
MREL	Minimum Requirement for Own Funds and Eligible Liabilities
NIMs	Net Interest Margins
NPL	Nonperforming Loan
P&A	Purchase and assumption
RF	Resolution Fund
ROA	Return on Assets
ROAA	Return on Average Assets
ROE	Return on Equity
RRP	Recovery and Resolution Plan
SAREB	Asset management company (Sociedad de Gestión de Activos Procedentes de la Reestructuración Bancaria)
SI	Significant Institution

SICAV	Sociedad de Inversión de Carácter Financiero (open-ended investment company)
SMEs	Small and Medium-sized Enterprises
SPE	Single Point of Entry
SRB	Single Resolution Board
SRM	Single resolution Mechanism
TLAC	Total Loss Absorbing Liabilities
TLTRO	Targeted Long-term Refinancing Operation
VAR	Vector Autoregression

Table 1. Spain: Key Recommendations	
	ST/MT
Incorporate cross-sectoral and cross-border dimensions in monitoring financial stability risks and systemic risks. Interconnectedness analysis could also be incorporated as part of the Financial Stability Review on a regular basis. Different quantitative methodologies could be considered to enhance the monitoring of interconnectedness and systemic risks (BdE and ECB).	ST
Close remaining data gaps on interconnectedness analysis with regards to interbank exposures, cross holding of assets and liabilities by banks and non-banks, the derivative exposure of banks and non-banks, the overall size and risk of non-traditional banking activities within banks and any perimeter supervisory issues. Data on interbank market and cross-sectoral exposures should be collected on a regular basis to better analyze the evolution of these relations (BdE, DGSFP, CNMV).	ST
Enhance inter-agency and college collaboration and coordination. Improve inter-agency (BdE/SSM, DGSFP, CNMV) collaboration and coordination to form a more holistic view of systemic risks and to calibrate and enact macroprudential measures. Supervisors should strengthen their collaborations from both cross-border and cross-sectoral dimensions, given the potential channels of risk transmission.	MT

EXECUTIVE SUMMARY

The significant international presence of Spanish banks provides welcome diversification effects but may also have significant implications for inward and outward spillovers. The share of financial assets abroad has grown continuously for the Spanish banking sector, with the largest international exposures by financial assets concentrated in the United Kingdom, the United States, Brazil, Mexico, Turkey and Chile. Spanish subsidiaries are systemically important for the banking system in several host countries. To some extent, spillovers could be mitigated by the Spanish subsidiary model characterized by a large share of local funding in local currency and a relatively high degree of autonomy of risk management practices.

Financial intermediaries in Spain are interconnected through conglomerate ownership, common exposures, and inter-sectoral claims. Financial groups operate in banking, insurance, manage investment funds and distribute pension funds. The main source of cross-sectoral connectedness appears to be insurance companies' exposures to banks, while exposures of banks to insurers or to mutual funds appear limited at present. Regarding common exposures, the sovereign debt market is by large the most developed financial market and the most important source of cross-sectoral linkages between banks and the rest of the financial system.

Empirical analysis using both exposure and market data suggest strong cross-border interconnectedness. Network simulations based on BIS aggregate cross-border banking claims indicate that the outward spillovers from the Spanish banking system to the rest of the world are sizable, while the Spanish banking system is vulnerable to shocks from countries where the two international banks have subsidiary operations. Market based approach suggests that Spanish banks are highly connected with European banks from France, the United Kingdom, Italy, and Germany. The high degree of equity return connectedness in European banks could be attributed to the close balance sheet linkages as shown in the exposure data, and the similarity in bank business models, the macro environment, monetary policy and financial regulations. Furthermore, credit shocks in Spain could have significant impact on the domestic real economy and bank credit in the United Kingdom and France, accounting for macro-financial interactions.

Contagion within the domestic interbank market appears to be limited at present. Network analysis based on domestic interbank exposures indicates limited contagion within the significant institutions (SIs) in the domestic banking system, with no bank failure resulting from interbank linkages. However, there is considerable heterogeneity among Spanish banks and the degree of contagion and vulnerability vary significantly among banks.

There are strong cross-sectoral linkages between banks and other parts of the financial system in Spain but systemic risks from those linkages appear to be limited. A tight network of cross-sectoral interconnections between banks and non-bank financial institutions exist in Spain since banking groups own insurance and investment management firms and are important players in the Spanish capital markets. Nevertheless, the interconnectedness between banks and nonbank financial institutions does not appear to pose systemic risks to the financial system and the overall

market stress has decreased substantially over time. However, as markets and institutions evolve these linkages might change and systemic risk from interconnectedness might increase and make the system vulnerable.

The mission recommends enhanced monitoring of interconnectedness and systemic risks, improvements in data collection, and strengthened inter-agency collaboration on oversight. The anticipated shifts in interest rate and liquidity environment could revitalize risks arising from interconnectedness that are current muted. Cross-sectoral and cross-border interconnectedness should be incorporated in systemic risk monitoring analysis and assist in the implementation of macroprudential measures when necessary. Remaining data gaps, such as the cross holding of assets, the ownership structure of key financial assets, and the overall size of non-traditional banking activities, should be closed. Finally, interagency and college collaboration should be further strengthened to form a holistic view of systemic risks.

INTRODUCTION[1]

1. Strong linkages of Spanish financial institutions with the rest of the world give rise to potential cross-border contagion risks. The share of financial assets abroad stood at about 45 percent of total financial assets in June 2016, with the largest exposures to households and SMEs. Spanish subsidiaries are systemically important for some banking systems in Latin America, accounting for about 38 percent and 25 percent of Mexico and Chile's banking sector assets, respectively. The top two banks, Santander and BBVA, have more than half of their assets abroad, and both banks are highly reliant on profits from their international operations. The high reliance on foreign subsidiaries in profit generation could imply significant vulnerabilities if the economic and financial conditions in host countries were to deteriorate. Furthermore, the significant presence of Spanish banks could have important financial stability implications for Spain and for host countries in terms of potential spillover risks.

2. Financial intermediaries in Spain are interconnected through financial conglomerate ownership common exposures, and inter-sectoral claims. The largest Spanish banks operate as diversified financial groups operating in insurance, mutual and pension funds and other service sectors. Strong inter-linkages among domestic financial institutions could engender systemic risks. A tight network of domestic interconnections could make the system vulnerable to destabilizing domino effects triggered by the realization of extreme losses (stress) in individual institutions or stresses in important financial markets. The nature and size of systemic risks, in turn, depends on whether interconnections within the financial sector are more prevalent among banks, or between banks and nonbanks (insurance companies, pension funds, money market and mutual funds).

[1] The authors of this note are Apostolos Apostolou and TengTeng Xu (both IMF) and members of the Spain FSAP 2017 team led by Udaibir Das. The analysis has benefitted from discussions with staff from the Bank of Spain, DGSFP, the CNMV and the Spain FSAP team. Many thanks to Pavel Lukyantsau and Felipe Nierhoff for the excellent research assistance.

3. To examine contagion risks and cross-border financial linkages, three approaches based on exposure and market data are applied. The first approach applies the Espinosa-Vega and Sole (2010) "domino" network methodology to examine cross-border banking linkages, using BIS Consolidated Banking Statistics. Two "domino" effects are considered: (i) assessing only the impact on interbank exposures; (ii) assessing impact on all bank exposures. The second approach uses the Diebold and Yilmaz (D&Y, 2014) methodology with daily equity returns of banking indices to examine the interconnectedness between Spain's banking sector and countries with strong financial and trade linkages with Spain, capturing potential *indirect* channels of contagion through market prices. The third approach uses the Global VAR methodology (Dees, di Mauro, Pesaran and Smith, 2007) to examine the cross-border impact of credit and other financial shocks, accounting for macro-financial interactions.

4. Domestic inter-sectoral and cross-sectoral relations are also analyzed using exposure and market information. Inter-sectoral interconnectedness is examined with inter-bank supervisory claims data from the Bank of Spain using Espinosa-Vega and Sole (2010) approach. Cross-sectoral interconnectedness is analyzed using (i) direct cross-sectoral exposure data between banks and nonbanks; (ii) market data to assess the interconnectedness between Spanish banks and insurers, with the Diebold and Yilmaz (2014) approach, capturing indirect linkages, and (iii) nonbank and market data to assess interconnectedness using the concentration ratio and cross-sectoral funding exposures.

SPAIN'S CROSS-BORDER AND CROSS-SECTOR LINKAGES: CHANNELS

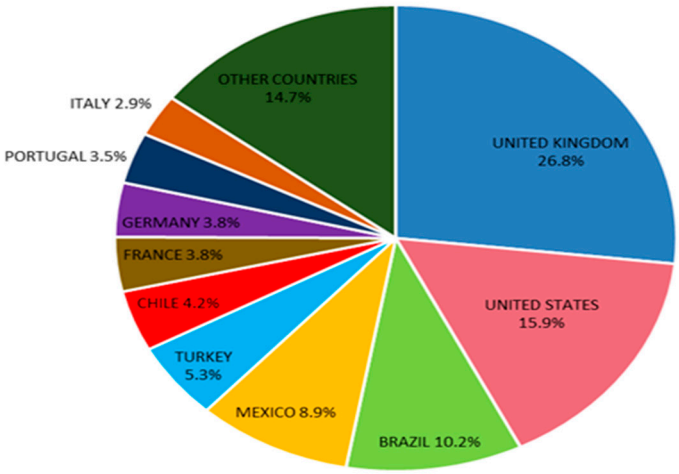
A. Cross-Border Linkages of Spanish Financial Intermediaries

5. Spanish banks have considerable international operations. The share of financial assets abroad has grown for Spanish banks, practically doubling to about 45 percent of total financial assets in June 2016 (up from 25 percent in June 2008), with the largest exposures to households and SMEs. The largest international exposures by financial assets are concentrated in the United Kingdom (27 percent), the United States (16 percent), Brazil (10 percent), Mexico (9 percent), Turkey (6 percent) and Chile (4 percent), see Figure 1. A similar pattern can be observed by the geographical breakdown of loans abroad, where Latin America, Europe and the United States are key destinations for Spanish banks.

6. Spanish subsidiaries are systemically important for some banking systems in Latin America, accounting for about 38 percent and 25 percent of Mexico and Chile's banking sector assets, respectively. While Spain has large exposures to the United Kingdom, United States, France, and Germany, these exposures are relatively moderate in relation to host countries' banking system. In Europe, Spanish banks also have a large presence in Portugal, where subsidiaries/branches account for about 14 percent of total banking sector assets in the country. In Turkey, with the recent acquisition by BBVA, Spanish banks account for about 12 percent of the host country's banking sector (Table 2). The significant presence of Spanish banks could have important financial stability

implications for Spain and for host countries in terms of potential spillover risks. The subsidiary model could mitigate, to some extent, potential spillover, as host country supervisors ring-fence the operations of Spanish subsidiaries.

Figure 1. Geographical Breakdown of Financial Assets Abroad (2016Q2)



Source: Banco de España.

Table 2. The Importance of the Spanish Banking Sector for Host Countries

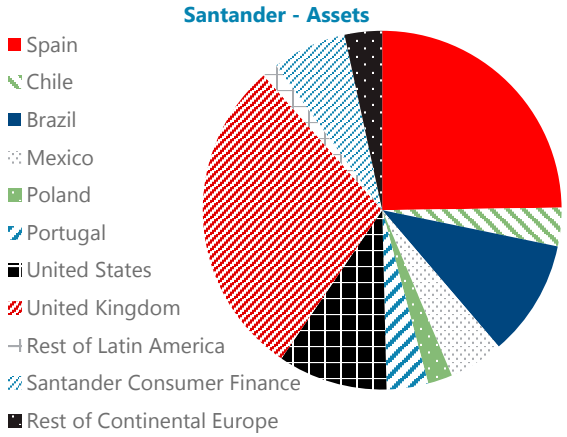
Country	Share of Spanish assets abroad (in percent)	Share of Spanish assets in host countries' banking assets (in percent)
U.K.	26.8	3.9
U.S.	15.9	1.8
Mexico	8.9	37.7
Brazil	10.2	10.3
France	3.8	0.8
Portugal	3.5	14.3
Chile	4.2	25.3
Germany	3.8	0.8
Turkey	5.3	11.5
Italy	2.9	1.7

Source: Banco de España, Financial Soundness Indicators, International Financial Statistics, IMF Staff Calculations
Note: 2016Q2 data or latest available.

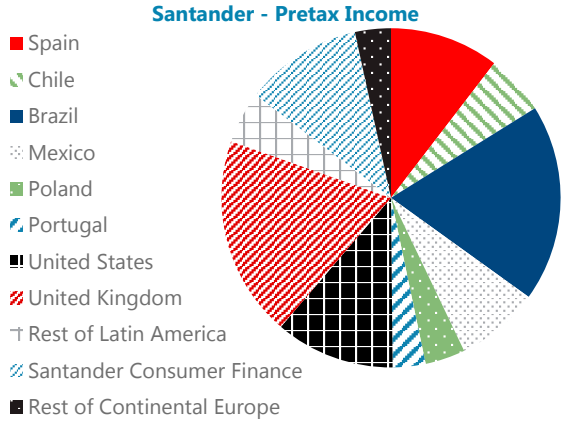
7. Among Spanish banks, the top two banks, Santander and BBVA, have more than half of their financial assets abroad (Figure 2).[2] Both banks are highly reliant on profits from their international operations. In 2015, 88 percent of Santander's pre-tax income were generated by its international operations, and 89 percent of the pre-tax income of BBVA also came from abroad. The high reliance on foreign subsidiaries in profit generation could imply significant vulnerabilities if the economic and financial conditions in host countries were to deteriorate.

Figure 2. Geographical Breakdown of Spanish Global Banks

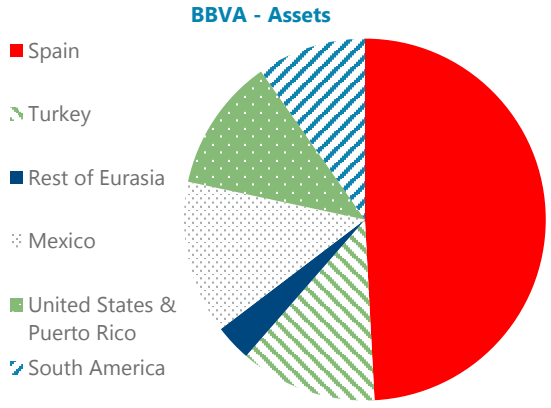
About ¾ of Santander's assets were overseas, with 29% in the UK, and 10% in Brazil and the U.S…



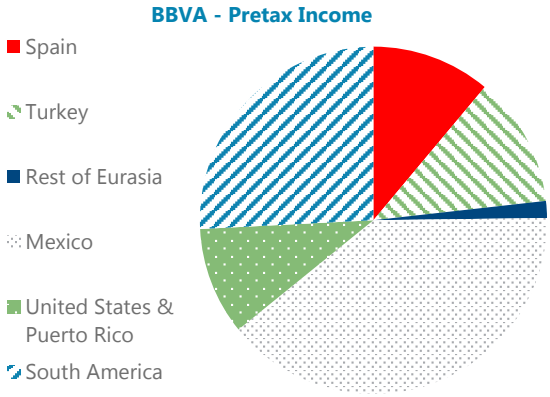
…and 88% of Santander's pre-tax income were generated abroad



Half of BBVA's assets were abroad, with the largest exposures in Turkey, Mexico and the U.S…



89% of BBVA's pre-tax income were generated abroad, with Mexico and South America the most profitable…

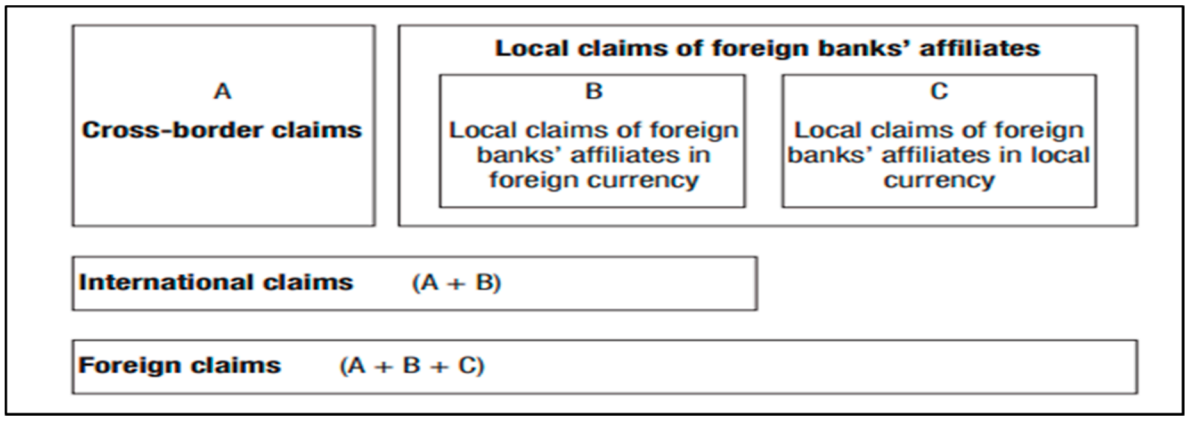


Source: Bloomberg/Company 2015 Annual Reports

[2] Three other banks, Banco de Sabadell, Banco Popular (now part of Santander) and Abanca also have international exposures.

8. The FSAP team uses the Consolidated Banking Statistics and the Locational Banking Statistics data from the Bank of International Settlements (BIS) to analyze the nature of foreign exposures of Spanish banks. The Consolidated Banking Statistics cover reporting banks' worldwide consolidated international claims, both on an "immediate borrower" and an "ultimate risk" basis (Figure 3). The latter considers risk transfers, such as hedges and other guarantees. The Consolidated Banking Statistics is informative on the type of exposures by sectors, the extent of pure cross-border claims versus local claims, and the funding patterns for the local operations for banks. Detailed information on banks' local claims and their funding pattern could shed light on banks' business model for their international operations, such as the subsidiary vs. the branch model. On the other hand, the Location Banking Statistics measure claims and liabilities, including intra-office positions of banking offices resident in reporting countries. The Location Banking Statistics are useful to analyze the geography of international banking and shed light on the extent of intra-office transfer in cross-border linkages between banks.

Figure 3. Types of Claims in BIS Consolidated Banking Statistics



Source: Cerutti, Claessens and McGuire (2012) and GFSR April 2015, Chapter 2.
Note: Cross-border claims and local claims of banks are reported on an ultimate risk basis whereas international claims are compiled on an intermediate risk basis. Cross border claims do not include intragroup positions in the Consolidated Banking Statistics.

9. Spanish banks' foreign claims are concentrated in the United Kingdom, the United States, Brazil, Mexico, Turkey and Chile, with exposures mostly to households and corporates. Based on the BIS Consolidated Banking Statistics, the total consolidated foreign claims (A+B+C in Figure 3) of Spanish banks on foreign banks, non-bank private sector and public sector stood at US$1.3 trillion in 2016Q2, with the majority of the foreign claims in those six countries (Figure 4). Approximately 69 percent of the claims are against foreign non-bank private sector, followed by the public sector (23 percent) and banks. While Spanish banks' claims on the United Kingdom are highest based on total exposure, the impact of Brexit on the Spanish banking sector and the financial sector appears to be limited at present (Box 1).

Box 1. Spanish Financial Institutions and Brexit

While Brexit could affect the Spanish financial Sector through four main channels outline below, Spanish banks and supervisors expect the impact from Brexit on risks or operational costs to be contained at present.

First, two Spanish banks have subsidiaries in London, which account for a sizable share of their total assets. Given that their main activity was to provide retail services to British clients, their UK operations would remain broadly similar after Brexit. The ringfencing of the UK retail activities would apply to these UK subsidiaries. However, if post-Brexit arrangements would result in a contraction in economic activity, the profitability these banks will be directly impacted. So far, despite the depreciation of the pound, the exchange rate impact on profits generated from the U.K. operations have been largely limited, in part, due to hedging activities.

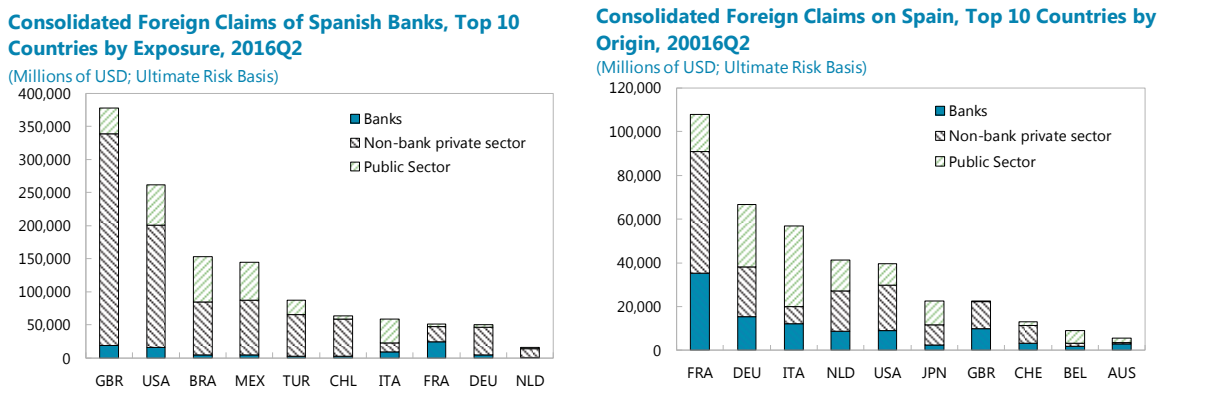
Second, like most European banks, Spanish banks use London based CCPs for clearing purposes, for example, OTC derivatives are mainly cleared in London. Post Brexit, these arrangements for European banks would be affected. A recent regulatory proposal by the European Commission addresses the above challenges by putting forward a range of possible measures, from re-enhanced joint supervision by UK and EU NCAs to an eventual mandatory re-location of non-EU systemically important CCPs into EU territory.

Third, some Spanish institutions issue debt outside Spain, including in London. Approximately, 90 percent of Spanish non-financial companies and 30 percent of Spanish financial firms who issue debt securities do so outside Spain. While some Spanish firms have issued debt in London in the past, the share is much smaller compared with debt issuance in Luxembourg and Ireland by Spanish firms. In terms of equity instruments, the majority of them are already issued within Spain. The Spanish authorities expect limited impact from the potential loss of access to debt capital markets in London as the current reliance is relatively low. In addition, they expect the impact on London based investors and their appetite for Spanish securities post-Brexit to be contained.

Fourth, supervisors may also see several non-EU banks relocating their key subsidiaries away from London into EU countries to manage their European operations. If Madrid were to be elected, this would give rise to additional supervisory needs (e.g., licensing and internal models) since subsidiary activities are under the supervision of NCAs. Supervisors voiced concerns for potential regulatory arbitrages by different jurisdictions to attract firms to relocate from London, however, they acknowledged EU initiatives to promote a level-playing field in post-Brexit regulations.

10. The claims of foreign banks on Spain are much smaller in comparison, which stood at about US$ 0.4 trillion in 2016Q2, with the largest claims from banks headquartered in France, Germany, Italy, the Netherlands and the United States (Figure 4). About 41 percent of the foreign claims are against Spanish nonbank private sector, with the remaining against the public sector (33 percent) and banks.

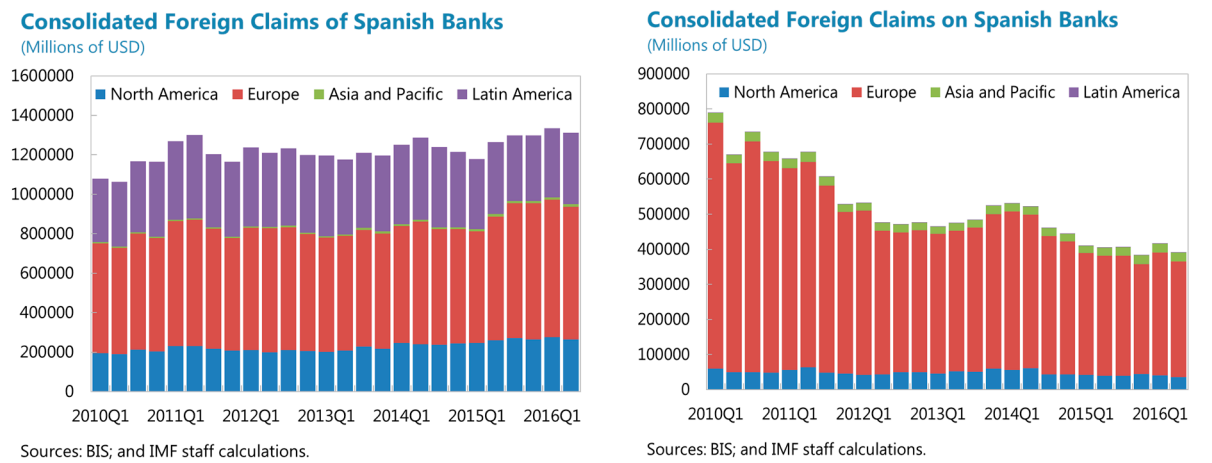
Figure 4. Consolidated Foreign Claims of Spanish Banks and on Spain, 2016Q2



Source: BIS Consolidated Banking Statistics (Ultimate Risk Basis).

