



IRELAND

FINANCIAL SECTOR ASSESSMENT PROGRAM

TECHNICAL NOTE ON FINANCIAL INTERCONNECTEDNESS OF THE MARKET-BASED FINANCE SECTOR

July 2022

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June 28, 2022

TECHNICAL NOTE

FINANCIAL INTERCONNECTEDNESS OF THE MARKET-BASED FINANCE SECTOR

Prepared By
**Monetary and Capital Markets
Department**

This Technical Note was prepared by IMF staff in the context of the Financial Sector Assessment Program (FSAP) in Ireland. It contains technical analysis and detailed information underpinning the FSAP's findings and recommendations. Further information on the FSAP can be found at <http://www.imf.org/external/np/fsap/fssa.aspx>

CONTENTS

Glossary	4
EXECUTIVE SUMMARY	5
MARKET-BASED FINANCE IN IRELAND—AN OVERVIEW	8
A. Overview	8
B. Scope of the Technical Note	11
FINANCIAL INTERCONNECTEDNESS FROM A NETWORK APPROACH	12
A. Introduction	12
B. A Bird’s Eye View of the Irish Financial Network	13
C. Key Interlinkages in the Irish Financial Network	16
D. The Evolution of Domestic Interlinkages	24
INVESTMENT AND MONEY MARKET FUND BALANCE SHEET EXPOSURES	28
A. Introduction	28
B. Stability Metrics and Domestic Linkages of Funds	29
C. Fund Balance Sheet Exposures to Banks, the Real Sector, and OFIs	32
D. Fund Exposures to Commercial Real Estate	36
FIGURES	
1. A Comparison of Fund Assets by Country	8
2. The Irish-Domiciled Market-Based Finance Sector	9
3. Composition and Change Over Time of the Irish Financial Sector	10
4. Linkages between Funds, Other Non-Banks, Banks, and the Real Sector in Ireland	14
5. Cross-Sectoral Assets and Liabilities	15
6. Evolution of Domestic Claims and Liabilities vis-à-vis Irish Funds	16
7. Network Assets as Share of Total Assets and Network Instrument Composition	17
8. Adjacency Matrices of Total Network Exposures in 2020Q4	18
9. Layer-by-Layer Financial Networks in 2020Q4	21
10. The Evolution of the Domestic Loans Network	26
11. The Evolution of the Domestic Debt Security Networks	27
12. Composition of Irish Fund Assets by Investment Strategy	29
13. Irish Fund Liquidity and Leverage Metrics	30
14. Domestic and Cross-Border Exposures of Irish Funds	31
15. Sectoral Composition of Irish Funds Claims on Irish-Domiciled Entities	32
16. Irish Funds Exposures to Banks by Type of Fund	33
17. Irish Funds Exposures to the Real Sector by Type of Fund	34

18. Irish Funds Exposures to Other Financial Institutions by Type of Fund _____	35
19. Change Over Time in Irish Funds Exposures to Banks and the Real Sector _____	36
20. CRE Security and Property Assets of Irish Funds _____	37
21. Trend of Real Estate Fund Assets _____	37
22. Commercial Real Estate Holdings and Financing of Property Funds _____	38
23. Irish Funds and Banks Exposures to Irish Commercial Real Estate _____	39

TABLE

1. Main Recommendations on Interconnectedness of Market-Based Finance _____	7
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APPENDICES

I. Definitions of the Network and Balance Sheet Sectors _____	40
II. Mapping Between the Network and Balance Sheet Datasets _____	42
III. Properties of Nodes in the Financial Network _____	43
IV. Financial Network Connections in 2015 and 2020 _____	45
V. Relative Claims and Obligations Matrices in 2020 _____	47
VI. Trends in Irish Funds by Legal Classification _____	52
VII. Instrument Composition of Irish Funds Balance Sheets _____	53