11. While Spanish bank' international claims have increased overtime, foreign banks' claims on Spain have declined since the European Sovereign Debt Crisis. The consolidated foreign claims of Spanish banks have risen gradually since 2010, with the largest claims on Europe, followed by Latin America and North America (Figure 5). In contrast, the consolidated foreign claims on Spain has declined sharply since 2010, driven by a fall in claims from other European countries. Despite the decline, Europe still had the largest claims on Spain at the beginning of 2016, followed by North America, and Asia and Pacific.

Figure 5. Evolution of Cross-Border Claims

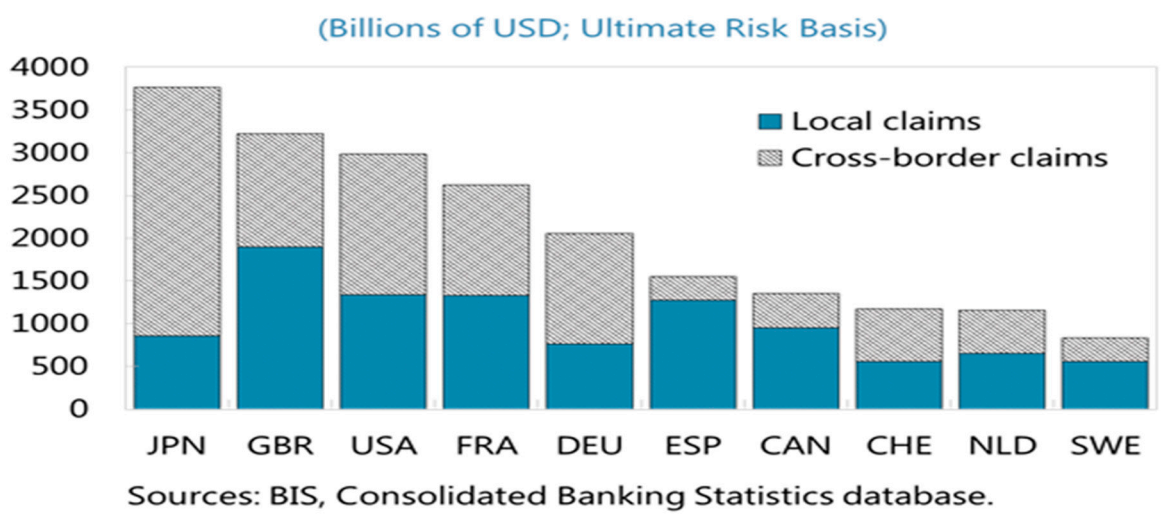


Sources: BIS; and IMF staff calculations.

Sources: BIS; and IMF staff calculations.

12. The majority of Spanish banks' foreign claims are local rather than cross-border, due to the subsidiary business model (Figure 6). In other words, the international activity of Spanish banks is mainly performed through local subsidiaries. As can be seen in Figure 6, the business models for global banking operations differ substantially among different banking systems. Japan, for example, follows the so-called international banking model which can be characterized by large cross-border exposures and small local operations. Spanish banks, on the other hand, follow the multinational-banking model or subsidiary model, which emphasizes local exposures in foreign banking markets (see McCauley et al., 2010; Gambacorta and Van Rixtel, 2013).

Figure 6. Consolidated Foreign Claims—Cross Border and Local Claims, 2016Q2



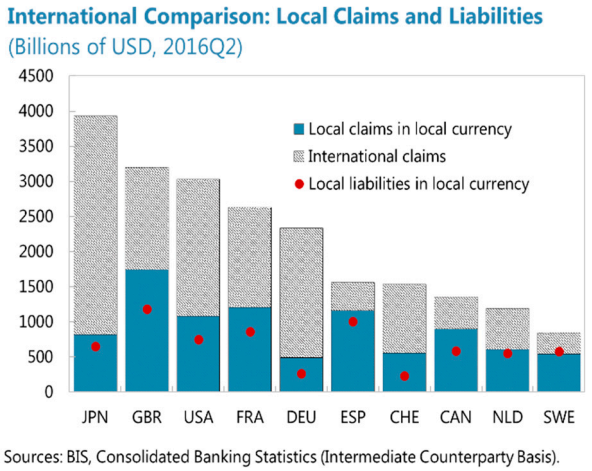
Sources: BIS, Consolidated Banking Statistics database.

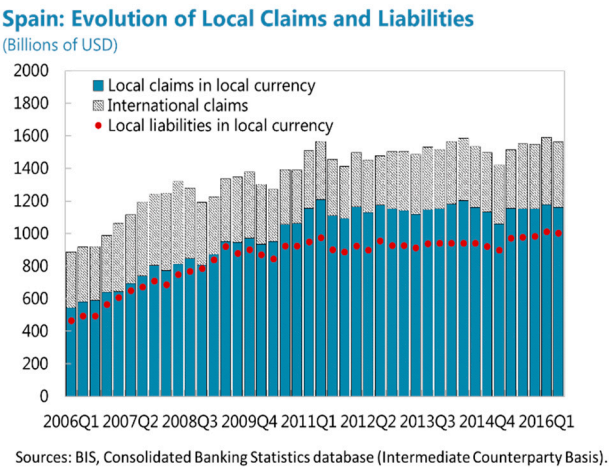
13. On the funding model of local operations, Spanish banks' local claims are largely funded by local liabilities in local currency (Figure 7), suggesting a high degree of funding autonomy of the subsidiaries. Typically, Spanish banks' foreign offices raise funds locally in each host country, in part, driven by restrictions imposed by the host regulators due to the nature of their retail business model. In contrast, a smaller share of local claims is funded locally for banks headquartered in the United Kingdom and Switzerland. Swiss banks, for example, tap funds in multiple locations through their global wealth management business to fund assets held in other jurisdictions (McCauley et al., 2010).

14. Over time, the increase in Spanish banks' foreign exposure is marked by a rise in their local claims in local currency, while their international claims (A+B in Figure 3) as measured by the sum of cross-border claims and local claims in foreign currency have been relatively stable (Figure 7). The marked rise in local claims in local currency can be attributed to the expansion of Spanish banks' foreign operations to Latin America, as well as acquisitions in the United Kingdom (by Santander and Sabadell) and Turkey (by BBVA), to diversify profit and revenue sources following

the Global Financial Crisis. It should be noted that the share of local liabilities in local claims have been consistently high for Spanish banks across time, at around 86 percent on average.

Figure 7. Local Claims and Liabilities in Local Currency

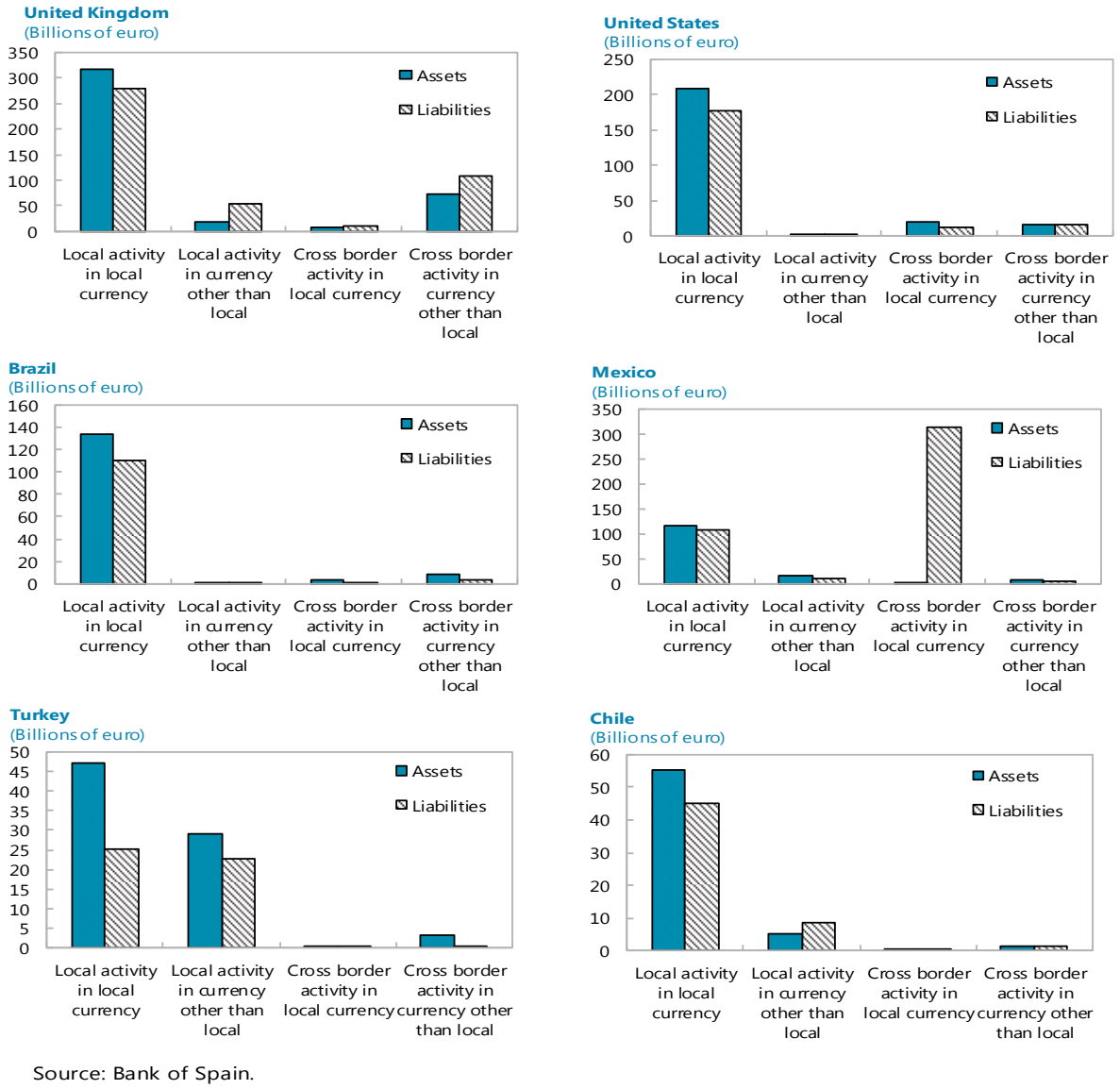




15. By country of exposure, most of Spanish banks' assets and liabilities are local activity in local currency, but with some notable exceptions (Figure 8). On the assets side, more than 90 percent of Spanish banks' assets are local rather than cross-border in Brazil, Mexico, Turkey and Chile, with about 80 to 85 percent of local assets in the United Kingdom and the United States. By currency, more than 90 percent of the local assets are in local currency in the United Kingdom, the United States, Brazil and Chile. However, only about 60 percent of the local assets in Turkey are in the local currency, with the remaining ones in other currencies. A similar pattern can be observed on the liability side, with most of the liabilities local in local currency, except for Mexico and Turkey. In Mexico, only 27 percent of the liabilities are local, with the remaining cross-border. In Turkey, while 98 percent of the liabilities are local, with only about half in local currency and the remaining in other currencies.[3]

[3] The banking sector in Turkey is structurally exposed to FX funding, due to the long-standing shortfall of national savings to finance domestic investment, persistent elevated inflation and exchange rate volatility which have incentivized households and firms to place their savings in short-term deposits and in foreign currency. In addition, the sizable interest rate differentials between interest rates for local and foreign funding makes it more lucrative for banks to finance them in foreign currency (see Turkey FSAP FSSA 2016).

Figure 8. Local vs. Cross-Border Activities by Country



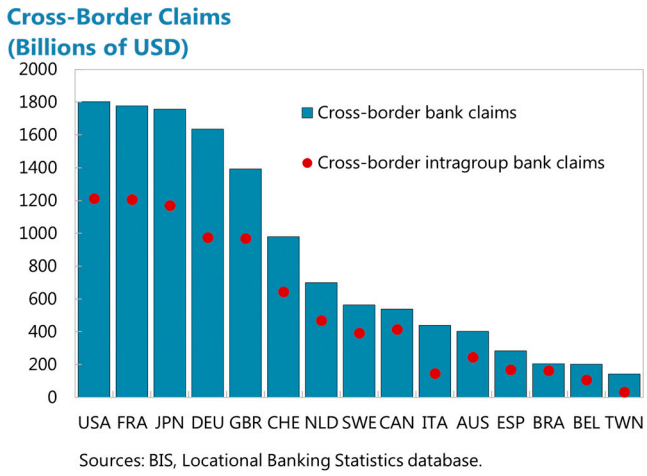
Source: Bank of Spain.

16. Intragroup transfer in Spanish banks appears to be low compared to other international banks. In order to examine the extent of intragroup transfer, we analyze the BIS Locational Banking Statistics, which report cross-border positions on an unconsolidated basis. First, consistent with the information from the Consolidated Banking statistics, the extent of pure cross-border banking linkages for Spain is moderate compared with other countries such as the United States, France, and Japan, given the retail-focused subsidiary model of Spanish banks (Figure 9). Most of Spanish banks' foreign claims are in the form of local claims on non-financial private sectors, instead of cross-border bank claims (Figure 4 and 6). Second, the share of intragroup bank claims and liabilities for Spanish banks is lower compared with peers. On the asset side, about 49 percent of cross-border bank claims is intragroup bank claims for Spanish banks, compared with

67 percent for British banks and 64 percent for U.S. banks in 2016Q2. On the liability side, the share of intragroup bank liabilities is even lower at 43 percent for Spanish banks, compared with 93 percent for Italian banks and 84 percent for Japanese banks. This suggests that Spanish subsidiaries are less dependent on parent funding compared with global banks from other countries.

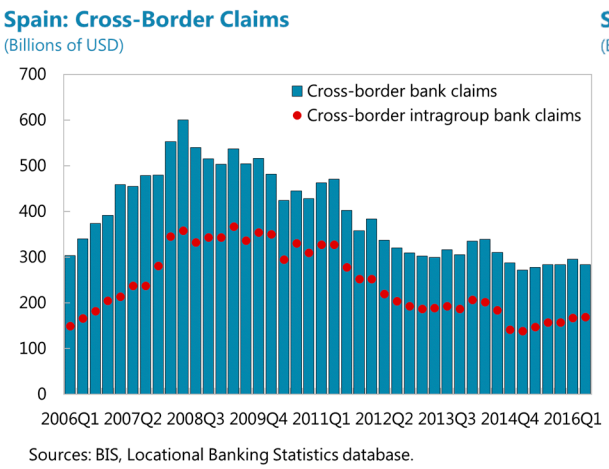
17. The share of intra group claims and liabilities for Spanish banks increased during the crises but has stabilized since then (Figure 10). The share of intra group claims started to pick up from around 50 percent at the beginning of the Global Financial Crisis to a peak of 74 percent in 2010Q3 during the European Sovereign Debt Crisis. A similar pattern can be observed for intra group liabilities, which rose from around 40 percent of total cross-border bank liabilities in 2006 to a peak of about 60 percent in 2008–2009. The share of intra group liabilities has since declined to a trough of about 30 percent in 2014Q4 before gradually recovering. It should be noted that the absolute level of cross border bank claims and liabilities peaked in 2007 and 2008, during the Global Financial Crisis.

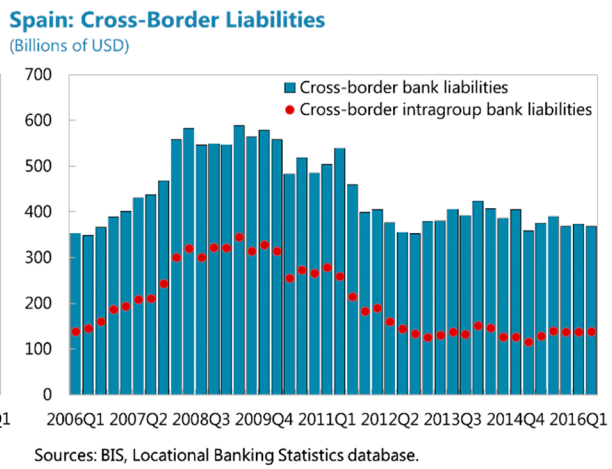
Figure 9. Cross-Border Intragroup Bank Claims and Liabilities, 2016Q2 (by Nationality of Reporting Banks)



Sources: BIS, Locational Banking Statistics database.

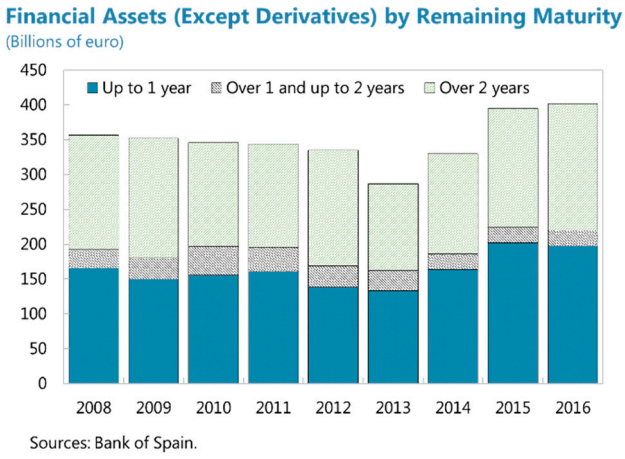
Figure 10. Spain Cross-Border Intragroup Bank Claims and Liabilities (by Nationality of Reporting Banks)

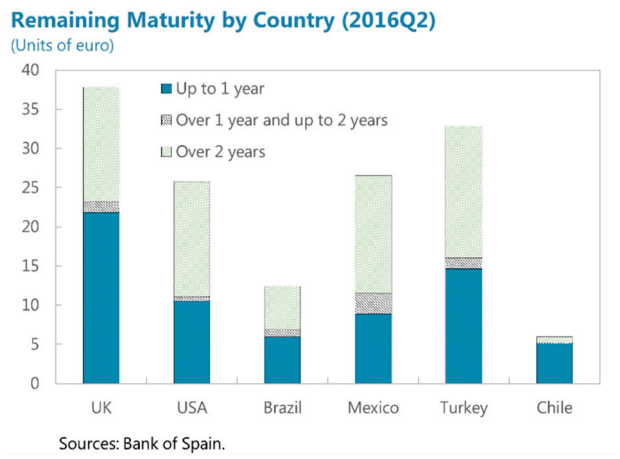




18. The composition of remaining maturity for Spanish banks' foreign claims has been stable overtime (Figure 11). About 47 percent of the remaining maturity was up to one year, and 45 percent of the was over two years, with the rest between one and two years. By country, more than half of the claims were below one year in the United Kingdom and Chile, while a larger proportion of claims were over two years in the United States and Mexico.

Figure 11. Spanish Banks' Foreign Exposures—Remaining Maturity

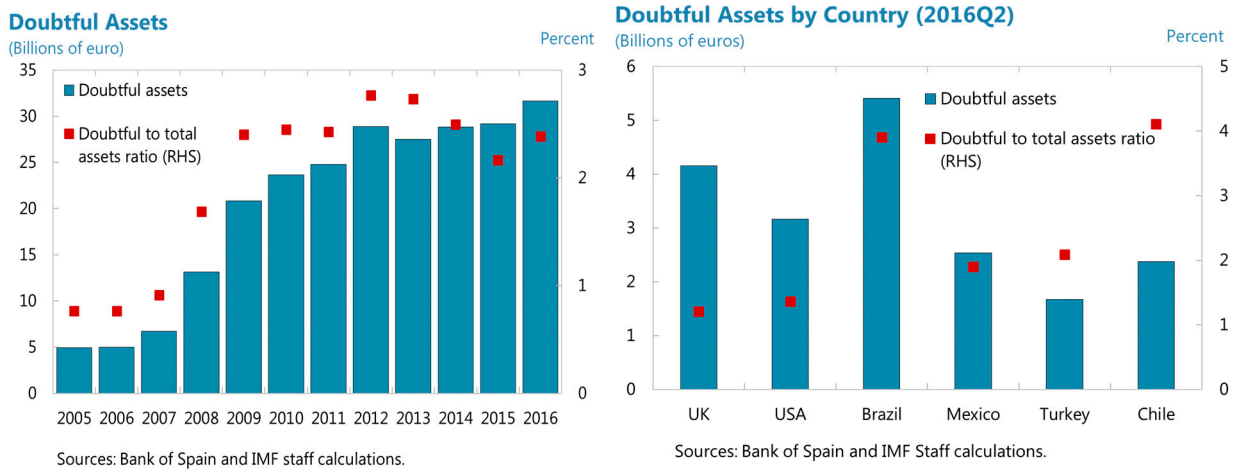




19. The share of doubtful assets in foreign exposure increased during the past two crises (the Global Financial Crisis and the European Sovereign debt crisis) but has since stabilized (Figure 12). The doubtful to total assets ratio increased from 0.8 percent in 2006 to 2.8 percent in 2012 at its peak, and it has since declined to about 2.4 percent in 2016. By country, the share of

doubtful assets is the lowest in the United Kingdom and the United States, at around 1.2 percent, while the ratio is higher at around 4 percent in Brazil and Chile.

Figure 12. Spanish Banks' Foreign Exposure Doubtful Assets



20. Another form of cross-border interconnectedness in the Spanish banking system is through the presence of foreign branches and subsidiaries in Spain. Based on end-2016 data from the Bank of Spain, foreign bank branches and subsidiaries account for about €154.9 billion (4.3 percent) of total banking sector assets, with about 61.3 percent as subsidiaries, 27.9 percent as branches and the rest in the form of leasing companies. Foreign subsidiaries and branches engage in four main types of business in Spain: (i) retail business such as consumer loans and mortgages; (ii) corporate banking that focuses on derivatives and syndicated loans (origination), which is largely funded by the parent bank instead of local retail deposits; (iii) bilateral trade finance; and (iv) private banking business, with parent companies from Switzerland for example. For non-EU banks, it is common to set up subsidiaries in the United Kingdom, Luxembourg, Germany, and Ireland, then operate as a bank branch in Spain, to benefit from the passporting arrangements.[4] On supervision, the SSM and the Bank of Spain supervise jointly subsidiaries and branches of SIs from the euro area that operate in Spain, while the Bank of Spain assumes sole responsibility in the supervision of LSI subsidiaries and branches, and non-EU branches and leasing companies. This channel of cross-border interconnectedness is considered more limited compared with Spanish banks' operations abroad.

B. Interbank Linkages in Spain

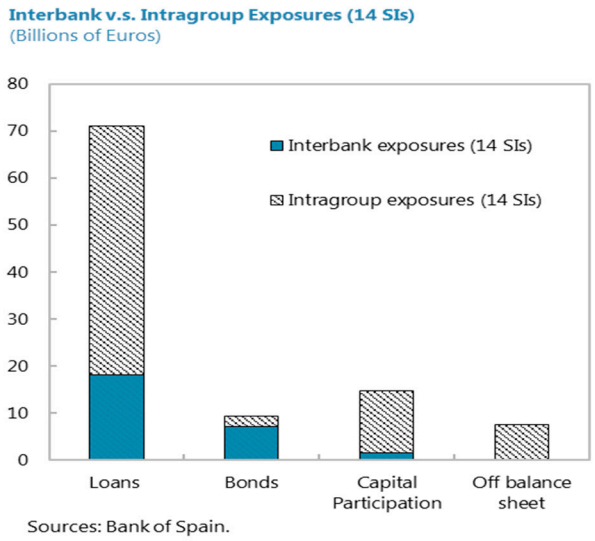
21. Among the 14 significant institutions (SIs), the top five largest banks account for much of the interbank exposures (see Figure 13). Specifically, the top five SIs account for more than 85 percent of loans, capital participation and off balance sheet exposures in the interbank

[4] The role of the United Kingdom as a hub for passporting could change depending on the outcome of Brexit negotiations.

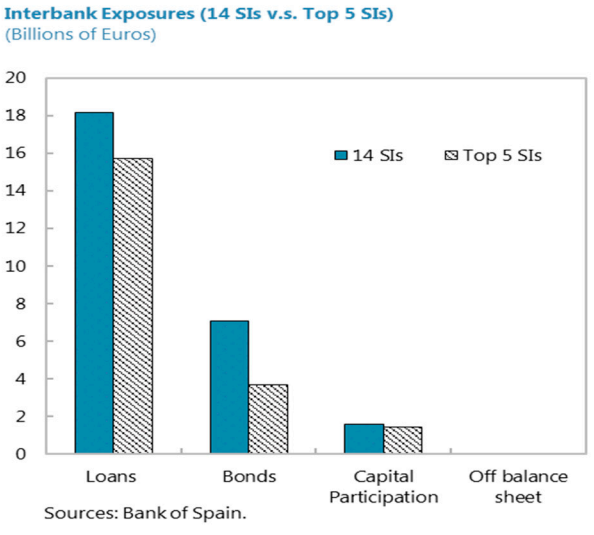
market for SIs, and about half of the interbank bond exposures. Compared with intragroup exposures among SIs, the interbank market is smaller, especially in loans, capital participation and off balance sheet exposures.

22. The interbank exposures between SIs and LSIs are mainly in the form of loans (Figure 13). More than 95 percent of the claims of SIs on LSIs are interbank loans, while the share is lower at 67 percent for the claims of LSIs on SIs. About 27 percent of the interbank claims of LSIs on SIs are capital participations. Overall, the interbank exposures between SIs and LSIs are in the magnitude of between 7.6 to 8.7 billion euros.

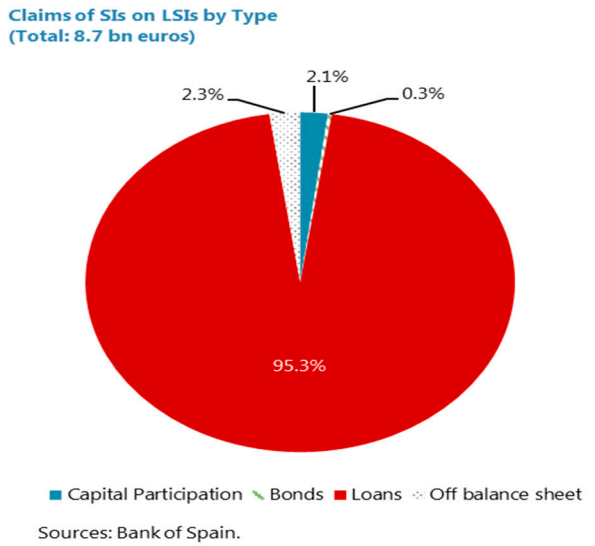
Figure 13. Spain Domestic Interbank Exposures (2016Q2)



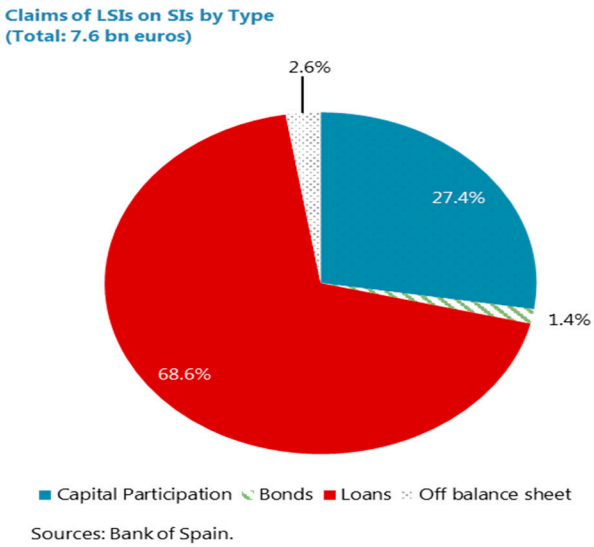
Sources: Bank of Spain.



Sources: Bank of Spain.



Sources: Bank of Spain.

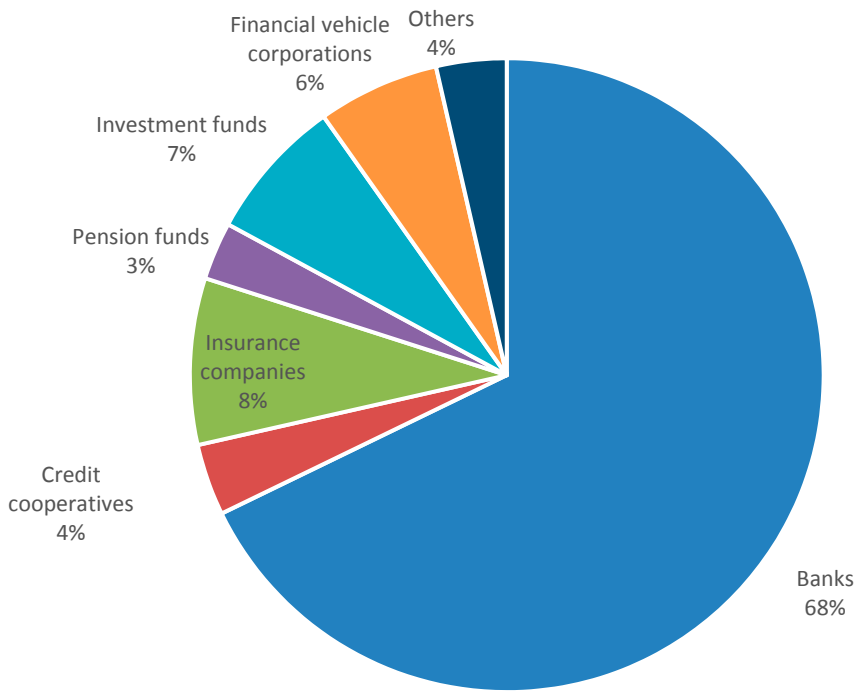


Sources: Bank of Spain.

C. Cross-Sectoral, Capital Markets, and Financial Market Infrastructure Linkages in Spain[5]

23. Spain's financial system is dominated by the banking sector, which accounts for about 68 percent of financial sector assets in the first half of 2016 (Figure 14). The rest of the financial sector includes insurance companies (8 percent), pension funds (3 percent), investment funds (7 percent) and financial vehicle corporations (6 percent).

Figure 14. Spain Financial System Structure (By Assets)



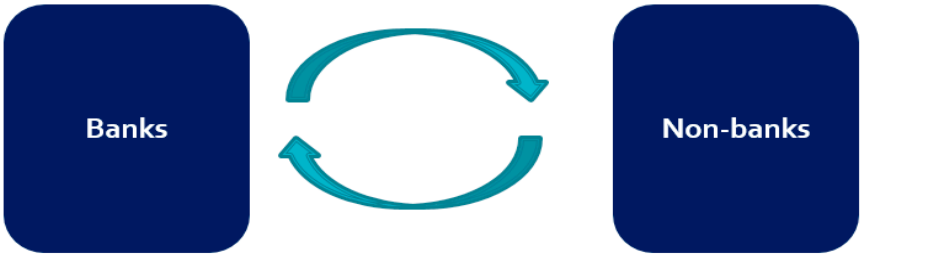
Source: Bank of Spain and IMF staff calculations.
Notes: Banks include domestic banks, savings banks and foreign brances and subsidiaries.

24. Financial intermediaries in Spain are interconnected through financial conglomerate ownership common exposures, and inter-sectoral claims (Figure 15). The largest Spanish banks operate as diversified financial groups. Typically, in addition to banking business, banking groups also operate in insurance, mutual and pension funds and other service sectors. In recent years, Spain's large and medium-sized banks are expanding their insurance activities. Four of the top ten life insurers—Caixabank, BBVA, Ibercaja and Santander—are linked to banking groups. In the

[5] Appendix III provides some background information and further discussion on the Spanish non-bank financial sector.

unit-linked segment (i.e., insurance linked to investment funds), the top ten companies are all controlled by banks. As in other advanced financial markets, the insurance sector in Spain is also a provider of funds to the banking sector through outright holding of bank debt (also via investment and pension funds). Furthermore, the main distributors of pension products include insurance companies and depository institutions. Consequently, the top pension funds in Spain are affiliated with banks and insurance companies, for example, Caixabank, BBVA, and Santander. Similarly, these three banking groups dominate the mutual fund industry in Spain.

Figure 15. Inter-Sectoral and Intra-Group Linkages in Spain



- Insurers invest in money market instruments and funds.
- Insurers provide funds to the banking sector through outright holding of bank debt.

- Pension products are distributed through depository institutions and insurance companies.
- Top pension funds are affiliated with banks and insurance companies.

- The largest Spanish banks operate as a diversified financial group in insurance, pension funds, in addition to banking business.

The financial intermediaries in Spain are interconnected through financial conglomerate and inter-sectoral claims such as loans, securitization and covered bonds.

25. Securitization in Spain[6] has in general used less complex structures and higher-quality assets based on the originate-to-hold model, which gives rise to some funding risks. Spanish banks (originators) retain the underlying securitized assets and are also responsible for the management of the underlying portfolio, which usually offers higher credit ratings. Securitization in Spain has been used as a funding mechanism for credit institutions rather than a risk transfer instrument, and therefore cross sectoral linkages are concentrated in funding risks for banks and other financial institutions if these funding markets face disruptions. Recently the securitization market has been picking up, and banks have issued bonds backed by securitized assets, which are eligible for the ECB's program for purchasing private-sector securities.

26. The covered bond market is used to fund the banks' mortgage portfolio. After a decline of the stock outstanding in the past few years, there are signs that issuance is picking up, with

[6] Securitization in Spain: Past developments and expected future trends. BBVA (2014).

outstanding covered bonds totaling around €216 billion in 2016Q2.[7] At present, they are mainly used for access to secure private funding and access to ECB financing.[8] Therefore, cross-sectoral linkages could pose funding risks for banks and other financial institutions if these funding markets face disruptions. Covered bonds represent around 40 percent of banks' mortgage portfolio, a similar percentage as before the crisis, as new covered bond issuance has declined with the decline in new mortgages. Common exposures to securitization markets are difficult to assess given the lack of data of holders of covered bonds and other asset-backed securities. Flow data analysis, indicates that concentration in these assets is not significant.

27. Spain's also has advanced capital markets of around 230 percent of GDP that have cross-sectoral linkages because market participants such as the government, banks, nonfinancial corporations, insurance, mutual and pension funds, broker dealers, financial market infrastructure firms, resident and nonresident investors etc., use these markets to raise financing and hedge risks (Figure 18). Markets in Spain span bond (public and corporate) and equity markets, securitization and covered bonds, and derivatives.

28. The sovereign debt market is the most important source cross-sectoral linkages between banks and the rest of the financial system, and has broader implications for financial stability and the overall economy (Box 2). The significant increase in public debt as a percent of GDP since the global financial crisis, has strengthened the importance of the sovereign debt market for the financial system's interconnectedness. Banks hold around one quarter of the Spanish sovereign debt securities (Figure 16) in 2016 (down from around one third in 2012) but pension and mutual funds, and insurance companies also hold a significant amount of around 11 percent (down from 14 percent in 2014). Interconnectedness is significant through the cross-sectoral holding of sovereign bonds and the bonds use as HQLA, in the repo market, and for managing liquidity in general, and it is important for financial stability.

29. Insurance companies have cross-sectoral linkages with the rest of the financial system even though they usually do not hold significant positions in other non-insurance financial entities. However, some insurance undertakings belong to banking groups or financial conglomerates. Most Spanish insurance companies have portfolios consisting mainly of bonds, deposits, property and equity. Spanish insurance companies have steadily increased their government bond portfolio to around 50 percent of their total investment portfolio, while corporate bonds are currently only 20 percent. Cross-sectoral linkages also exist from insurance companies' investment in deposits and bonds issued by banks, commonly banks of the same group. New regulation (Solvency II), has affected these linkages since risk concentration against one counterparty leads to higher capital requirements and, thus, insurance companies now usually have much more diversified investment portfolios.

[7] According to data provided by the CNMV.

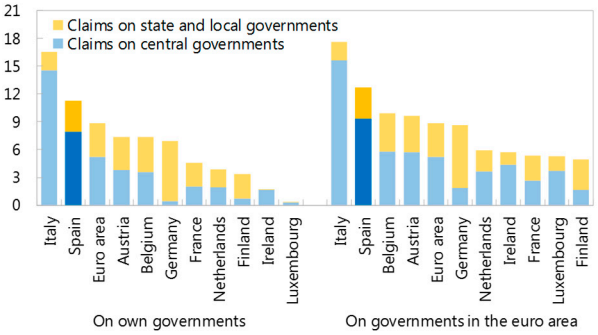
[8] Covered bonds as opposed to mortgage-backed securities, can only be issued by credit institutions, are backed by a loan portfolio that remain on the issuer's balance sheet, and are usually overcollateralized. Covered bond holders have a dual recourse, both over the issuer who has an obligation to pay and over the covered pool and its cash flows in case of the issuer's insolvency.

Box 2. The Bank-Sovereign Nexus[/1]

The link between the balance sheet of the sovereign and those of banks is a classic amplification mechanism. Channels work through actual exposures as well as through market perceptions of risk dependence between banks and the sovereign.

First, *bank exposures to the sovereign* through the claims on government, including the holding of government bonds, represent the most direct link of the two sectors. Spanish banks' claims on its own sovereign amounted to 11 percent of total assets at end-2016 (text chart). These sizeable exposures of Spanish banks to its own sovereign are higher than the euro area average at 9 percent of total assets, and only second to those of Italian banks among major euro area economies.

Claims on Government, 2016 [1]
(In percent of total assets of depository institutions)



Sources: IMF, International Financial Statistics; and IMF staff estimates.
[1] Include securities, loans, and accounts receivables. DTAs are not included.

Second, sovereign's *contingent liabilities* in the financial sector represents another channel of contagion. The Spanish government provided guarantees on certain liabilities of banks during the crisis, with outstanding guarantees at about €1.06 billion at end-2016. It also guaranteed the entire senior debt issued by the company for the Management of Assets proceeding from Restructuring of the Banking System (Sareb) in the amount of €41.6 billion at end-2016 (about 4 percent of GDP). The government could also be called to disburse deferred tax credits, which are certain deferred tax assets (DTAs) that are eligible for CET1 capital, in the case that banks fail.

Third, the bank funding channel could reflect market perception of risk dependence between the financial and the government sectors, including potential state support to the financial system. Strong co-movement between bank equity indices and sovereign bond yields are observed, as lower sovereign ratings could weaken bank profits through valuation effects and funding costs, and affect investor confidence potentially related to concerns surrounding fiscal backstop. For example, a cointegrated VAR for the Spanish economy shows that a one-standard deviation positive shock to Spain's 10-year sovereign yield (around 50 basis points) is associated with a 4 percent decline in bank equity index in real terms in the first two quarters after the shock.

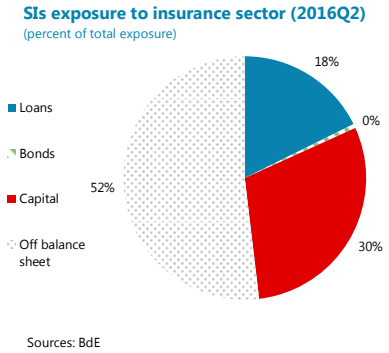
[/1] Prepared by the Spain FSAP team.

30. Fixed-income and mixed funds, SICAV and money market funds—all open-ended funds—are the largest mutual funds in terms of assets under management (AUM) and are mostly managed by banks (Figure 17). Redemption risk materialized during the crisis and the size of the industry fell one half of the size from its peak. Recently, the more positive economic environment in Spain and low interest rates, led to an expansion and more portfolio diversification with foreign securities accounting more than 50 percent of mutual funds' AUM. Mutual fund investors have changed their portfolio composition now owning fewer fixed income funds and more mixed funds (fixed income and equity) due to the low interest rate environment. This has reduced the share of illiquid assets but exposes funds to higher equity volatility.

31. Money market and mutual funds, and broker dealers have linkages with the rest of the financial system by providing financing and participating in the same capital markets. Mutual funds and investment companies have significant deposits with credit institutions and consequently provide important financing to banks. Funds and investment companies invest domestic debt securities but their domestic debt exposure has decreased in the past few years (Figure 17).

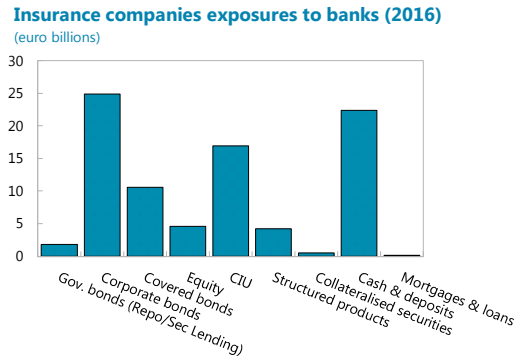
Figure 16. Spain: Cross-Sectoral Interconnectedness

While banks exposures to insurers are mild (around 1 percent of banks' total exposure) ...



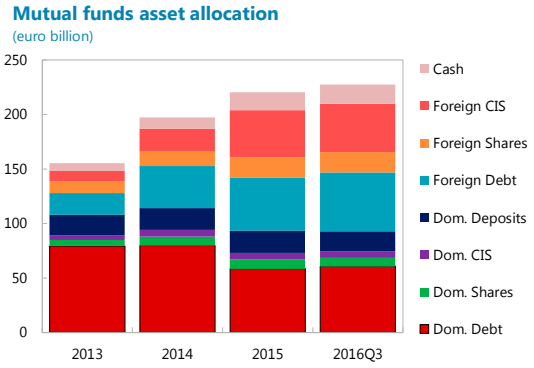
Sources: BdE

Insurance exposures to banks are significant (around 30 percent of insurance companies' total exposures)



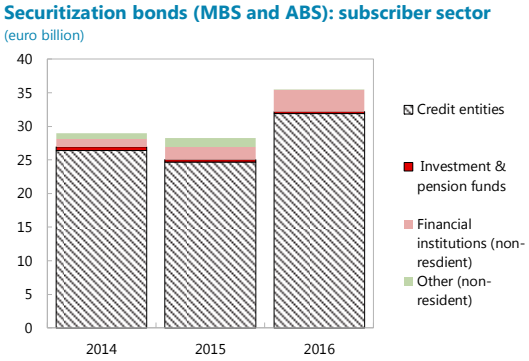
Sources: DGSFP

Mutual funds' investment in domestic deposits is about 1 percent of deposits and their domestic assets represent around 40 percent of AUM; yet the trend is to diversify abroad....



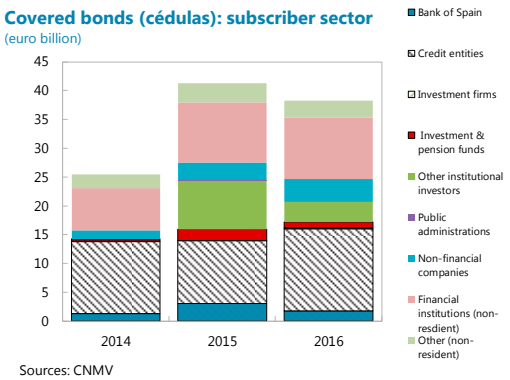
Sources: CNMV

Risk transmission to banks from securitization appear mild: subscriptions by credit entities over the last three years represent about 1 percent of bank assets...



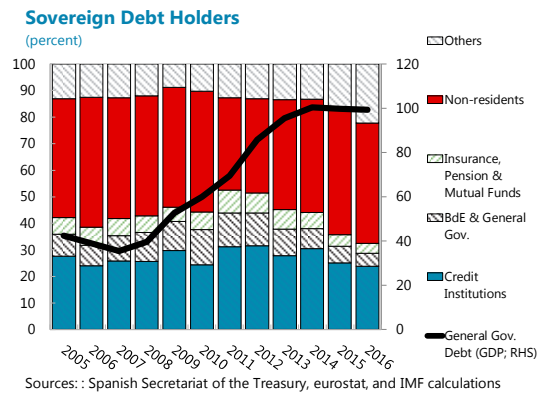
Sources: CNMV

There may be transmission through common exposures: about 65 percent of issuances over the last 3 years were subscribed by domestic investors...



Sources: CNMV

Common exposure to the sovereign bond market remains the largest source of interconnectedness....



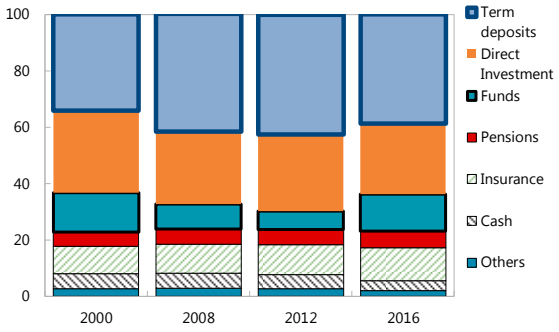
Sources: : Spanish Secretariat of the Treasury, eurostat, and IMF calculations

Sources: BdE, CNMV, DGFSP, and IMF staff calculations.

Figure 17. CIS Portfolio Allocation and Liquidity

Portfolio allocations have changed….

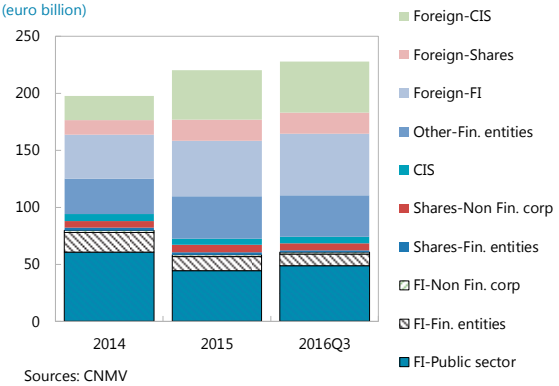
Financial assets
(percent of total)



Sources: Inverco

But concentrations in sovereign debt and banks remain….

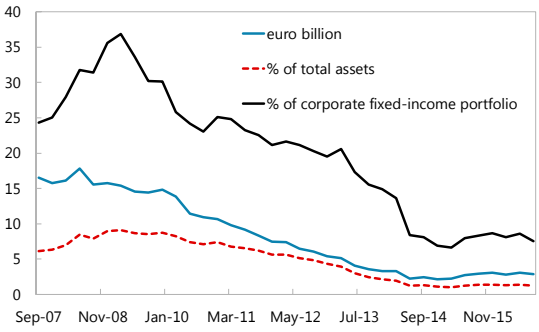
Mutual funds portfolio: counterpart sector
(euro billion)



Sources: CNMV

Illiquid assets have declined….

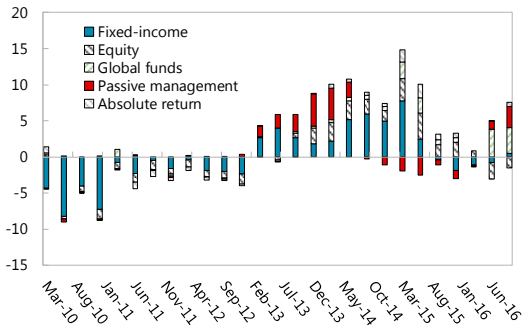
Illiquid assets in mutual funds´ fixed-income portfolio
(2007M9-2016M09)



Sources: CNMV

Net inflows but risks of significant redemptions remain…

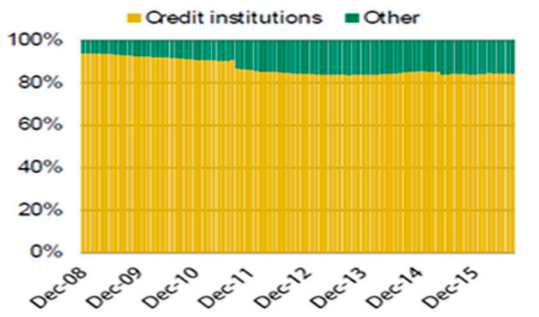
Mutual funds: Monthly net subscriptions by category
(euro billion)



Sources: CNMV

Banks managed most CIS

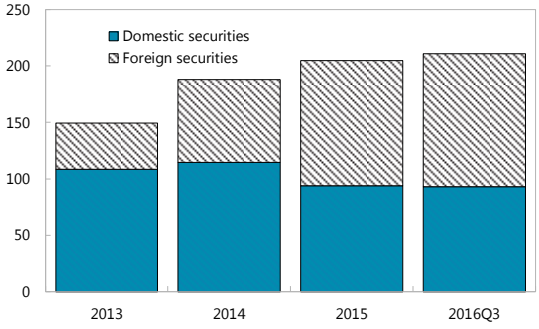
Assets managed by banking groups
(percent of total assets under management)



Sources: CNMV

Portfolio composition is switching to foreign…

Mutual Funds AUM: Foreign>Domestic
(euro billion)



Sources: CNMV

Sources: CNMV, Inverco and IMF staff calculations.