Glossary

AIF	Alternative Investment Fund
AUM	Assets Under Management
BIS	Bank for International Settlements
CBI	Central Bank of Ireland
CC	Central Counterparties
CRE	Commercial Real Estate
CSO	Central Statistics Office
DTC	Deposit Taking Corporations
FAU	Financial Auxiliaries
FSAP	Financial Stability Assessment Program
FSB	Financial Stability Board
FVC	Financial Vehicle Corporations
GDP	Gross Domestic Product
GOV	Government
HH	Households
IC	Insurance Corporations
IF	Investment Funds
IIFA	International Investment Fund Association
IMF	International Monetary Fund
MBF	Market-based Finance
MFI	Monetary Financial Institutions
MMF	Money Market Funds
NBFI	Non-Bank Financial Institutions
NFC	Non-Financial Corporations
OFI	Other Financial Institutions
PF	Pension Funds
REIT	Real Estate Investment Trust
ROW	Rest of the World
SME	Small and Medium Enterprises
SPE	Special Purpose Entity
SPV	Special Purpose Vehicles
TN	Technical Note
UCITS	Undertaking for the Collective Investment for Transferable Securities
WEO	World Economic Outlook

EXECUTIVE SUMMARY

This technical note¹ investigates the interconnectedness between the market-based finance (MBF) sector in Ireland and the rest of the financial system, with a view to assessing potential financial stability risks. The MBF sector, the largest component of the financial system, totals over 14 times GDP and is comprised of the funds sector—both money-market (170 percent of GDP) and investment funds (850 percent of GDP)—as well as other financial institutions (OFIs), which comprise of special purpose entities (SPEs, 240 percent of GDP) and a catch-all category entitled “OFI residual” (160 percent of GDP). Chapter I provides an overview of the potential financial stability risks associated with the MBF sector, with a focus on the funds sector, and places it in its domestic and global context. Chapter II maps out the interlinkages between the non-banks, banks, and the real sector using network analysis to assess the strength and direction of interconnectedness. Chapter III delves into the balance sheet exposures of major categories of Irish funds, the largest component of the MBF sector, to further assess channels of risk transmission. The analysis focuses on a network of complex inter-sectoral financial relationships, based on a range of lending and borrowing instruments, and several findings emerge.

Ireland has made good progress in implementing the recommendations from the 2016 FSAP, but some important data gaps remain to be closed. While many linkages between the domestic economy and the MBF sector have been analyzed, challenging data gaps and opaque linkages relating to the OFI residual should continue to be explored through ongoing cooperation at a domestic and international level. The Central Bank of Ireland (CBI) has made significant strides in the collection, monitoring, and analysis of data on MBF and improved its regulation of funds. CBI has also made progress on closing data gaps as recommended by the previous FSAP, including improving visibility on the underlying investor base in funds, reducing the size of the OFI residual, collecting information on the business models of SPEs, and researching on the use of leverage in funds. However, the CBI’s fund stress-testing model remains under development and there remain some gaps in terms of granular data collection and analysis of the interconnectedness and composition of the significant activity of the remaining OFI residual.

There are four main findings based on the analysis:

- **First, Irish funds have limited links to domestic banks and households.** Bank asset claims on Irish funds are negligible, while bank liabilities to funds are comprised mostly of deposits corresponding to around 4 percent of GDP. Households do not have liabilities to the funds, and their claims on funds, which comprise of their holdings of fund shares, stand at less than 1 percent of GDP. As such, these linkages appear to pose relatively lower risk.
- **Second, in contrast, Irish funds have significant interlinkages with OFIs resident in Ireland, as part of Ireland’s large, internationally-oriented financial sector.** The OFI sector consists of SPEs and the OFI residual, which includes entities that engage in non-bank financial intermediation. The financial linkages of Irish funds with OFIs are sizeable, with fund asset claims and liabilities to the total OFI sector close to 30 and 50 percent of GDP respectively. While there has been good progress in understanding the links between funds and SPEs, the nature,

¹ This Technical Note was authored by Tara Iyer, Monetary and Capital Markets Department, in the context of the 2022 Ireland Financial Sector Assessment Program.