32. Exchange traded derivatives are mainly traded in the MEFF Exchange market. The 10-year Spanish government bond future trading volume has risen significantly[9] in the past few years reflecting the increase in hedging needs resulting from the increase in the volatility of debt interest

[9] CNMV Annual Report (2015).

rates. The Spanish government bond future market is valuable for hedging the significant sovereign debt exposures of banks and forms an important part of the cross-sectoral linkages in the financial system.

33. The size of shadow banking is small compared to other large euro area countries, the United Kingdom and the United States (Figure 18) but it is interconnected with the rest of the financial sector through the integration of shadow banking type activities within banks and the cross holding of liabilities between banks and other financial institutions (OFIs). Banking groups conduct a significant amount of shadow banking activities, which are consolidated in banking groups balance sheet, which are deducted from the measure of shadow banking activity as calculated per FSB guidance.

34. Shadow banking activities carried out by banks poses potential risks to financial stability and increases interconnectedness between banks and non-banks, but also poses coordination issues between the various Spanish supervisors and the SSM (Figure 18). Interconnectedness extends to capital markets where much of the shadow banking activity takes place. A measure of interconnectedness, the liabilities of banks to OFI and vice versa between banks and other financial institutions (OFI) in Spain shows a decline since the 2008–2009 but it is still systemically important.

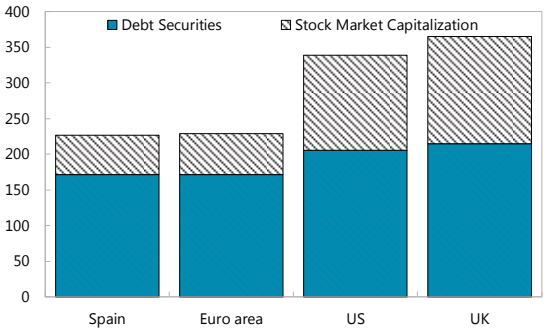
35. The Spanish Stock Exchange (BME Group) is an important financial infrastructure institution for Spain, can transmit shocks, and has cross-sectoral linkages with the rest of the Spanish and euro area financial system. The BME is the market operator of the Spanish stock exchanges (Valencia Stock Exchange, Barcelona Stock exchange, Madrid Stock Exchange and Bilbao Stock Exchange) that deals with securities in Spain. BME also makes decisions with regards to market derivatives, settlement systems, fixed-income markets, equities and clearing systems. Securities registry, clearing and settlement activities are done by Iberclear. Iberclear performs these functions in Spain for stock markets, public debt markets and AIAF (Spain's benchmark market for Corporate Debt and Private Fixed Income). BME Clearing is authorized to provide central counterparty services in financial derivatives and power derivative segments operated by MEFF Exchange (Spanish financial futures and options market), in the public debt repos market, equity and OTC interest rate derivatives markets (Table 3).[10] BME Clearing and Iberclear are part of the BME Group.

[10] CNMV Annual Report (2015).

Figure 18. Capital Markets Composition and Shadow Banking

Spanish capital markets size is comparable to euro area average but smaller than other developed countries….

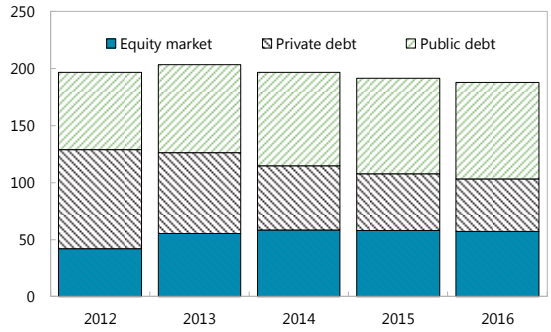
Size of capital markets (2013)
(percent of GDP)



Sources: IMF, GFSR (2015)

And the sovereign debt market dominates Spanish capital markets

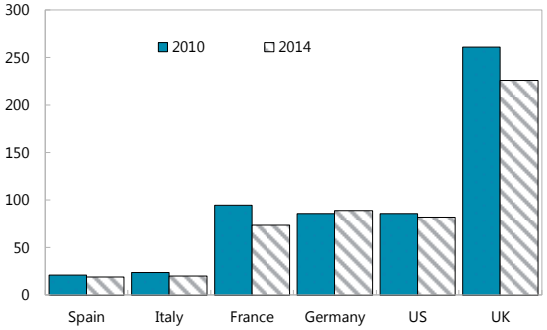
Capital markets size
(percent of GDP)



Sources: CNMV

The shadow banking sector is small….

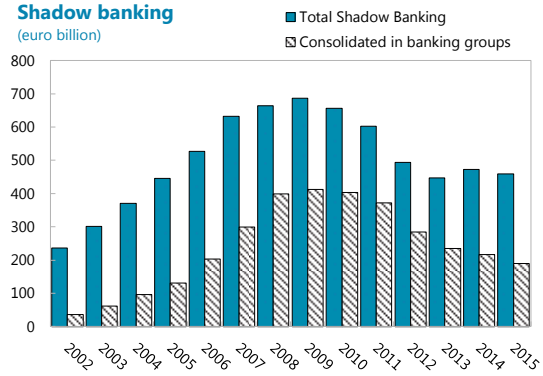
Shadow banking size
(percent of GDP)



Sources: FSB (2015)

But larger if the securitized assets consolidated in banks' balance sheets are included…

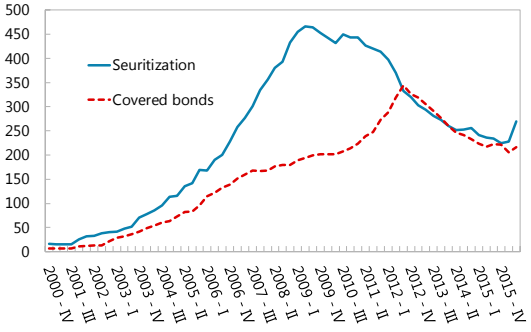
Shadow banking
(euro billion)



Sources: CNMV

Some life appeared in the securitization and covered bond markets

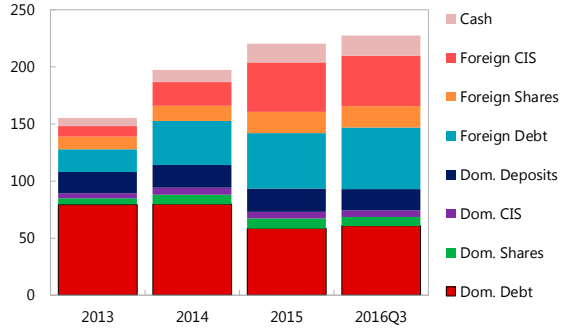
Securitization and covered bonds outstanding
(euro billions)



Sources: CNMV

But domestic mutual funds are not buying securitized assets and nonbank financing remains small…

Mutual funds asset allocation
(euro billion)



Sources: CNMV

Sources: CNMV, FSB and IMF staff calculations.

Table 3. Trading on MEFF Exchange (Thousands of Contracts)

Number of contracts	2013	2014	2015	2015 II	2015 III	2015 IV	2016 I	2016 II[1]
Debt products	13,667	4,690	8,012	3,035	1,200	616	230	9
Debt futures[2]	13,667	4,690	8,012	3,035	1,200	616	230	9
Ibex 35 products[3, 4]	6,416,073	7,728,494	8,279,939	2,129,718	2,068,055	1,943,701	2,125,580	1,164,248
Ibex 35 plus futures	5,578,607	6,924,068	7,384,896	1,909,834	1,869,745	1,743,089	1,920,556	1,087,381
Ibex 35 mini futures	198,736	304,891	318,129	81,209	79,730	71,809	89,717	36,502
Ibex 35 dividend impact futures	3,520	23,939	32,499	1,775	4,731	13,321	13,908	4,771
Call mini options	308,084	302,255	325,479	83,437	64,019	58,337	51,347	16,654
Put mini options	327,126	173,342	218,937	53,463	49,830	57,146	50,053	18,940
Stock products[5]	35,884,393	27,697,961	31,768,355	7,723,250	6,771,629	8,509,783	8,253,156	3,554,655
Futures	14,927,659	12,740,105	10,054,830	2,616,035	1,709,635	2,069,470	3,312,316	707,125
Stock dividend futures	66,650	236,151	292,840	75,637	61,935	97,940	112,248	95,347
Call options	10,534,741	5,773,662	8,572,088	2,228,050	1,951,235	2,032,647	2,394,785	1,568,984
Put options	10,355,343	8,948,043	12,848,597	2,803,528	3,048,824	4,309,726	2,433,807	1,183,199
Pro memoria: MEFF trading on Eurex								
Debt products[6]	167,827	172,883	149,378	55,580	24,938	28,388	41,979	45,937
Index products[7]	111,924	56,356	49,119	15,682	9,983	8,285	12,050	6,272

1 Available data: May 2016.
2 Contract size: 100 thousand euros.
3 The number of Ibex 35 mini futures (multiples of 1 euro) was standardised to the size of the Ibex 35 plus futures (multiples of 10 euro).
4 Contract size: Ibex 35, 10 euros.
5 Contract size: 100 Stocks.
6 Bund, Bobl , Schatz, Bon, Btp, Bts, Bux and Oat futures.
7 Dax 30, DJ Eurostoxx 50, DJ Stoxx 50 and MiniDax futures.

ANALYSIS ON CROSS-BORDER BANK LINKAGES

36. Contagion risks and cross-border interconnectedness are assessed using three complementary approaches. The first approach applies the Espinosa-Vega and Sole (2010) methodology to examine cross-border bank exposures and *direct* banking sector linkages, using BIS Consolidated Banking Statistics. The second approach uses the Diebold and Yilmaz (2014) methodology with daily equity returns of banking indices to examine the interconnectedness between Spain's banking sector and countries with strong financial and trade linkages with Spain, capturing potential *indirect* channels of contagion through market prices. The third approach uses the Global VAR methodology (Dees, di Mauro, Pesaran, and Smith, 2007) to examine the cross-border impact of credit shocks, accounting for macro-financial interactions.[11]

A. Network Analysis Based on BIS Consolidated Banking Statistics

37. The analysis based on the network framework of Espinosa-Vega and Sole (2010) considers both credit and funding shocks to the banking systems. An initial negative credit or funding shock to a country's financial system could be propagated through the network of bilateral claims across countries, and could distress banking systems in other countries beyond the direct losses from the initial shocks. If any banking system incurs losses larger than their capital, the system "fails." This failure can subsequently cause some other banking system to fail, triggering domino effects, where a failure of a banking system in a network transmits to other banking systems. The Espinosa-Vega and Sole (2010) methodology can provide useful insights on the resilience or

[11] The detailed description on the methodologies can be found in Appendix II.

vulnerability of Spain's banking system in relation to other banking systems, capturing the impact of both outward and inward spillovers and the subsequent impact on overall banking sector capital.[12]

38. Two sets of simulations are conducted using the BIS consolidated banking statistics for 2016Q2. The first simulation applies to reporting banks' exposure to foreign banks only, considering both credit and funding shocks. The second considers the impact of credit shock to the *total exposure* of the banking sector, including claims to banks, government and the non-financial sector based on the BIS Consolidated Banking Statistics.[13]

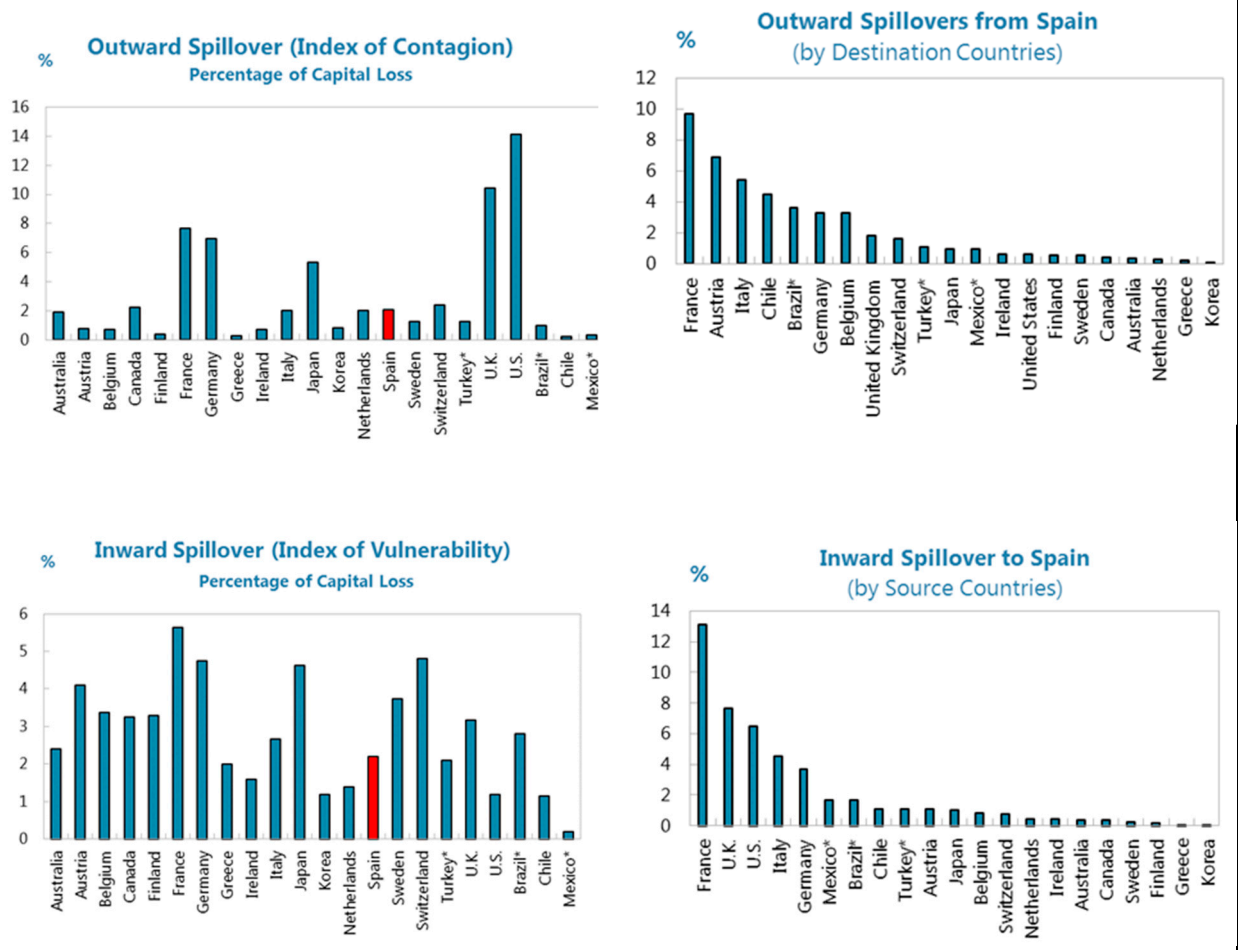
39. Network analysis (the first simulation) suggests the Spanish banking sector is closely linked to other European banking system through interbank exposures (Figure 19). Credit and funding shocks in the Spanish bank sector have the largest *outward* spillover to banks in France, Austria and Italy, as measured by the percentage of capital loss in a banking system due to the default of all bank-to-bank exposures. In terms of *inward* spillover, banks in France, the United Kingdom, the United States and Italy have the largest impact on the Spanish banking sector, through credit and funding channels.

40. The second simulation with total exposures shows that credit shocks originating from the United Kingdom, United States, Brazil, Mexico, and Turkey would have the largest impact on Spanish banks (Figure 20). In the second simulation, we consider total exposures including claims on banks, the public sector and the non-bank private sector. As seen in Figure 4, most of Spanish banks' foreign claims are against the non-bank private sector, in part, due to the multi-country subsidiary model. In this case, the United Kingdom and United States remain important sources of credit shocks for Spanish banks. In addition, Spanish banks' exposures in Brazil, Mexico, Turkey and Chile could also be significant for the transmission of credit shocks, due to the large claims on the nonbank private sector and the public sector in these countries. Not surprisingly, the degree of inward spillover to Spanish banks is higher when all exposures are considered, compared to bank exposure only. Similarly, countries with sizable exposures to Spain (Figure 4) are affected most by outward spillover from Spanish banks.

[12] The Espinosa-Vega and Sole (2010) has been used in many recent European FSAPs, including Germany (2016), Ireland (2016), and Italy (2013).

[13] The detailed discussions on the BIS Consolidated Banking Statistics can be found in Paragraph 8 and Figure 3. The Consolidated Banking Statistics cover reporting banks' worldwide consolidated international claims. The simulation sample consists of 22 countries: Australia, Austria, Belgium, Brazil, Canada, Chile, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Mexico, the Netherlands, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. Please note that the data availability for Brazil, Mexico and Turkey is relatively low.

Figure 19. Outward and Inward Spillover of the Spanish Banking Sector
(Simulation 1: Bank Exposure, Credit and Funding Shocks, Consolidated Banking Statistics)



Source: IMF Staff Calculations. Results are based on the Espinosa-Vega and Sole (2010) approach and BIS Consolidated Banking Statistics (ultimate risk basis) for 2016Q2. Note: * Limited data availabilities for Turkey, Brazil and Mexico, which may underestimate the impact for these three countries.

Figure 20. Outward and Inward Spillover (Total Claims)

(Simulation 2: All Exposures, Credit Shock, Consolidated Banking Statistics)

Source: IMF Staff Calculations. Results are based on the Espinosa-Vega and Sole (2010) approach and BIS Consolidated Banking Statistics (ultimate risk basis) for 2016Q2. Note: * Limited data availabilities for Turkey, Brazil and Mexico, which may underestimate the impact for these three countries.

B. Cross-Border Linkages Based on Market Data

41. The FSAP team uses the Diebold and Yilmaz (2014) methodology to examine indirect cross-border banking linkages. The interconnectedness analysis using the Diebold and Yilmaz (2014) methodology first estimates a Vector Autoregression (VAR) model with daily returns of equity price indices. The connectedness measure is then derived from the Generalized Variance Decomposition (Pesaran and Shin, 1998) of the underlying VAR.[14] The pairwise connectedness measure captures the extent to which innovations in the equity returns of the banking index in one

[14] In contrast to the traditional Cholesky and other structural identification strategies, the Generalized Variance Decomposition (GVD) does not impose any assumptions on the order of variables, instead, it relies on a largely data-based identification scheme ("let the data speak").

country could explain that of another country. Several connectedness measures could be derived from the Generalized Variance Decomposition, including the from-degree, to-degree and net-degree measures. The from-degree measure captures total directional connectedness of the system to a country's banking index (inward spillover), the to-degree measure captures contributions of individual country's banking index to systemic network events (outward spill over). In addition, the net-degree measure (the difference between to- and from- measures) describes the relative contribution to system connectedness from each country's banking sector. The Diebold and Yilmaz (2014) approach can provide useful insights on the cross-border interconnectedness between the banking sector in Spain and in countries with a large presence of Spanish global banks. Given the recent setup of the European banking union the methodology will also attempt to capture the connectedness within the euro area banking system as implied by market prices.[15]

42. The estimation sample covers banking indices for 16 countries, containing those with the strongest financial and trade linkages with Spain.[16] The data source was the MSCI Banking Indices and the DataStream banking indices from June 2005 to February 2017 at daily frequency.[17] To control for the differences in trading hours due to time zones, equity returns are computed as the average two-day log returns for equity prices (see, for example, Forbes and Rigobon, 2002, and GFSR, April 2016b).

43. Spanish banks are highly connected with European banks from France, the United Kingdom, the Netherlands, Italy and Germany based on market data (Figure 21). The strong linkages could be attributed to the strong balance sheet linkages as shown in the exposure data and the similarity in bank business models, the macro environment, monetary policy and financial regulations. The banking indices from France, the United Kingdom, and Germany appear to be the source of return connectedness for Spanish banks, while Italy, Portugal and the Netherlands are found to be the recipients.[18]

44. Spanish banks appear to be an important source of net return connectedness in the global banking system, with considerable impact on bank equity prices in Latin America (Figure 21). The net directional connectedness of equity returns is captured by the difference between the outward spillover to the system from the country's banking index and the inward spillover to the country from the system. Together with Germany, France and the United Kingdom, Spanish banks are found to be an important net contributor to return connectedness in the global banking system. The equity indices in the Netherlands, Italy, and the United States also appear to be

[15] The Diebold and Yilmaz (2014) approach has been used widely in recent European FSAPs, including Germany (2016), Ireland (2016), United Kingdom (2016) and Norway (2015) and in the April 2016 GFSR.

[16] The empirical sample consists of Brazil, Chile, China, France, Germany, Italy, Japan, Mexico, the Netherlands, Portugal, Spain, Switzerland, Sweden, Turkey, the United Kingdom and the United States.

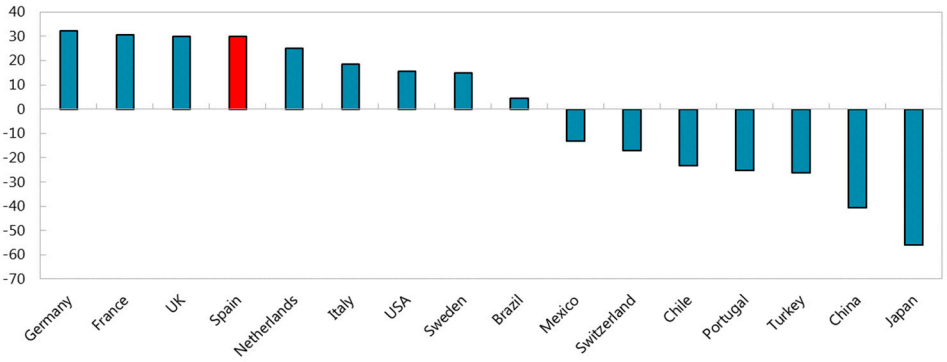
[17] We treat holidays and missing observations as follows: we remove a day if more than half of the entities have missing data. We then interpolate the remaining missing observations.

[18] Spanish and French banks are highly interconnected, in part due to sizable balance sheet exposures. For example, France has the largest claims on Spain (bank-only and total), while Spanish banks have considerable claims on French banks (Figure 4).

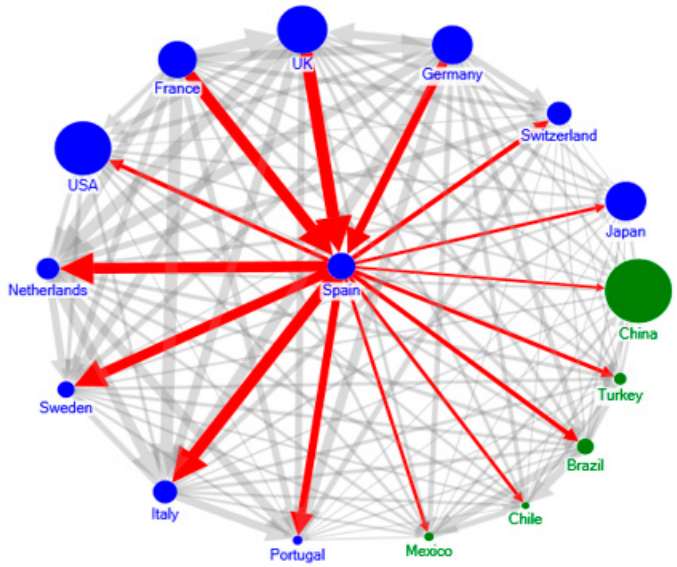
important sources of return connectedness, while banks in Asia and Latin America tend to be the recipients of return connectedness. Interestingly, the equity returns for the banking indices in Mexico, Chile, Brazil, and Turkey appear to be influenced by the equity returns of Spanish banks.

Figure 21. Interconnectedness Among Banking Indices

Net Directional Connectedness: Equity Returns of Banking Indices



Note: Fully sample net connectedness (June 2005 to February 2017). Net directional connectedness is constructed as the difference between the total directional connectedness of country i to the system (the to-degree) and the total directional connectedness of the system to country i (the from-degree).



Note: Full sample return connectedness (June 2005 to February 2017). The blue and green nodes denote developed countries and emerging market economies, respectively. The thickness of the edges reflects total connectedness (both inward and outward) and the direction of the arrow captures the direction of net connectedness. The size of the nodes reflects asset size. Chart constructed with NodeXL. Source: IMF Staff Calculations based on the Diebold and Yilmaz (2014) methodology.

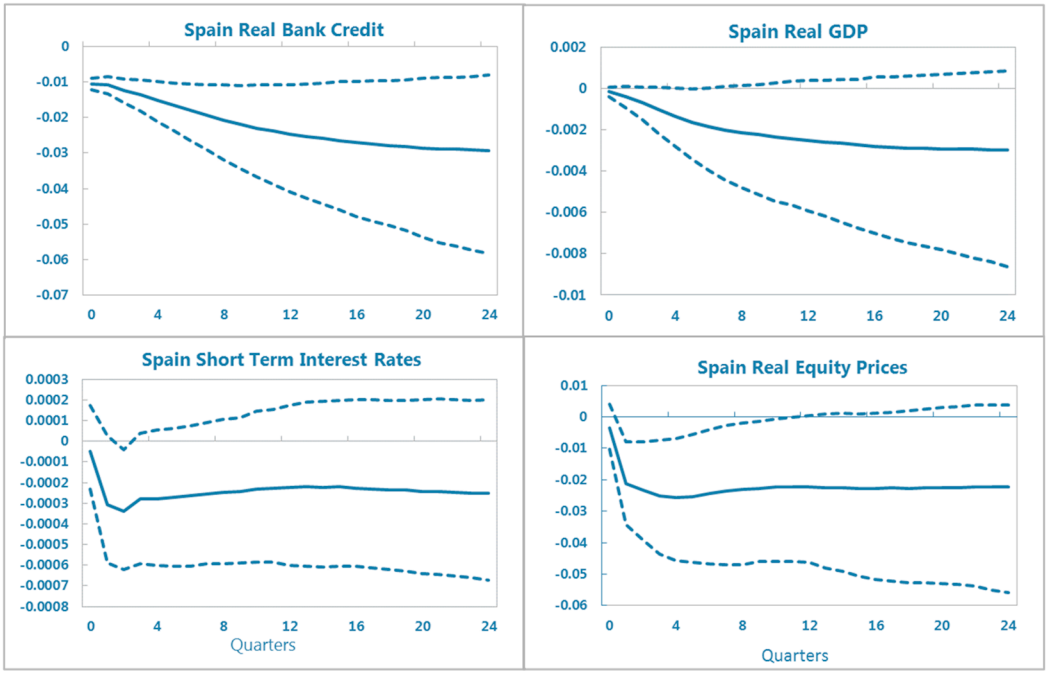
C. Macrofinancial Spillover Using the Global VAR Approach

45. Finally, the FSAP team applies the global VAR (GVAR) methodology (Dees, di Mauro, Pesaran and Smith, 2007) to examine the macro-financial spillover of credit shocks in Spain. The GVAR model combines time series, panel data, and factor analysis techniques permitting to address spillover issues. In the first step of the methodology, each country is modeled individually as

a small open economy by estimating country-specific vector error-correction models, in which domestic variables are related to country-specific foreign variables as well as global variables that are common across all countries (such as the international prices of oil). In the second step, a global model is constructed by combining all the estimated country-specific models and linking them with a matrix of cross-country linkages.

46. The GVAR model in our analysis includes 33 major advanced and emerging market economies. The sample period is from 1979Q2 to 2016Q4, including countries that account for 90 percent of world GDP. The variables included in the country-specific models cover real GDP, inflation rate, the real exchange rate, and when available, real equity prices, short term and long term interest rates, real equity prices and real credit.[19] In our analysis, we use trade data from the IMF Direction of Trade Statistics and banking exposures from the BIS Consolidated Banking Statistics, to quantify the linkages among all the economies included in the GVAR model.

Figure 22. Macrofinancial Spillover of Spain Credit Shock
(GIRFs of a one standard deviation negative shock to Spain real credit)



Note: Estimated with a Global VAR model from 1979Q2 to 2016Q4 for 33 major advanced and emerging market economies. Each country specific model includes real GDP, inflation, the real exchange rate, short term and long term interest rates, real equity prices and real credit, where available.

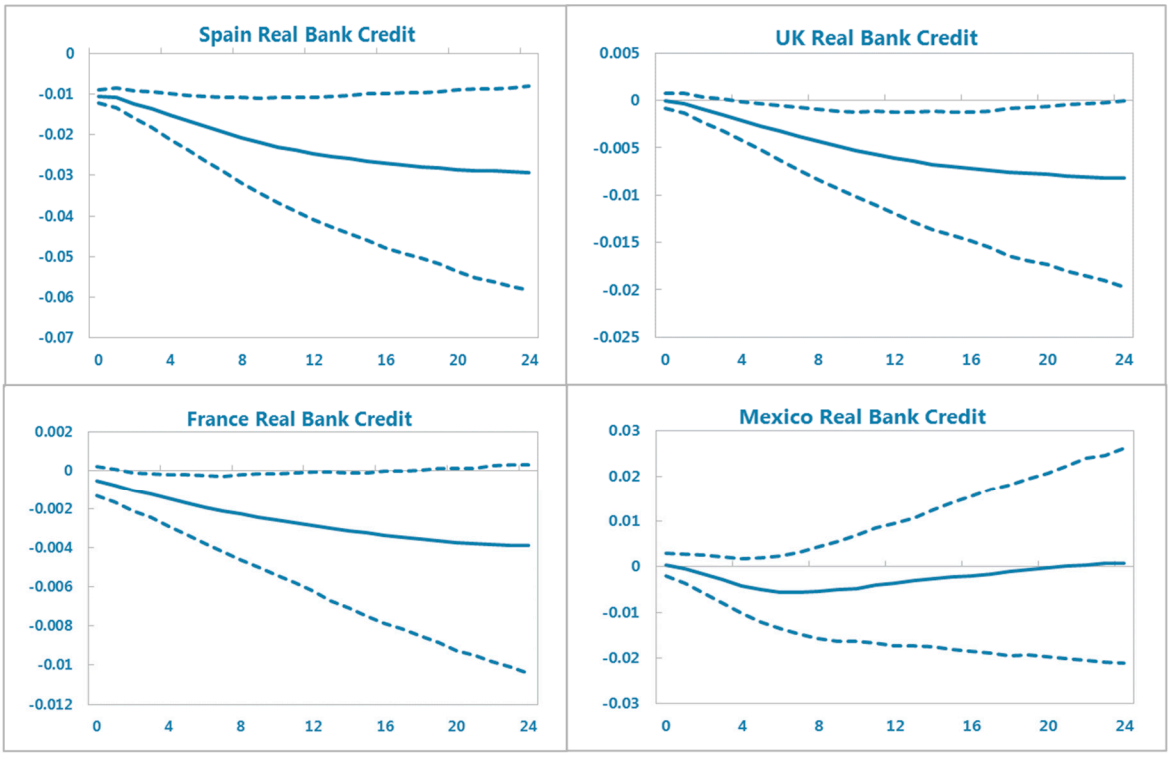
47. Credit shocks in Spain could have macro-financial impact on the real economy (Figure 22). A one-standard deviation negative shock to bank credit in Spain is equivalent to a fall of around

[19] See Appendix and Xu (2012) for detailed specification for a GVAR model with bank credit.

1 percent per quarter.[20] The decline in bank credit is accompanied by a significant fall in real GDP of around 0.2 percent in the first one year, a marginal decrease in short term interest rates (only significant in two quarters), and a two percent drop in real equity prices in the first year, possibly reflecting a fall in investor confidence and a deterioration in the economic fundamentals of the economy.

48. A credit shock in Spain could have spillover to bank credit in the United Kingdom and France (Figure 23). The generalized impulse response functions (GIRFs) show that the transmission of the real credit shock to the United Kingdom and France takes place with a delay, with the impact on U.K. bank credit to be particularly strong at about 0.5 percent in eight quarters, possibly due to the strong linkages in the banking sector between Spain and the United Kingdom. This finding is consistent with the results based on exposure data and market data, using the Espinosa-Vega and Sole (2010) and the Diebold and Yilmaz (2014) approaches. Furthermore, the impact of the credit shock on Mexico appears to be limited, which could be attributed to the subsidiary model that local claims are largely funded by local liabilities.

Figure 23. Cross-Border Spillover of Spain Credit Shock
(GIRFs of a one standard deviation negative shock to Spain real credit)



Note: Estimated with a Global VAR model from 1979Q2 to 2016Q4 for 33 major advanced and emerging market economies. Each country specific model includes real GDP, inflation, the real exchange rate, short term and long term interest rates, real equity prices and real credit, where available.

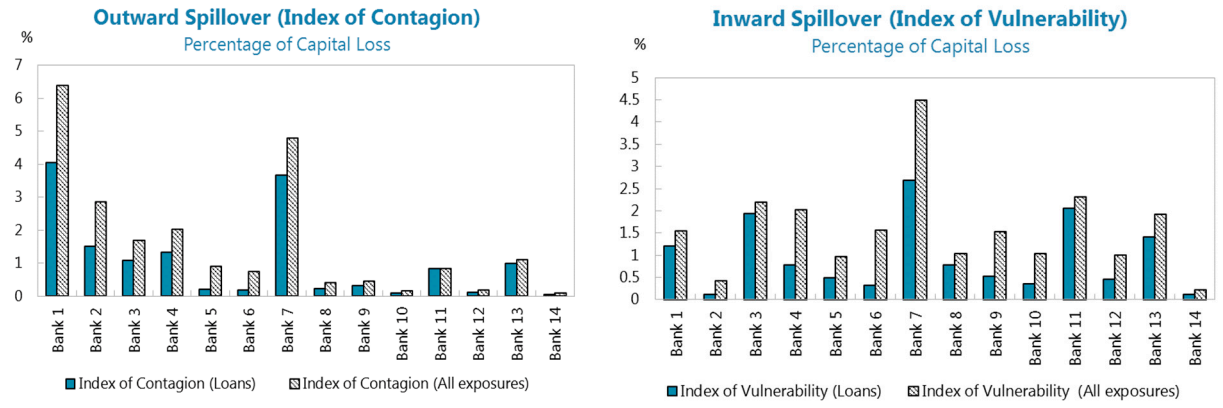
[20] The bank credit shock could be interpreted as a decline (displacement) in the volume of bank credit, either due to demand or supply factors.

ANALYSIS OF INTER-SECTORAL AND CROSS-SECTORAL LINKAGES

A. Network Analysis Based on Interbank Data

49. The network framework of Espinosa-Vega and Sole (2010) is used to analyze credit and funding shocks in the Spanish interbank market. The analysis examines the domestic interbank exposures for significant institutions (SIs), using confidential supervisory data from the Bank of Spain.[21] The SIs collectively account for about 93 percent of the Spanish bank sector in 2016. Two simulations are considered: the first simulation applies to interbank loan exposure only; and the second simulation considers all exposures including loans, bonds, capital participation and off balance sheet exposures.

Figure 24. Outward and Inward Spillover in the Domestic Interbank Market



Source: Bank of Spain Staff Calculations. Results are based on the Espinosa-Vega and Sole (2010) approach and supervisory interbank exposure data for 2016Q2. Both credit and funding shocks are considered.

50. The results suggest that the overall contagion risk in the domestic interbank market is contained, however, some banks are found to be relatively vulnerable (Figure 24). In terms of outward spillover (index of contagion), Bank 1 and Bank 7 appear to have the largest impact on the rest of the banking sector through interbank loans and total interbank exposures. For inward spillover, Bank 7 is found to be more vulnerable compared with the rest of the banking sector, losing up to 4.5 percent of capital due to credit and funding shocks originating in other parts of the banking sector.

[21] The analysis was conducted jointed by the Bank of Spain and the FSAP team, based on data available at 2016Q2. Please note that Banco Popular was resolved and sold to Banco Santander after the cut-off date of the empirical analysis.

B. Linkages Between Banks and Insurers Based on Market Data

51. A considerable co-movement of financial firms' equity prices in Spain is observed. As evidenced in Figure 25, during the crisis a significant co-movement was observed; however more recently this co-movement has decreased. The co-movement of financial firms' equity prices could be related to many factors such as direct or indirect linkages between firms, exposure to similar assets and macroeconomic conditions, and common ownership among other factors. The movement in prices partly reflects the views of investors regarding the health and the prospects of the underlying businesses. The co-movement of banks and insurance companies' equity prices implies that there is at least some interconnectedness between the two sectors.

52. Using publicly available data the FSAP team conducted an analysis of bank and insurance companies' linkages within Spain. The analysis provides insights into the spillover risks among publicly listed Spanish bank and insurance companies using daily equity returns data for 10 publicly listed Spanish banks and insurers. The interconnectedness between banks and insurance companies is derived from the variance decomposition of the VAR.[22]

53. Spanish banks are connected with insurance companies (Figure 25). The strong linkages could be attributed to the strong balance sheet linkages and ownership of large insurance businesses by banks. Analysis of the bank and insurance companies' equity prices illustrate that banks appear to be the source of return connectedness and insurance companies are found to be the recipients. The ownership by banks of large insurance business, which are not listed, masks the overall connectedness between banks and insurance companies. We explore this channel of interconnectedness using regulatory data of the cross-exposures of banks and insurance companies.

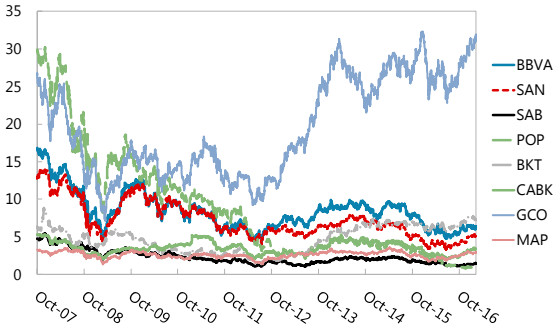
54. Overall, systemic risk in Spain has declined to pre-crisis levels. This reflects, to a significant degree, the improved banking sector resilience due to regulatory changes, increased capital, progress with legacy, etc. However, systemic risk is high in Spain with banks being net transmitters of spillovers, and insurance companies being net recipients of spillovers. A measure of connectedness (Figure 25) shows that interconnectedness (a type of co-distress or joint loss measure) has declined to pre-crisis levels and that overall market stress, where banks and nonbank financial institutions participate, has decreased substantially since the crisis (Figure 26).

[22] See Appendix for the methodology description.

Figure 25. Systemic Risk and Connectedness

Banks and insurance companies' equity prices have not fully recovered since the crisis…

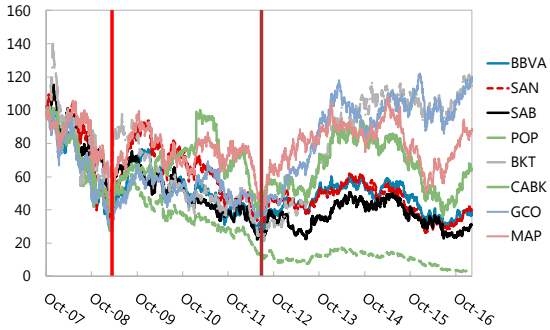
Bank and Insurance companies equity prices
(euro)



Sources: Bloomberg

But banks and insurance companies' equity price correlation appear to decrease.

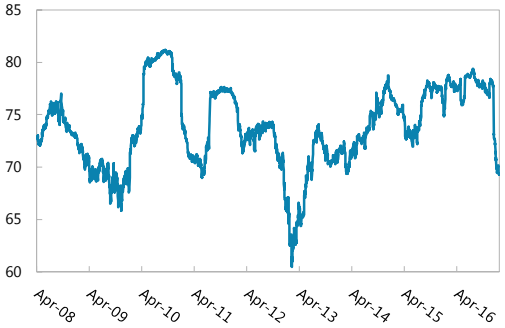
Bank and Insurance companies equity prices indexed
(2017-10-10=100)



Sources: Bloomberg

Connectedness between banks and insurance companies has decreased…

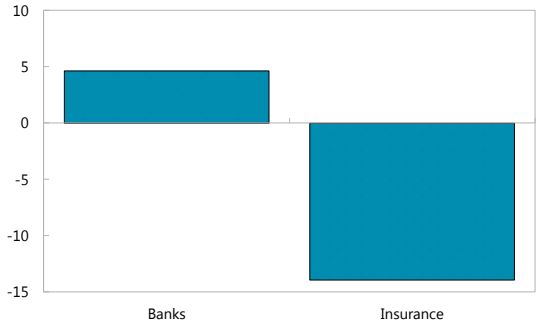
Index of connectedness
(October 2007 to February 2017)



Sources: IMF staff estimates

Banks are the source of outward spillovers…

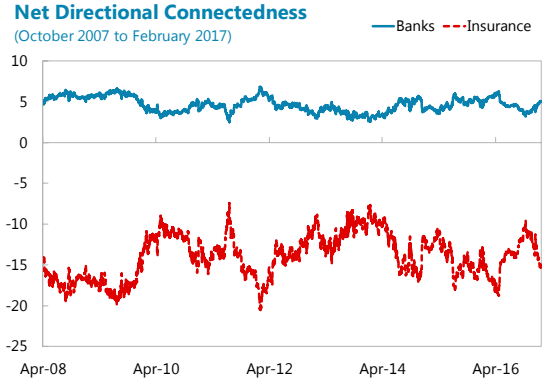
Net directional connectedness
(October 2007 to February 2017)



Sources: IMF staff estimates

Banks' outward spillovers have remained positive….

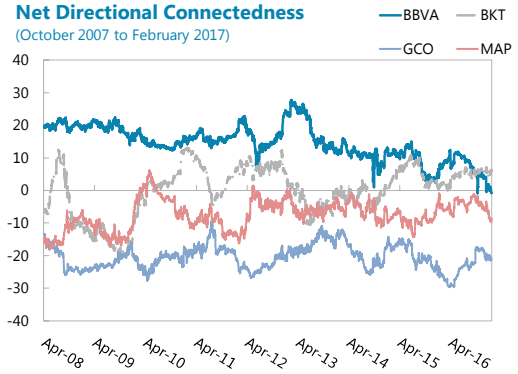
Net Directional Connectedness
(October 2007 to February 2017)



Sources: IMF staff estimates

Some larger banks appear to have more outward spillovers although these have decreased…

Net Directional Connectedness
(October 2007 to February 2017)



Sources: IMF staff estimates

Sources: Bloomberg, and IMF staff calculations.

C. Linkages Between Banks and the Nonbank Financial Sector Based on Market Data[23]

55. There are strong cross-sectoral linkages between banks and other parts of the Spanish financial system, but systemic risks from those linkages appear to be limited. A tight network of cross-sectoral interconnections between banks and non-bank financial institutions exist in Spain since banking groups own insurance and investment management firms, and are important players in the Spanish capital markets. Nevertheless, the interconnectedness between banks and nonbank financial institutions does not appear to pose systemic risks to the financial system, and overall market stress has decreased substantially. However, as markets and institutions evolve these linkages might change and systemic risks from interconnectedness might increase, and make the system vulnerable to destabilizing domino effects triggered by the realization of extreme losses (stress) in individual institutions.

56. Because banks are active in the Spanish financial markets, while the largest investment management firms are part of banking groups, there is a need for close supervision and monitoring, and ensuring that management structures avoid conflicts of interest and the buildup of risks. A more holistic approach to the monitoring of financial institutions and markets could help to better gauge systemic risks to the Spanish financial system, and assist in the implementation of macroprudential measures when necessary. A formal relationship of all financial supervisors (DGSFP, CNMV, and BdE/SSM) would help the authorities to form a more holistic view of systemic risks and to calibrate and enact macroprudential measures, when necessary.

57. Overall financial market stress has declined to almost pre-crisis levels, reflecting an improved banking sector-specific resilience, regulatory and supervisory changes, the introduction of the SSM, and improved macroeconomic conditions. As evidenced in Figure 27, the overall financial market stress indicator,[24] measured using money market, bond market, equity market, financial intermediaries, foreign exchange market and derivatives market indicators representing the different segments of the financial system, is close to 30 percent off its peak value reached around the global financial crisis (GFC) and 35 percent off its value during the summer of 2012.

58. Bond and financial intermediaries stress indicators remain elevated but below pre-crisis levels, reflecting continued stress in the fixed income markets and remaining challenges in the

[23] Sectors considered include banking, insurance and asset management and financial markets such as equity, bond, money and derivatives.

[24] Financial Market Stress Indicator (FMSI) represents a real-time measure of systemic risk, quantifying stress in the Spanish financial system and describing the contribution of each financial market segment (bond market, equity market, money market, financial intermediaries, forex markets and derivatives) to the total stress in the system. The methodology takes into account time-varying correlations between market segments (see Cambón and Estévez, 'A Spanish Financial Market Stress Index (FMSI),' CNMV working paper 60, 2015).

banking sector. As evidenced in Figure 27, the bond[25] and financial intermediaries[26] market segments stress indicators remain elevated but below their peak value reached around in 2012. This represent improved banking sector resilience, but that challenges remain due to legacy assets on banks' balance sheets and in SAREB. Higher sovereign debt levels since the crisis partly explain the elevated level of bond market segment stress indicator.

59. Risks emanating from markets and investment management firm's activities remain subdued but close monitoring is warranted as macroeconomic conditions, interest rates and financial market change. Scenarios analyzing the effects of low for long interest rates and higher than expected interest rates, could help the authorities monitor the buildup of risks. Clarifying the supervisors' internal decision making process regarding resolution and macroprudential regulation, and the coordination procedures with EU institutions would assist in preparing for potential disruptions in financial markets and entities. Mutual funds' activities remain subdued however indicators point to higher illiquidity (Figure 27). Market indicators point to illiquidity in the fixed income markets with a negative trend that could pose risks to financial stability.[27] Trading in fixed income securities of financial intermediaries is subdued, partly because of easing financing conditions from the ECB.

60. Continued monitoring of illiquidity in fixed income markets (Figure 27) is warranted as macrofinancial conditions evolve towards a normalization of interest rates. A sudden need to obtain additional financing by financial intermediaries from the fixed income markets might prove costly and disruptive. Problems could be compounded because the private debt market and mutual funds AUM in Spain are small, and fixed income mutual funds are vulnerable to redemptions if interest rates increase faster than anticipated.

61. The relative large size of banks compared to the nonbank financial sector imply benefits from market deepening and increasing the breadth of markets. Authorities should consider the potential benefits for Spain of encouraging an increased rate of private savings directed towards insurance, pension and asset management sectors and increasing the breadth of markets to avoid overreliance on bank financing and disruptions in fixed income markets as macroeconomic conditions change.

[25] Measured by the realized volatility of the Spanish ten-year benchmark government bond index, they yield spread between the Spanish ten-year government bond and German ten-year government bond and the bid-ask spread of Spanish government bonds.

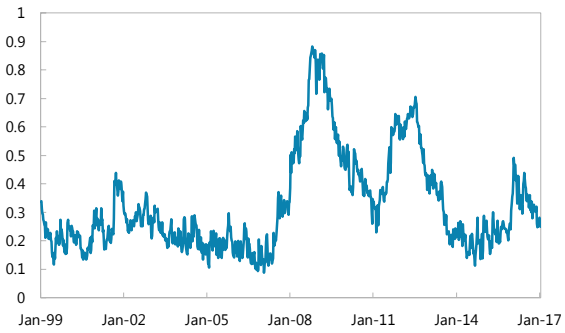
[26] Measured by the realized volatility of the idiosyncratic equity return of the banking sector market index relative to Ibex 35 returns, the financial sector credit risk spread, and the weekly average of daily maximum cumulated index losses of Spanish financial sector index, over a moving two-year window and the inverse of the price-book ratio of these markets.

[27] Liquidity and interest rate risks endure, and might intensify as monetary policy normalizes and the ECB's TLTROs mature. The private debt market is small and this can have negative effects on banks' borrowing costs.

Figure 26. Financial Markets Stress

The overall market stress has decreased substantially since the crisis…

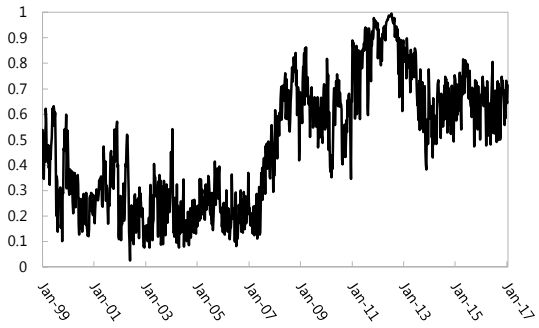
Overall market stress index
(lowest=0, highest=1)



Sources: CNMV

Bond market stress is lower but remains elevated.

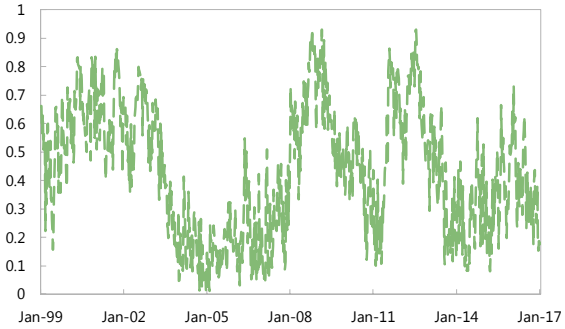
Bond market stress
(lowest=0, highest=1)



Sources: CNMV

Equity market stress has also decreased substantially…

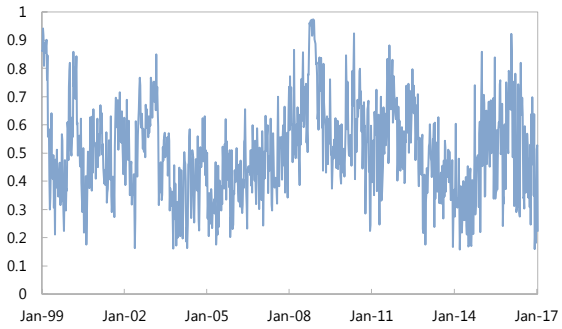
Equity markets stress
(lowest=0, highest=1)



Sources: CNMV

Derivatives markets stress remains elevated…

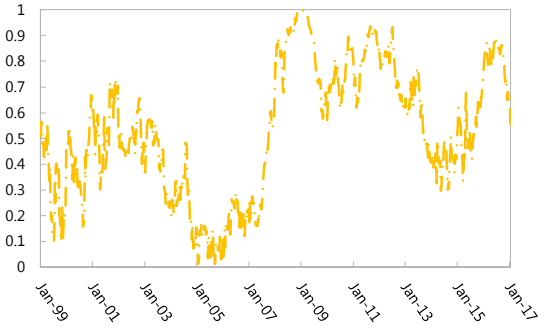
Derivatives markets stress
(lowest=0, highest=1)



Sources: CNMV

Financial intermediaries stress remains high partly due to the ongoing legacy asset disposal process….

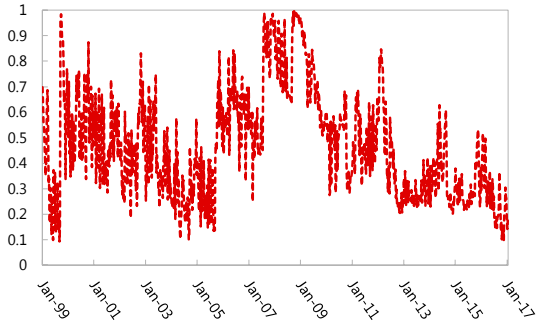
Financial intermediaries stress
(lowest=0, highest=1)



Sources: CNMV

Money market stress has decreased as funding costs for banks have decreased and funding sources have increased…

Money market stress
(lowest=0, highest=1)



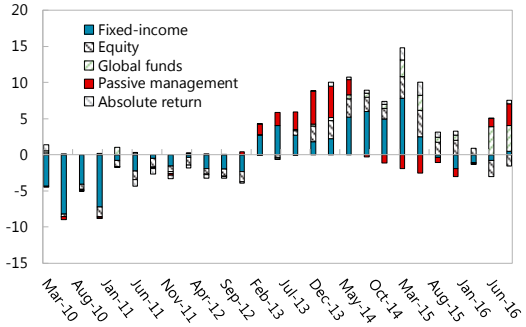
Sources: CNMV

Sources: CNMV, and IMF staff calculations.

Figure 27. Mutual Funds and Bond Market Liquidity

Fixed income funds are the most vulnerable to redemptions…

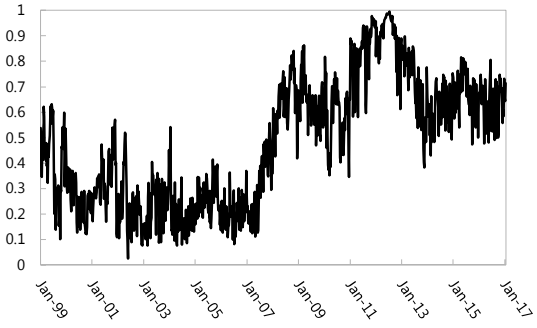
Mutual funds: Monthly net subscriptions by category
(euro billion)



Sources: CNMV

Bond market stress is lower but remains elevated.

Bond market stress
(lowest=0, highest=1)

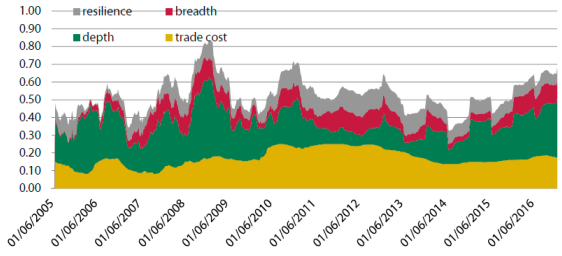


Sources: CNMV

Illiquidity in the fixed income market is high …

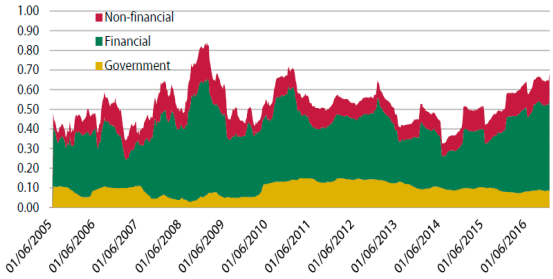
The liquidity synthetic indicator (LSI)

By liquidity chraracteristics



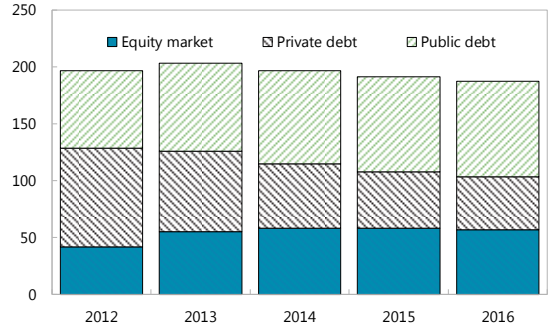
Illiquidity concentrated in the financial intermediaries fixed income instruments…

By sector



And because the private debt market is small, this can have negative effects on banks' borrowing costs if the ECB trims its bank funding facilities….

Capital markets size
(percent of GDP)



Sources: CNMV

Sources: CNMV, and IMF staff calculations.

D. Linkages Between Banks and Insurers Based on Regulatory Data

62. Using regulatory data, we confirm that banks are the source of outward connectedness. As evidenced in Figure 28, insurance companies have substantial exposures to banks (a large proportion of their assets around €300 billion). Insurance companies' exposures to banks confirm that the banking sector is the main source of cross-sectoral linkages.

63. Despite banks ownership of insurance companies, it appears that parent-insurance exposures are limited (Figure 29). Insurance companies deposits with parent banks are small compared with banks' overall liabilities. Repo transactions between insurance companies and banks appear to be small confirming that cross-sectoral linkages between banks and insurance companies appears to be small.

64. Overall exposures of banks to insurance companies is also small compared to the overall size of the banking sector, however banks are significant holders of insurers capital. This reflects, to a significant degree, the ownership of insurance businesses by banks, which can be a source of contagion due to reputational risks if bank-owned insurance companies run into trouble. However, the overall exposures of banks to insurance companies appear to be small as a portion of banks' assets, posing a relative limited amount of systemic risk to the Spanish financial system.

65. There are drawbacks in the market data based approach but we check for consistency the overall results using regulatory data. First, specific channels through which shocks could be transmitted are not traced**.** Therefore, an approach based on regulatory balance-sheet data and asset market exposures can provide complementary analysis. Second, the market data approach excludes financial institutions that are not publicly traded, which in the case of Spain account for a significant share of the financial system.

66. Volatility spillovers measures between banking and insurance sectors show that the spillovers between the two sectors have remained relatively stable. Using the framework developed by Diebold and Yilmaz (2015) based on network connectivity measures, it can be observed that banks are net transmitters of spillovers, while insurance companies are net recipients.

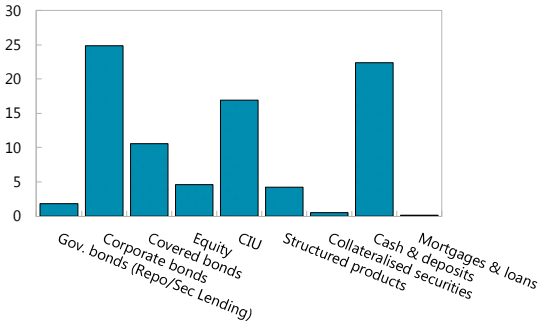
67. In Spain, the ownership of insurance companies by banking groups means that the Diebold and Yilmaz (2015) approach faces drawbacks and advantages similar to all market based approaches. Some of the largest insurance groups belong to banking groups and the Spanish authorities have designated four of them as conglomerates.[28] Therefore, banking groups with large insurance exposures might be both gross transmitters and recipients of spillovers. Bilateral exposure data at the entity level are not available and the use of market based approach complements the analysis using aggregate exposure data. The constraints of the Diebold and Yilmaz (2015) are common to all market based approaches.

[28] Among the four conglomerates, two have been designated for supplementary supervision.

Figure 28. Banks and Insurance Companies' Exposures Using Regulatory Data

Insurance companies have substantial exposures to banks…

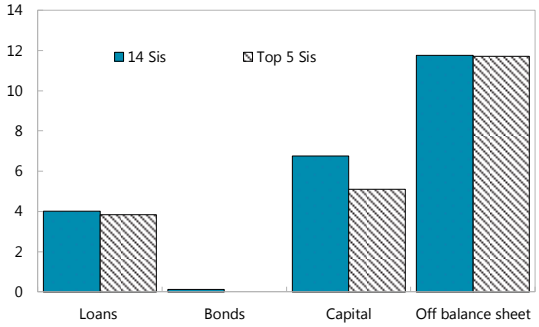
Insurance companies exposures to banks (2016)
(euro billions)



Sources: DGSFP

But banks have limited exposures to insurance companies.

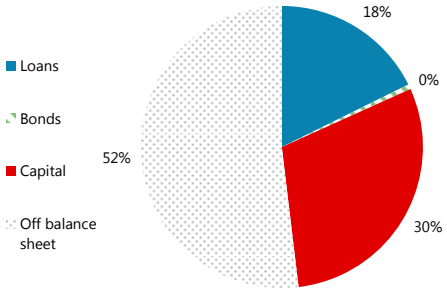
Exposures of banks to insurance companies (2016Q2)
(euro billions)



Sources: BdE

Larger banks exposures to the insurance sector is off balance sheet…

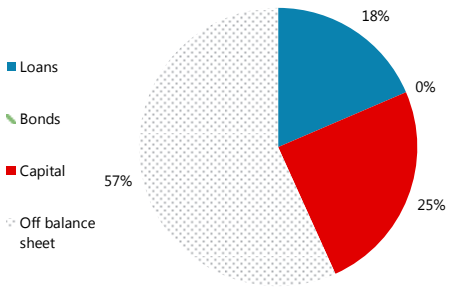
SIs exposure to insurance sector (2016Q2)
(percent of total exposure)



Sources: BdE

And the largest banks hold a substantial portion of insurance companies' capital…

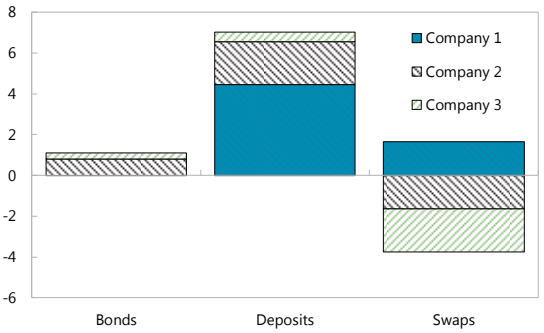
Top 5 Sis exposure to insurance sector (2016Q2)
(percent of total exposure)



Sources: BdE

Insurance companies deposits with parent banks is relatively small compared to overall bank liabilities….

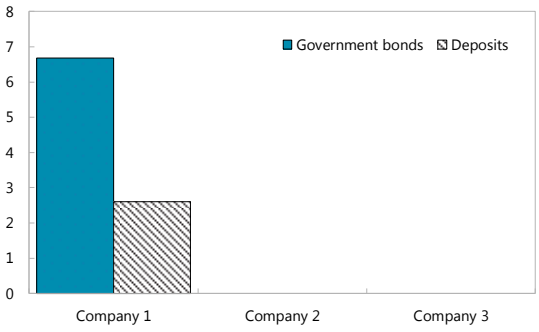
Insurance company exposure to parent bank
(euro billion)



Sources: DGSFP (2016)

And repo transaction between banks and insurance companies appear to be limited….

Insurance assets pledged as collateral in repo agreements
(euro billion)



Sources: DGSFP (2016)

Sources: BdE, DGFSP, and IMF staff calculations.

CONCLUSIONS AND POLICY RECOMMENDATIONS[29]

68. The significant international presence of Spanish banks provides diversification benefits but also has significant implications for inward and outward spillovers, risk monitoring and supervision. The domino-style network simulation suggests that the largest *inward spillover to* Spanish banks originates from the United Kingdom, United States, France, and Germany. Spanish banks' exposures in Latin America and Turkey could also be significant for the inward spillover of credit shocks, due to the large claims on the non-bank private sector and the public sector in these countries. Regarding *outward spillovers from Spain*, some European and Latin American banking systems appear to be influenced most by credit and funding shocks due to interbank exposures with Spain. Market based approach confirms the strong degree of connectedness between Spanish banks and European banks from France, the United Kingdom, Italy and Germany, and Spanish banks appear to be an important source of net return connectedness in the global banking system. Furthermore, credit shocks in Spain could have significant impact on the domestic real economy and on bank credit in the United Kingdom and France, accounting for macro-financial linkages.

69. Financial intermediaries in Spain have linkages through conglomerate ownership, common exposures, and inter-sectoral claims but interconnectedness appears to be limited based on the available data. Financial groups operate in banking and insurance, manage investment funds and distribute pension funds. Interconnectedness from intersectoral claims was hard to assess given that most data are not collected. Aggregate financial accounts data shows that claims between banks and other financial institutions (OFI) appear not to be significant and have declined after the crisis. The market data-based analysis of Spanish financial and non-financial sectors show that banks are the source of net connectedness with the insurance companies. The main source of risk in intersectoral connectedness appears to be insurance companies' exposures to banks, while exposures of banks to insurers or to mutual funds appear small at present.

70. The sovereign debt market is by far the most developed financial market and the most important source of cross-sectoral linkages between banks and the rest of the financial system. Banks hold around one quarter of the Spanish sovereign debt securities in 2016, which was around 100 percent of GDP, but pension and mutual funds, and insurance companies also hold a significant amount. The strong sovereign-bank nexus is a major transmission channel for Spanish banks and the public sector and poses risks to financial stability. Other common exposures were difficult to assess given the lack of data of holders of covered bonds and other asset-backed securities. Flow data appears to signal that concentration in these assets is not significant.

71. The mission recommends enhanced monitoring of interconnectedness and systemic risks, closing remaining data gaps and strengthening collaboration in the college of supervisors and among sectoral supervisors.

[29] Appendix III provides a discussion and some recommendations on improving Spain's macro-financial resilience.

- **Interconnectedness and systemic risk**. Cross-sectoral and cross-border interconnectedness should be incorporated in systemic risk monitoring analysis and assist in the implementation of macroprudential measures when necessary. Different quantitative methodologies could be considered to enhance the monitoring of interconnectedness and systemic risk analysis.

- **Data gaps**. Authorities should close the remaining data gaps on interbank exposures, cross holding of assets and liabilities by banks and non-banks, ownership structure of key financial assets, the derivative exposure of banks and non-banks, the overall size and risk of non-traditional banking activities within banks and resolve any perimeter supervisory issues to fully assess the potential for domino effects of institutions' distress. While at present sectoral interconnectedness appears subdued, due partly to ECB's funding role, these linkages will change as monetary policy normalizes.

- **Interagency (BdE/SSM, DGSFP, CNMV) and college collaboration**. Both should be enhanced to implement a more holistic approach to the monitoring of markets and financial intermediaries and provide useful inputs for the calibration and enactment of macroprudential measures. Given the high degree of outward spillover of European banks, supervisors should be mindful of the cross-border linkages in systemic risk monitoring; the collaboration in the college of supervisors could also be further strengthened.

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Appendix I. Stress Test Matrix (STEM) for Interconnectedness and Contagion Analysis

Domain		Framework
Cross-border analysis	Data and Methodology	The FSAP team applies three main approaches to examine interconnectedness and contagion, based on cross border exposure and market data: <u>Espinosa-Vega and Sole (2010) methodology</u> • Examine cross-border banking sector exposures, with the BIS consolidated banking statistics (2016Q2) and regulatory capital data from IMF Financial Soundness Indicators (FSIs). • Two sets of simulations are considered in the analysis. • Simulation 1: Positions include bilateral bank exposures. Consider both initial credit and funding shocks to the banking sector. • Simulation 2: Positions include aggregated total exposures (bank, non-bank private sector and public). Consider the impact of credit shocks to total foreign claims. • List of countries for both simulations include: Australia, Austria, Belgium, Brazil, Canada, Chile, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Mexico, the Netherlands, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States. <u>Diebold and Yilmaz (2014) methodology</u> • Examine the cross-border interconnectedness between the banking sector in Spain and others countries with strong financial and trade linkages with Spain. • The data was sourced from the MSCI Banking Indices and the DataStream banking indices from June 27, 2005 to February 24, 2017 at daily frequency. • Equity returns are computed as the average two-day log returns to control to the differences in trading hours due to time zones. • The interconnectedness measure is derived from the forecast error variance decomposition of the underlying VAR. <u>The Global VAR (2007) methodology</u> • Examine the cross-border impact of credit shocks, accounting for macro-financial interactions. • The data source includes Haver Analytics, IMF International Finance Statistics, DataStream, Bloomberg, IMF Direction of Trade Statistics and BIS Consolidated Banking Statistics. • The Global VAR model was estimated from 1979Q2 to 2016Q4, covering 33 countries.

Domain		Framework
		• Analyze the macro-financial impact of a credit shock in Spain and its cross-border implications.
Interbank market analysis	Data and Methodology	The Bank of Spain and the FSAP team conducted the interbank market analysis jointly. Espinosa-Vega and Sole (2010) methodology • Examine the interconnectedness among the 14 significant institutions (SIs) in Spain. • The source for the interbank bilateral exposure data and the regulatory capital data was the Bank of Spain (2016Q2). • Two sets of simulations are considered in the analysis. • Simulation 1: Positions include bilateral bank exposures. Consider both initial credit and funding shocks to the banking sector. • Simulation 2: Positions include aggregated total exposures (bank, nonbank private sector and public). Consider both initial credit and funding shocks to the banking sector.
Cross-sector analysis	Data and Methodology	Diebold and Yilmaz (2014) methodology Bank and insurance linkages within Spain • Examine the spillover risks among publicly listed Spanish banks and insurance companies • Use daily equity returns data from 11 October 2007 to 17 February 2017 for publicly listed Spanish banks and insurers. • Interconnectedness measure is derived from the variance decomposition of the VAR. CNMV and BdE regulatory data on cross sectoral exposures Bank, insurance companies and mutual fund linkages within Spain • Examine the cross exposures of Spanish banks, insurance companies and mutual funds • Use stress market indices to measure systemic risks as introduced by Cambón and Estévez (2015) and updated by the CNMV. • Use liquidity indices to measure illiquidity in fixed income markets as measured by the CNMV.

Appendix II. Technical Appendix on Interconnectedness Analysis

72. Contagion risks and interconnectedness are assessed using three different approaches. The first approach applies the Espinosa-Vega and Sole (2010) methodology to examine cross-border bank exposures and interbank market contagion. The second approach uses the Diebold and Yilmaz (2014) methodology with daily equity returns data to examine the contagion between publicly traded banks and insurance companies in Spain, and the spillover among banking indices in Spain and countries with strong financial and trade linkages with Spain. The third approach applies the global VAR to analyze the impact of external spillovers on Spain, accounting for macro-financial linkages.

Network Analysis Framework (Espinosa-Vega and Sole, 2010)

73. The analysis based on the network framework of Espinosa-Vega and Sole (2010) considers both credit and funding shocks to the banking systems.

- Credit shock: "Failure" of banking system A will incur credit losses to system B that has claims against A. The credit loss rate assumption controls for the severity of credit cost upon failure. A loss given default rate of 100 percent is assumed to capture the impact of an extreme credit shock. [30]

- Funding shock: "Failure" of banking system A will force system B (that has claims against A) to find alternative sources of funding. This may result in the fire sale of liquid assets by system B to fill the funding gap. The fraction of lost funding that is not replaceable is assumed to be 35 percent (65 percent rollover) and the haircut in the fire sale is assumed to be 50 percent.[31]

74. An initial negative credit or funding shock to a country's financial system could be propagated through the network of bilateral claims across countries (based on the BIS consolidated banking statistics), and could distress banking systems in other countries beyond the direct losses from the initial shocks.

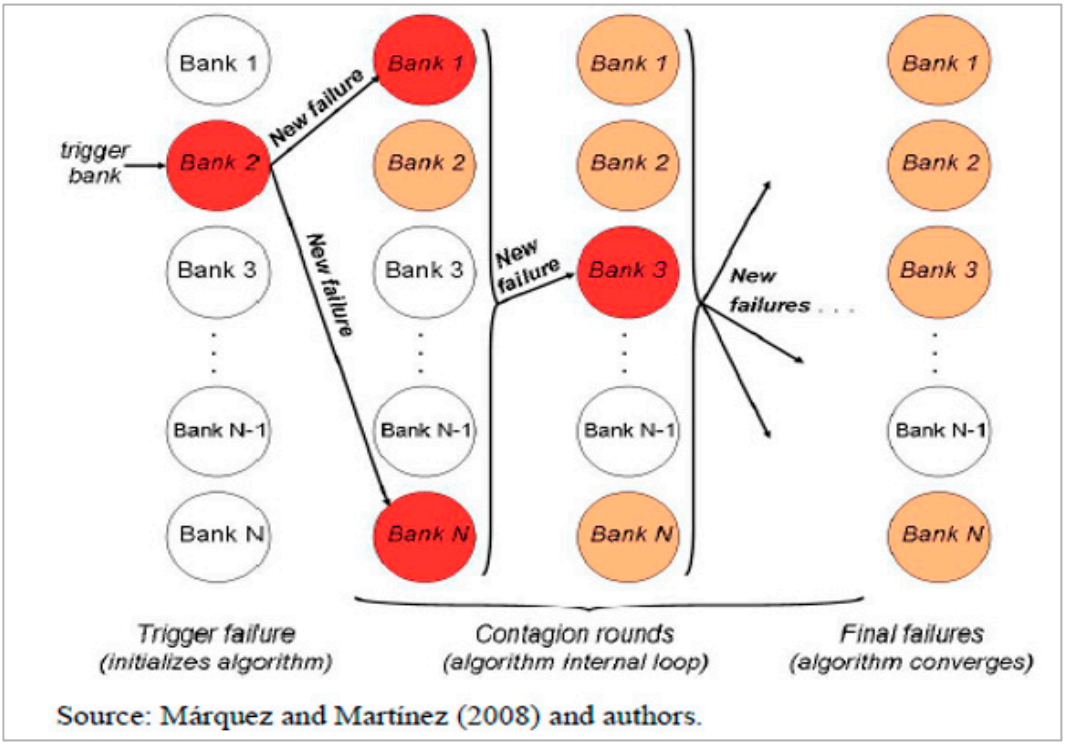
75. If any banking system incurs losses larger than their total Tier 1 or regulatory capital, the system "fails." This failure can subsequently cause some other banking system to fail, triggering domino effects, where a failure of a banking system in a network transmits to other banking systems.

[30] A loss given default rate of 100 percent is also assumed in Espinosa-Vega and Sole (2010), the Germany 2016 FSAO, Italy 2013 FSAP and the 2012 Japan FSAP. Espinosa-Vega and Sole (2010) and Wells (2004) argue that network studies should consider higher loss-given-default estimates than typically assumed, as banks tend to face substantial uncertainty over recovery rates in the short run. The simulation results should be interpreted as the maximum possible impact of systemic instability. Note that collaterals and hedging instruments are not considered due to data limitations.

[31] The same assumptions on the funding shock were made in Espinosa-Vega and Sole (2010). While the final numerical results are sensitive to these assumptions; however, the relative importance of systemic countries remain the same.

76. The sample for cross-border analysis consists of 22 BIS reporting countries including those with the highest banking sector exposure to Spain. [32] Cross-border banking exposure data are based on BIS consolidated statistics on ultimate risk basis. Regulatory data are taken from IMF's Financial Soundness Indicators (FSIs). The analysis is based on 2016Q2 data.

Figure 29. Network Analysis Based on Interbank Exposures



Source: Márquez and Martínez (2008) and authors.

77. The sample for interbank analysis consists of 14 significant institutions (SIs) in Spain. Both interbank exposure data and regulatory data are sourced from the Bank of Spain. The analysis is also based on 2016Q2 information.

Spillover Analysis with Market Data (Diebold and Yilmaz, 2014)

78. The spillover analysis using the Diebold and Yilmaz (2014) methodology first estimates a Vector Autoregression (VAR) model with market data. The interconnectedness measure is then derived from the Generalized Variance Decomposition (Pesaran and Shin, 1998) of the underlying VAR. In contrast to the traditional Cholesky and other structural identification strategies, the Generalized Variance Decomposition (GVD) does not impose any assumptions on the order of variables, instead, it relies on a largely data-based identification scheme ("let the data speak").

[32] The sample consists of 22 countries: Australia, Austria, Belgium, Brazil, Canada, Chile, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Mexico, the Netherlands, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States.

79. The GVD conceptually measures the fraction of changes in an equity return attributable to shocks to the returns of other equity. For instance, the GVD analysis reveals that x percent of variation in equity A's (log) returns can be attributed to shocks (innovations) to equity B's (log) return.[33] Note that both A's contribution to B as well as B's contribution to A are calculated, and they are generally different.

80. Two sets of simulations are conducted as part of the market-based spillover analysis. The first set of simulations examines the interconnectedness between publicly traded banks and insurers in Spain, while the second studies the interconnectedness among banking sector equity indices in 16 countries, using MSCI and DataStream banking indices. Daily equity returns are constructed as the log difference of equity prices. For the cross-border analysis, we use the average two-day log returns to control to the differences in trading hours due to time zones. The sample spans from October 11, 2007 to February 17, 2017 for the Spanish bank-insurer analysis, and from June 27, 2005 to February 24, 2017 for the cross-border analysis.[34]

81. The FSAP team derives a set of pair-wise directional connectedness measure between financial firms/banking indices, based on the Generalized Variance Decompositions. The pairwise connectedness measure captures the extent to which the equity returns of the banking index in one country could explain that of another country. Gross contribution between A and B, that is, the sum of A's contribution to B and B's contribution to A, indicates the overall level of co-movement between two variables (hence the overall level of connectedness among equity returns in this context). Net contribution from A to B, or the difference of A's contribution to B and B's contribution to A, indicates the degree to which B's fluctuations could be explained by the fluctuations in A's equity returns (on net), hence A's relative influence over B in the connectedness.

82. On aggregate, the from-degree measure captures total directional connectedness of the system to a country's banking index/individual firm (inward spillover), the to-degree measure captures contributions of individual country's banking index/individual firm to systemic network events (outward spill over). In addition, the net-degree measure (the difference between to- and from- measures) describes the relative contribution to system connectedness from each country's banking sector/each individual firm.

[33] Hereafter, A's contribution to B actually refers to the contribution from A's innovations to B's variation, or B's variation attributable to innovations to A according to the GVD analysis.

[34] The sample size for the Spanish bank-insurer analysis was restricted by data availabilities, in particular, for the Bankia bank. The data source is Bloomberg.

Macrofinancial spillover using the Global VAR approach (Dees et al, 2007)

83. The dataset consists of 33 countries, including Argentina, Australia, Austria, Belgium, Brazil, Canada, China, Chile, Finland, France, Germany, Italy, India, Indonesia, Japan, Korea, Malaysia, Mexico, Netherlands, New Zealand, Norway, Peru, Philippines, Saudi Arabia, Singapore, Spain, South Africa, Sweden, Switzerland, Thailand, Turkey, United Kingdom, United States, covering 90 percent of world GDP. The database in Xu (2012) which covers the period of 1979Q2 to 2009Q4 is extended to 2016Q4 for this analysis. The data sources include Haver Analytics, IMF International Finance Statistics, DataStream and Bloomberg. In addition, we use trade data from the IMF Direction of Trade Statistics and banking exposures from the BIS Consolidated Banking Statistics, to quantify the linkages among all the economies included in the GVAR model.

84. The global VAR (GVAR) methodology is a multi-country framework, which allows for the analysis of the international transmission mechanics and the interdependencies among countries (Dees, di Mauro, Pesaran and Smith, 2007). In the first step of the methodology, each country is modeled individually as a small open economy by estimating country-specific vector error-correction models, in which domestic variables are related to country-specific foreign variables, as well as global variables that are common across all countries (such as the international prices of oil). In the second step, a global model is constructed combining all the estimated country-specific models and linking them with a matrix of cross-country linkages.

85. The country-specific VARX (augmented VAR) models are estimated over the period of 1979Q2 to 2016Q4. With the exception of the U.S. model, all country models include the same set of variables, including real GDP, the inflation rate, the real exchange rate, and where available, real equity prices, quarterly short term and long term interest rates, and real credit. Oil price is also included as a weakly exogenous foreign variable. The U.S. model is specified differently. First, oil price is included as an endogenous variable. In addition, given the importance of the U.S. financial variables in the global economy, the U.S.-specific foreign financial variables such as foreign equity prices and foreign long run interest rates, are not included in the U.S. model. Furthermore, the U.S.-specific real exchange rate is included as a weakly exogenous foreign variable.

86. After estimating each country VARX model, all the endogenous variables are collected in the global vector and solved simultaneously using the link matrix defined in terms of country specific weights. The resulting global model is then solved recursively, and used for generalized impulse response analysis.

Appendix III. The Nonbank Financial Sector, its Role and Potential and Risks

87. Banks dominate the Spanish financial sector, whereas the nonbank financial sector, capital markets and shadow banks are much smaller. The nonbank financial sector lags the depth and breadth of the banking sector; even though the largest Spanish banks operate in insurance, mutual and pension funds and other service sectors. The potential benefits from larger nonbank financial sector and financial markets for Spain, stem from higher macro-financial resilience, and a reduction in overreliance on the banking sector. However, it would be important to monitor risks in the nonbank financial sector and financial markets, and their linkages with banks, to identify, calibrate and implement any prudential measures, both micro and macro, if needed. Increased cooperation, coordination and exchange of information between supervisors could further enhance financial stability.

88. During the crisis both banks and nonbank financial intermediaries deleveraged simultaneously affecting investment and growth. The lack of depth and breadth in the Spanish nonbank financial sector (Figure 40), in part due to Spanish households' savings directed toward housing and deposits, played a role in the reduction of financing to the economy (Figure 40), during the crisis that hit the banking sector in 2012–13. Even though, the largest Spanish banks operate in insurance, mutual and pension funds and other service sectors, insurance premiums are small, and pension and mutual funds' assets under management are limited. Deeper capital markets and a larger and more sophisticated insurance, pension and mutual funds industry, with different business models and time horizons than banks, could provide an alternative to bank financing when banks are unable to provide credit to the economy. The limited domestic institutional investor base, meant that during the crisis banks were constrained in selling equity stakes to domestic investors to replenish their capital, and relatively small markets in fixed income, outside securitization, meant that banks and corporates had to resort to foreign investors for capital and financing, in competition with the sovereign.

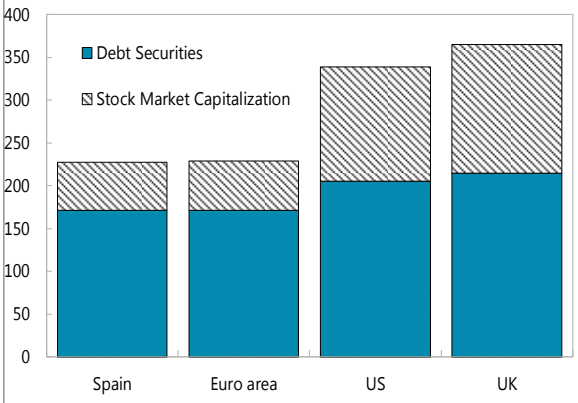
89. As the Spanish economy recovers, global, EU and local regulations, and the legacy of the crisis could limit banks' growth, push activities to capital markets and shadow banks, making monitoring risks vital. The potential benefits from a larger nonbank financial sector and financial markets for Spain, stem from higher macro-financial resilience, and a reduction in overreliance on the banking sector (Figure 40). A strong nonbank financial sector and deeper financial markets could be an important element of Spain's increased macro-financial resilience. However, it would be important to monitor risks, especially of interconnectedness, in the nonbank financial sector and its linkages with banks, to identify, calibrate and implement any prudential measures, both micro and macro, if needed. Increased cooperation, coordination and exchange of information between supervisors could further enhance financial stability.

90. The size of Spain's capital markets is around 200 percent of GDP (2016), slightly below the euro area average, but significantly smaller than other large developed countries. The private and public sectors raise capital, borrow and hedge exposures in capital markets that include equity, bond, derivatives and securitization. However, the size of the stock market at around 58 percent of GDP in 2015 was lower than US, Canadian or Japanese ratios but it is in line with Germany. The Spanish equity market has high degree of concentration in terms of companies' capitalization and trading and eight companies[35] account for more than 57 percent of total market capitalization and total trading.[36] Given the size of the large Spanish multinational corporations and banks, and that foreign investors have stakes of around 40 percent of the total stock market capitalization, a larger domestic investor pool would contribute to diversifying the investor base, especially in times of financial stress. The sovereign debt market is by far the largest and most developed financial market, and the most important source of cross-sectoral linkages. Since the crisis, banks have been obtaining funding from ECB facilities, further reducing the size and liquidity of domestic fixed income markets, which could have repercussions if banks need to increase their borrowing volumes.

Figure 30. Capital Markets are Small

Capital Markets Size (2013)

(percent of GDP)



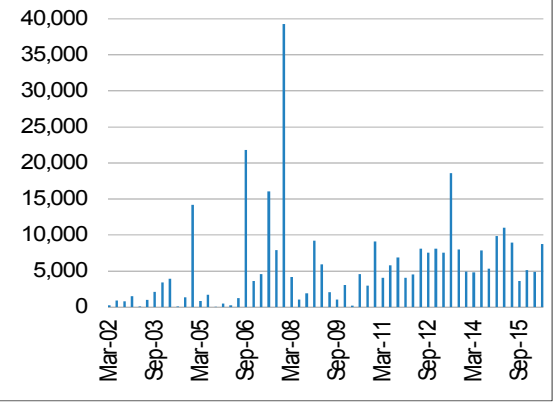
Sources: GFSR (2015)

Figure 31. Market Capitalization Comparison

	Market capitalisation[1]		Trading volume	
	2014	2015	2014	2015
USA[2]	151.2	139.7	161.3	167.2
Canada	123.5	124.8	79.6	86.2
China[3]	89.2	109.0	130.8	397.2
Japan[4]	107.4	118.2	118.9	134.5
London Stock Exchange[5]	96.1	84.4	64.7	57.2
Euronext[6]	81.8	87.7	43.5	54.5
Germany	50.9	51.9	39.4	46.6
Spain	59.3	58.0	77.3	85.6

Source: World Federation of Exchanges; Eurostat; Governments of the United States, Canada and Japan; Datastream and CNMV. (1) In local currency, the market capitalisation figures correspond to the last working session of the year. (2) The numerator is the combined total of the NYSE, Euronext US and Nasdaq. (3) Includes data from the Hong Kong, Shanghai and Shenzhen stock markets, as well as the GDP of the People's Republic of China and Hong Kong. (4) Includes data from the Tokyo and Osaka stock exchanges. (5) The London data as from 2010 includes data from the Borsa Italiana, integrated in the London SE Group, and the GDP of both countries. (6) The denominator is the sum of the nominal GDP of France, the Netherlands, Belgium and Portugal.

Figure 32. Equity Issuance (€million-CNMV)

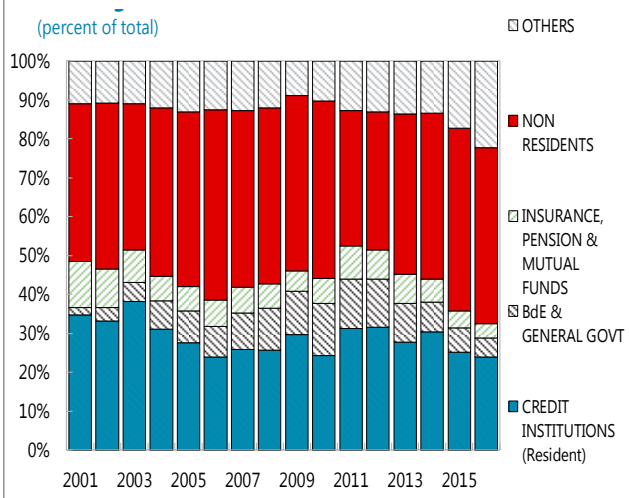


[35] Inditex, Banco Santander, Telefónica, BBVA, Iberdrola, Endesa, Caixabank and Gas Natural.

[36] CNMV (2016)

91. The sovereign debt market is by far the most developed financial market and the strong sovereign-bank linkages pose risks to financial stability since other domestic financing pools except banks, are relatively small. Banks hold around one quarter of the Spanish sovereign debt securities in 2016 but pension and mutual funds, and insurance companies also hold a significant amount of around 11 percent. Since other institutional investors are small compared to banks it increases the sovereign-bank linkages. While banks depend on mark-to-market and take a shorter view of asset holdings, other institutional investor with longer term horizons, such as insurance companies, can help to finance the public sector when banks are unable to do so. However, the total size of the insurance sector in Spain was around €300 billion (Figure 37), similar to the size of the mutual fund industry, while sovereign debt amounted to around €1.1 trillion. Therefore, the small size of the nonbank financial sector, increases the risk that the sovereign would have difficulties in financing its liabilities using domestic funds, if banks face significant problems. The correlation between the credit risks of the banks and the sovereign became obvious during 2012-3 (Figure 34). As government bond yields rose, bank funding costs increased with a subsequent negative impact on profitability, limiting the banks' ability to retain profits and increase capital, since they were unable to pass on the costs to their customers.

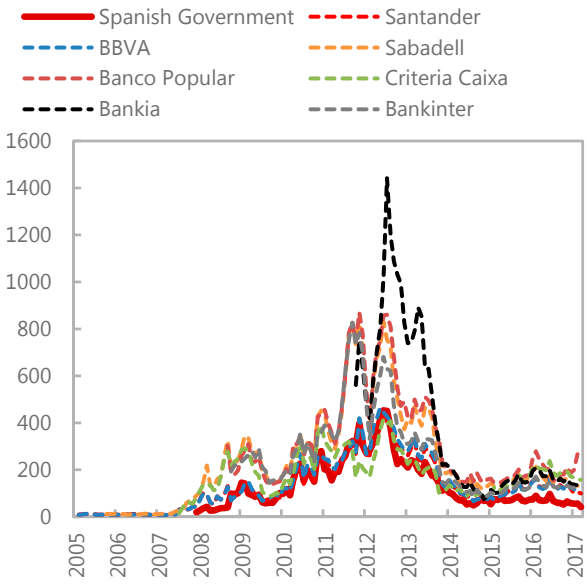
Figure 33. Sovereign Debt Market Dominates



Sources: Spanish Secretariat of the Treasury, IMF calculations

Figure 34. Sovereign debt market and financial sector

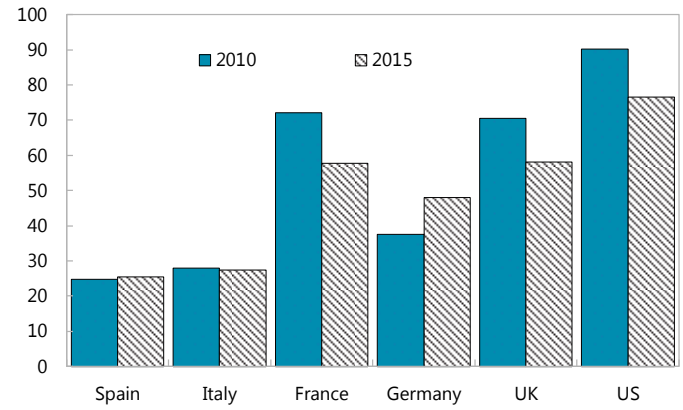
Spanish Bank 5 Yr CDS Spreads vs. Government 5 Yr CDS Spread
(in basis points)



Source: Bloomberg, Datastream

92. The size of shadow banking in Spain[37] is small compared to some other large euro area countries, the United Kingdom and the United States, but including securitization consolidated in banks' balance sheets the size of shadow banking is larger. The relatively small size of shadow banking is largely due to the limited AUM of mutual funds and because securitization in Spain is based on the originate-to-hold model.[38] Spanish banks (originators) retain the underlying securitized assets and are responsible for the management of the underlying portfolio, which usually offers higher credit ratings. Securitization in Spain has been used as a funding mechanism for credit institutions rather than a risk transfer instrument, which means that market depth remains limited since institutional investors have limited participation in risk sharing. The securitization market has been picking up recently, as banks used the ECB's program for ABS and covered bond purchases to obtain longer term funding.[39]

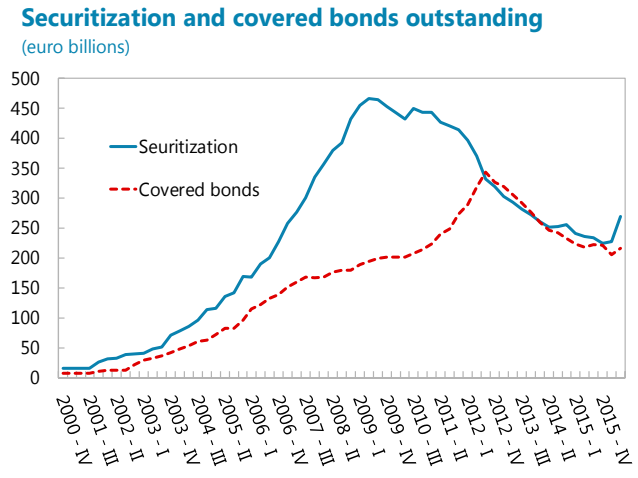
Figure 35. Shadow Banking is Small (FSB Definition)



Sources: FSB - Shadow Banking Monitoring Report (2016), WEO April 2017

93. The size of outstanding securitization assets and covered bonds has decreased significantly since the crisis but it is still used as a funding mechanism for banks. Securitization and covered bonds are held on banks' balance sheets and are not used to diversify credit risks to investors, which also limits the depth and breadth of the markets. However, if the model changed to originate-to-distribute, risks could transmitted from banks to investors, and investors unable to absorb price declines in these assets could increase contagion, as it happened during the global financial crisis. Close monitoring of the risks posed by securitization and covered bonds is warranted.

Figure 36. Securitization and Covered Bonds



Sources: CNMV

[37] FSB definition on the economic function-based shadow banking measure.

[38] Securitized assets are consolidated into banks' balance sheets in the originate-to-hold model.

[39] Proceedings of the Sixth IFC Conference on "Statistical issues and activities in a changing environment", Basel, 28-29 August 2012, 2013, vol. 36, pp 89-98 from Bank for International Settlements.

94. The insurance sector in Spain is well developed and mature but its size is small. It is the sixth largest in Europe, while Spain is the fourth largest economy, with gross premium income of €55.3 billion in 2015. There is a substantial room for market development since insurance density (premium per capita) is US$1,322 and insurance penetration rate (premium as percentage of GDP) is 5.6 percent, compared to the average of US$1,634 and 6.9 percent, respectively, for the whole of Europe (see also Figure 40).[40,41] Banks are the main sellers of life insurance, and the reinsurance market in Spain is relatively modest in size, hence risks are concentrated in banking groups. The investment of insurance assets is predominantly in fixed income instruments, while direct exposure to real estate is low. Holdings in government securities (largely Spanish) are around 44 percent of invested assets (up from 23 percent in 2010), while corporate securities are around 21 percent of invested assets (down from 32 percent in 2010). Forty-six percent of the corporate securities held by composite insurers were issued by banks and the comparable ratio for life and non-life insurers was about 30 percent. Due to their limited size, insurance companies are unable to be a large alternative financing source to bank financing (Figure 40).

95. The role and size of private pension funds is smaller in Spain than in some other jurisdictions. As most plans are Defined Contribution plans, there is limited risk of plan insolvency due to benefit guarantees. It is the individual plan members who bear the risk that the funds accumulated on their behalf will be sufficient to provide for their retirement income expectations as well as their future longevity (to the extent that guaranteed payout annuities do not provide complete longevity protection). Both banks and insurers are active in managing the funds in the pension sector. Debt and other fixed income securities are the main asset classes in which pension funds invest. Pension funds invest 57 per cent in debt securities, of which 27 per cent is Spanish sovereign debt. Due to their limited size, private pension funds are unable to be a large alternative financing source to bank financing. Research by the IMF (Figure 40)[42] shows that Spain lags other large euro area countries in financial institution depth.

96. The DGSFP and relevant government authorities should consider the potential benefits for Spain of encouraging an increased rate of private savings directed toward the insurance and pension sectors. An observation of this FSAP, both from the research data for this mission and views received from members of the insurance and pension community (see TN on insurance), is that the rate of saving in Spain through insurance and private pension is lower when compared to other EU countries. A strong insurance and private pensions market is an important element of Spain's social safety net and the potential benefits from a larger insurance and pension fund sectors, stem from higher macro-financial resilience, and a reduction in overreliance on the banking sector.

[40] Swiss Re: World Insurance in 2015, Sigma No. 3/2016.

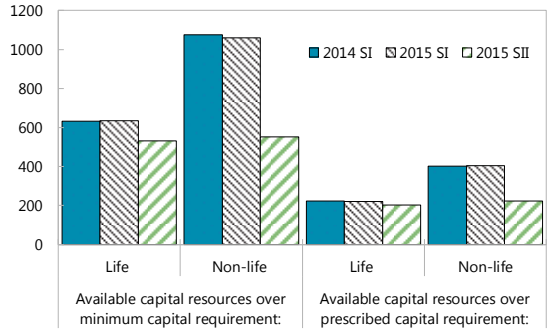
[41] See Spain FSAP, TN on Insurance (2017).

[42] Svirydzenka (2016).

Figure 37. Insurance Sector: Financial Soundness Indicators

Under Solvency I, life and non-life insurers show on average solvency margins of around 200 and 350 percent over requirements, respectively

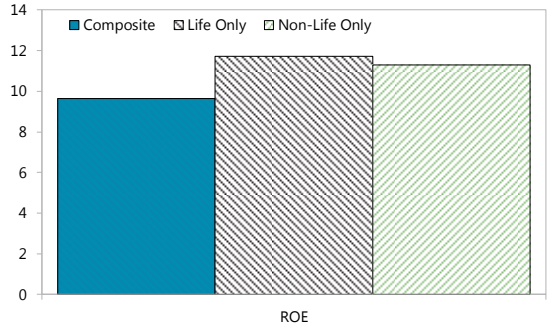
Insurer Solvency Position
(euro million)



Sources: DGSFP

Despite the stagnation of premium income, insurers remain profitable

Profitability of insurers (2015)
(percent)



Sources: DGFSP

Insurers invest conservatively and are thus exposed to little credit risk

Investments of Insurance Assets

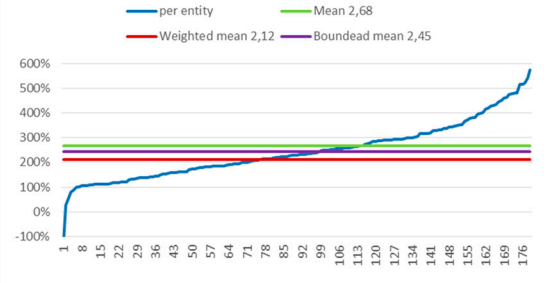
	Life		Non-Life		Composite	
As at end of 2015	€ bn	*% Total*	€ bn	*% Total*	€ bn	*% Total*
Intangible assets	0.22	*0.8*	1.62	*6.3*	1.69	*0.7*
Investments:						
Government securities	13.03	*44.9*	4.69	*18.3*	113.6	*46.8*
Corporate securities	6.78	*23.3*	3.44	*13.4*	51.69	*21.3*
Equities	1.35	*4.6*	4.36	*17*	17.9	*7.4*
Real estate and related	0.17	*0.6*	0.55	*2.1*	3.82	*1.6*
Investments supporting unit-linked	3.01	*10.4*	n.a.	*n.a.*	11.37	*4.7*
Receivables	0.28	*1*	2.31	*9*	5.04	*2.1*
Intra-group/related company receivables	0.09	*0.3*	0.63	*2.5*	5.77	*2.4*
Reinsurance recoverables	0.18	*0.6*	3.26	*12.7*	2.78	*1.1*
Cash	0.94	*3.2*	1.79	*7*	20.03	*8.2*
Other assets	3	*10.3*	3.02	*11.8*	9.11	*3.7*
Total assets	29.05	*100*	25.67	*100*	242.8	*100*

Sources: DGSFP

Sources: DGFSP and IMF staff calculations.

Adequate capitalization also holds at an individual level for all institution under Solvency IIs, except one entity that was liquidated.

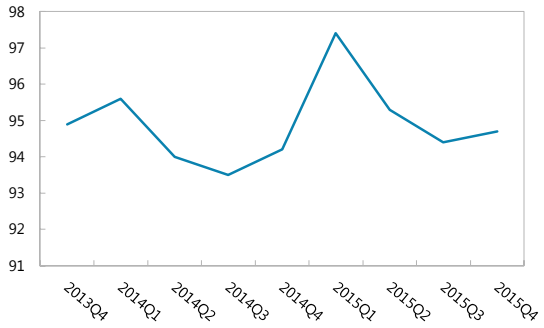
Solvency II SCR Coverage Ratios (2015)
(percent)



Sources: DGFSP

Solvency II's non-life combined ratio is healthy and at times even lower than in the EU (e.g. in 2015, the EU average ratio was 98)

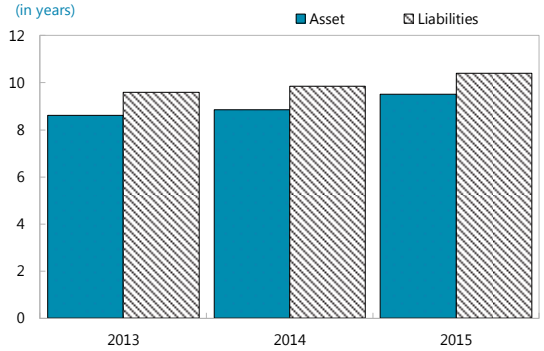
Nonlife insurers net combined ratio
(percent)



Sources: DGFSP

Interest rate risk is the main source of risk, due to interest rate guarantees and duration mismatches that create cash-flows mismatches

Duration matching (Life and Non-Life)
(in years)

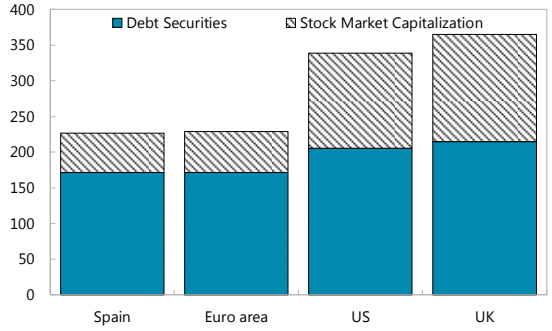


Sources: DGFSP

Figure 38. Financial Markets, Shadow Banking and Mutual Funds

Spanish capital markets size is comparable to euro area average but smaller than other developed countries….

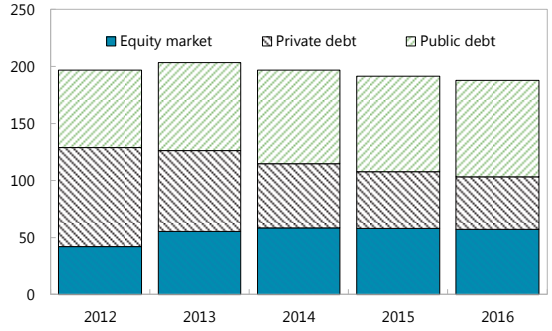
Size of capital markets (2013)
(percent of GDP)



Sources: IMF, GFSR (2015)

And the sovereign debt market dominates Spanish capital markets

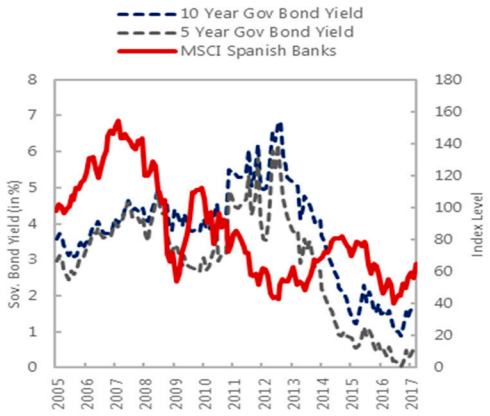
Capital markets size
(percent of GDP)



Sources: CNMV

The shadow banking sector is small….

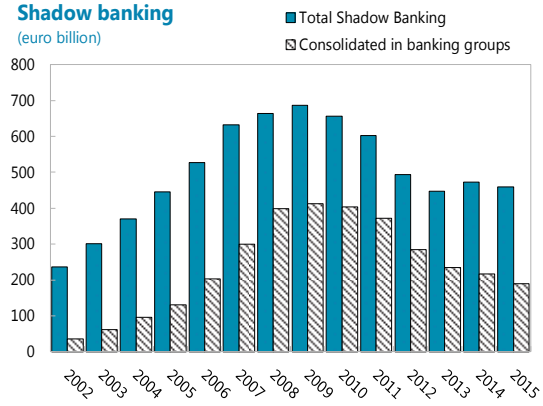
Spanish Government Bond Yields and Bank Equity Prices



Sources: Bloomberg, Datastream

But larger if the securitized assets consolidated in banks' balance sheets are included…

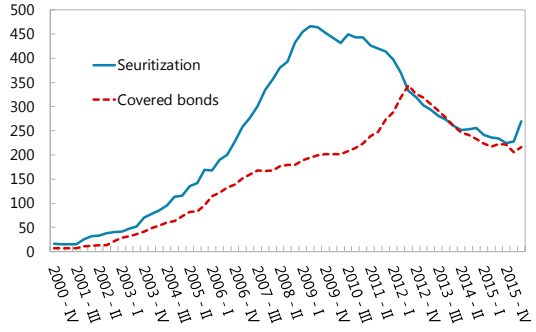
Shadow banking
(euro billion)



Sources: CNMV

Some life appeared in the securitization and covered bond markets

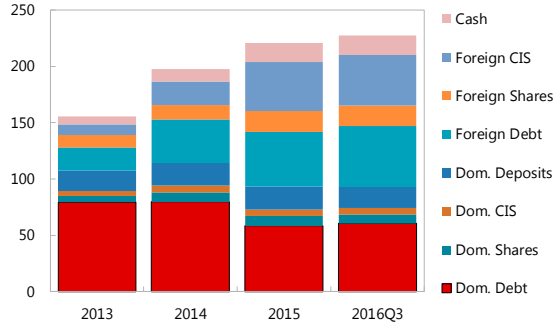
Securitization and covered bonds outstanding
(euro billions)



Sources: CNMV

But domestic mutual funds are not buying securitized assets and nonbank financing remains small…

Mutual funds asset allocation
(euro billion)



Sources: CNMV

Sources: CNMV, FSB and IMF staff calculations.

97. The biggest mutual fund companies are owned by banks but they are relatively small, to offer a large alternative financing source to bank financing. In recent years, Spain's large and medium-sized banks are expanding their asset management business and the three largest banking groups dominate the mutual fund industry in Spain. Fixed-income and mixed funds, SICAV (open-ended funds) and money market funds are the largest mutual funds in terms of AUM and are mostly managed by banks (Figure 41). Redemption risk materialized during the crisis and the size of the industry fell one half of the size from its peak. Recently, the more positive economic environment in Spain and low interest rates, led to expansion and more portfolio diversification with foreign securities accounting for more than 50 percent of mutual funds' AUM. Mutual fund investors changed their portfolio composition now owning fewer fixed income funds and more mixed funds (fixed income and equity) due to the low interest rate environment. However, due to their limited size, mutual funds are unable to be a large alternative financing source to bank financing (Figure 38).

98. Corporate bond markets are dominated by bank issuance, while large non-financial corporates are increasingly issuing debt abroad.[43] The corporate bond market is smaller than the sovereign bond market and the small size of the insurance and mutual fund sectors means that domestically focused firms largely depend on banks for financing, while large international firms increasingly borrow in foreign bond markets. Financial companies play a major role in domestic fixed-income markets with more than 90 percent of total issuance every year (CNMV, Table 4). Bank dominated, securitization issuance accounts for 33 percent (down from 50 percent) of total issuance, while covered bond issuance accounts for 39 percent (up from 24 percent). Due to the limited size of the domestic mutual and pension funds and the insurance sector, corporates cannot easily substitute bank financing with corporate bond issuance. Larger domestic mutual and pension funds and insurance sector could increase macro-financial resilience, and a reduce overreliance on the banking sector.

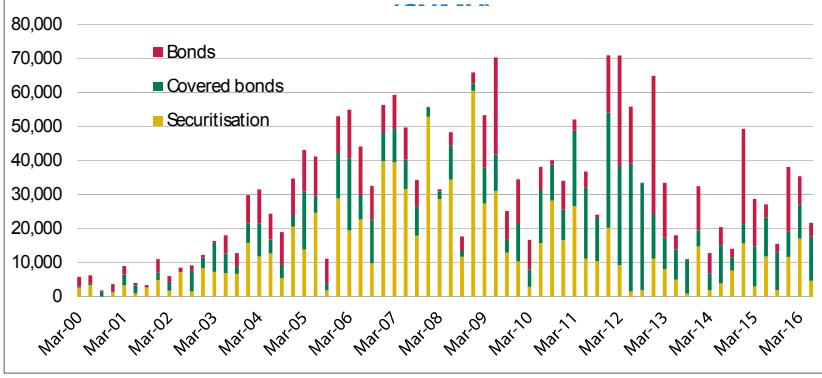
Table 4. Financial Firms Domestic Bond Issuance

Nominal amount in million euros

	Nominal amount issued		
Name of issuing company	Total	Short term[2]	Long-term
Sociedad de Gestión de Activos Procedentes de la Reestructuración Bancaria	27,032	0	27,032
Banco Bilbao Vizcaya Argentaria, S.A.	26,000	15,000	11,000
Banco de Sabadell, S.A.	18,761	6,000	12,761
Bankia, S.A.	17,534	15,000	2,534
Banco Popular Español, S.A.	8,575	5,000	3,575
Caixabank, S.A.	8,152	3,000	5,152
Bankinter, S.A.	7,991	4,000	3,991
Santander Consumer Finance, S.A.	5,000	5,000	0

Source: CNMV. (1) Issuers that registered issues exceeding 4 billion euros in 2015. (2) Nominal amount of shelf registrations.

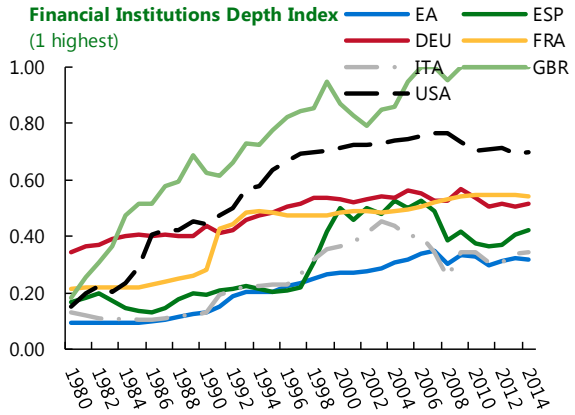
Figure 39. Long Term Fixed-Income Issuance by Asset Class



[43] Large corporates that can access international markets, prefer to issue abroad where their advisors and investors are active, and where bond markets are deeper and more liquid.

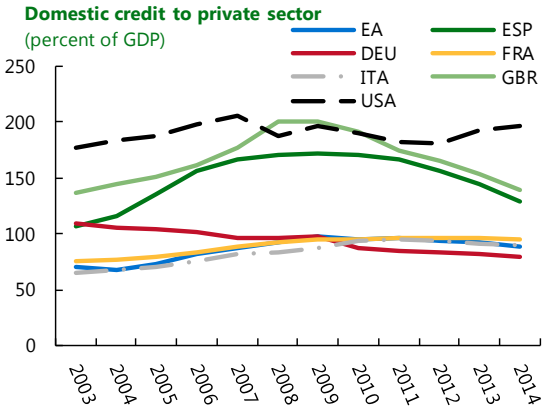
Figure 40. Financial Development Comparison

Spain now lags other large euro area countries in financial institution depth



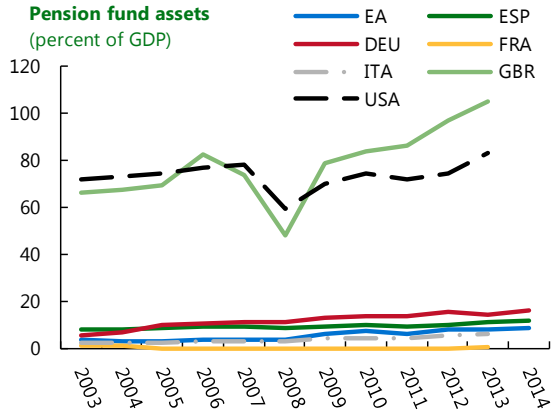
Sources: Svirydzenka (2016)

The lag of depth contributed to the decrease in domestic credit.



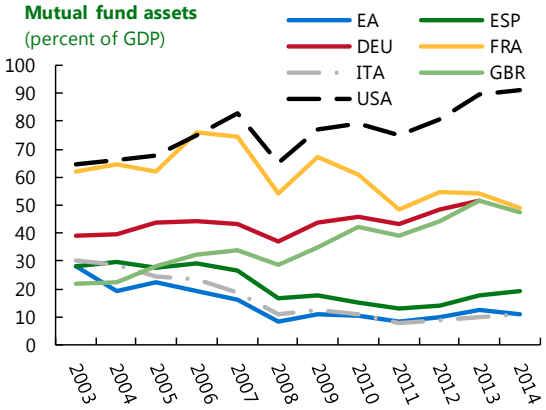
Sources: World Bank Finstats (2016)

The lag of depth is partly because the pension fund industry is small....



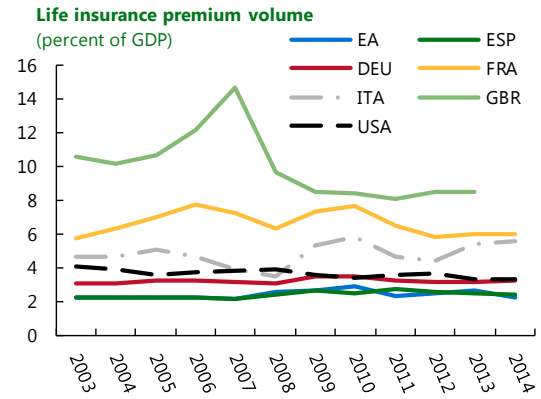
Sources: World Bank Finstats (2016)

Partly because mutual fund assets are limited



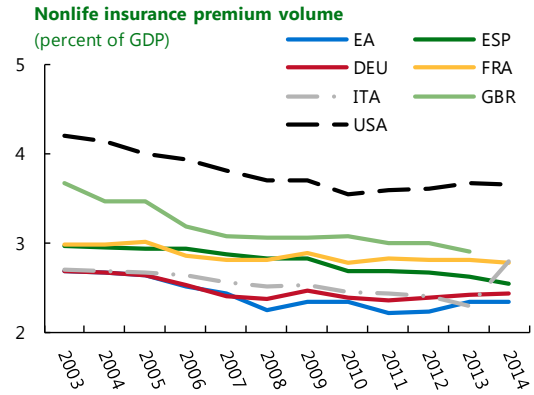
Sources: World Bank Finstats (2016)

Life-insurance premiums are small



Sources: World Bank Finstats (2016)

And non-life insurance premiums are also limited



Sources: World Bank Finstats (2016)

Sources: Finstats, Svirydzenka and IMF staff calculations.

99. Banks dominate the Spanish financial sector, whereas the nonbank financial sector, the Spanish capital markets and shadow banks, are much smaller, inducing an overreliance of the economy on banks for financing, while banks have limited substitutes to deposits for domestic private financing. The Spanish nonbank financial sector lags in depth and breadth compared to the banking sector; even though the largest Spanish banks operate in insurance, mutual (Figure 41) and pension funds and other service sectors. The potential benefits from a larger nonbank financial sector and financial markets for Spain, stem from higher macro-financial resilience, and a reduction in overreliance on the banking sector. Banks that now have limited substitutes to deposits for domestic private financing, could also benefit from diversified domestic private financing. A strong nonbank financial sector and deeper financial markets could be an important element of Spain's increased macro-financial resilience. However, it would be important to monitor risks, especially of interconnectedness, in the nonbank financial sector and linkages with banks, identify, calibrate and implement any prudential measures, both micro and macro, if needed, and increase cooperation, coordination and exchange of information between supervisors to ensure financial stability.

Figure 41. Mutual Fund AUM Managed by Banks as Percent of Total Assets (CNMV)

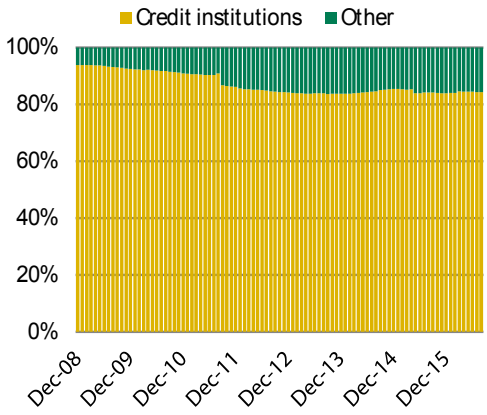
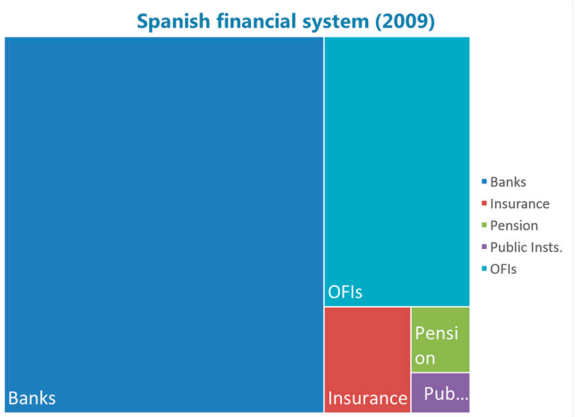
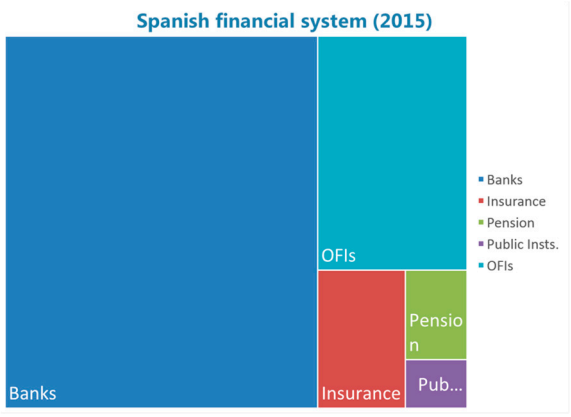


Figure 42. Spanish Banks, Nonbank Financial Intermediaries, Investment and Growth

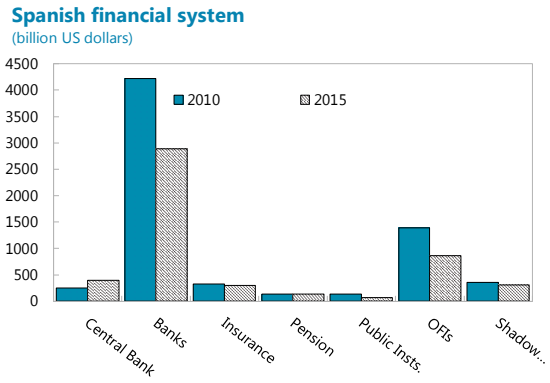
Banks dominated the financial system in 2009 …



And banks dominate the financial system in 2015.

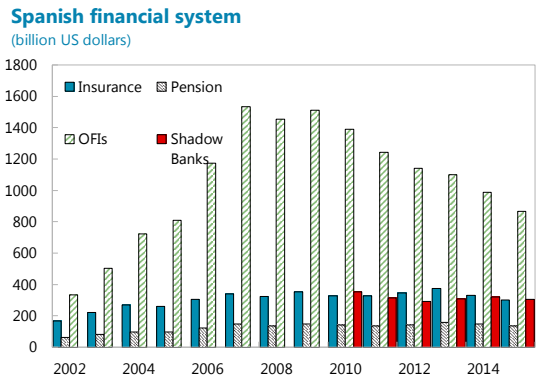


The banking crisis forced banks to deleverage…



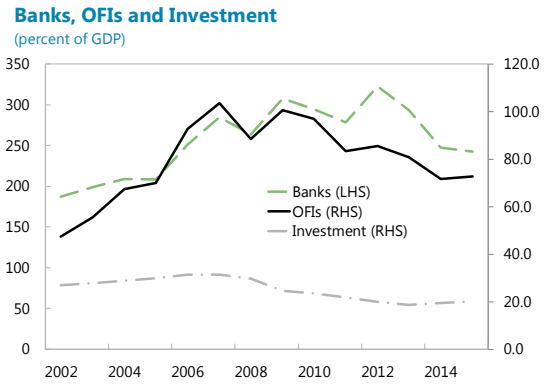
Sources: FSB - Shadow Banking Monitoring Report (2016)

But as banks deleveraged the nonbank financial sector did not expand to fill in the gap…



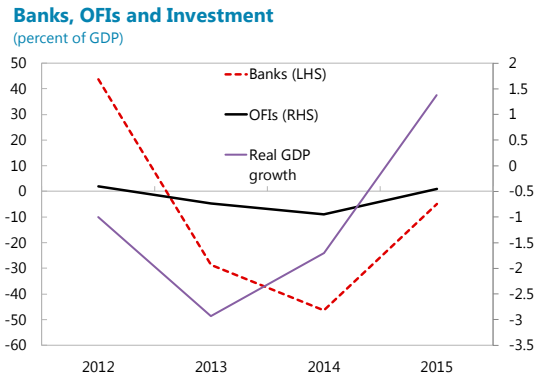
Sources: FSB - Shadow Banking Monitoring Report (2016)

Financial sector deleveraging decreased investment….



Sources: FSB - Shadow Banking Monitoring Report (2016), WEO April 2017

And deleveraging correlated with a decrease in GDP growth….



Sources: FSB - Shadow Banking Monitoring Report (2016), WEO April 2017

Sources: FSB, IMF WEO April 2017, and IMF staff calculations.