IRELAND

business rationale, and riskiness of many fund exposures to entities in the OFI residual sector are not fully transparent.

- **Third, OFIs – while largely internationally focused – also have significant linkages to the domestic economy.** OFI financial assets and liabilities are sizeable, at 250 and 270 percent of GDP², respectively. Most of these transactions relate to internationally focused activities, but entities within the OFI sector also have meaningful linkages with domestic banks, households, and firms. OFIs hold deposits in domestic banks totaling 12 percent of GDP (about 7 percent of total bank deposits) and SPE loans to Irish households total 12 percent of GDP, or more than 30 percent of the household loan stock. SPE loans to Irish NFCs total about 15 percent of GDP, or about 10 percent of the NFC loan stock.³ A subset of those SPEs engage in new lending to the economy. Depending on their funding model, SPEs that engage in new lending to the local economy could potentially amplify financial cycles in Ireland and make the economy more vulnerable to global financial shocks. Beyond SPEs, granular balance sheet risk metrics for entities in the OFI residual sector do not currently exist.
- **Fourth, funds and banks have common exposures to the domestic commercial real estate (CRE) sector, which represents a potential channel of contagion.** The CBI has conducted in-depth analysis of these links, supplementing supervisory data with a deep-dive survey of property fund activity. It has also consulted on macroprudential measures to guard against potential financial stability risks from the property fund sector. This reflects the fact that property funds hold a material share of the outstanding stock of commercial real estate, and so represent a key direct channel of interlinkages between the broader funds sector and the real economy. Data on the extent of cross-border and non-bank lending to the CRE sector could be improved. Given the common exposures of multiple financial sub-sectors, shocks to the CRE market could pose risks to the financial system and lead to adverse feedback to the domestic economy through a contagion channel.

The analysis suggests that, notwithstanding progress, work remains to be done to elucidate fully the linkages between parts of the MBF sector and the rest of the financial system, and to the domestic economy, to explore further areas of potential systemic risk. A key area of risk lies in the opacity and lack of granular data on financial transactions of entities in the OFI residual sector. Based on the analysis, the FSAP makes eight recommendations for the authorities.

² Non-financial assets and liabilities of OFIs amount to an additional 130 and 150 percent of GDP, respectively.

³ However, the impact of this lending on the domestic economy remains an open question, given the large footprint of multi-national firms in Ireland and the preponderance of their operations being outside the country.

Table 1. Ireland: Main Recommendations on Interconnectedness of Market-Based Finance

#	Recommendations	Addressee	Timing*	Priority**
1.	Disaggregate the OFI residual into foreign controlled versus indigenous entities to better understand linkages to the domestic economy. (¶22)	CBI, CSO	MT	M
2.	Deepen understanding of the risks and vulnerabilities associated with loans between SPEs and NFCs and from SPEs to SMEs and households. (¶30)	CBI, CSO	ST	H
3.	Intensify the collaboration between the CBI, the CSO, and international regulators on the nature of the OFI residual linkages to the domestic economy. (¶33)	CBI, CSO	MT	M
4.	Conduct risk analysis of the OFI residual at a granular balance sheet level. (¶34)	CBI, CSO	MT	M
5.	Conduct more deep-dives to further enhance the monitoring of risks of sub-segments of the funds sector. (¶50)	CBI	ST	H
6.	Conduct further in-depth analyses of the indirect linkages of the funds sector to the domestic economy, with a focus on funds' claims on the SPEs and OFI residual sectors. (¶63)	CBI	ST	H
7.	Ensure sufficient resources at the CBI MBF unit to allow it to monitor developments and conduct the analyses recommended in this technical note. (¶64)	CBI	MT	M
8.	Reduce the remaining data gaps in the non-bank lending and cross-border financing to the CRE sector. (¶72)	CBI	MT	M

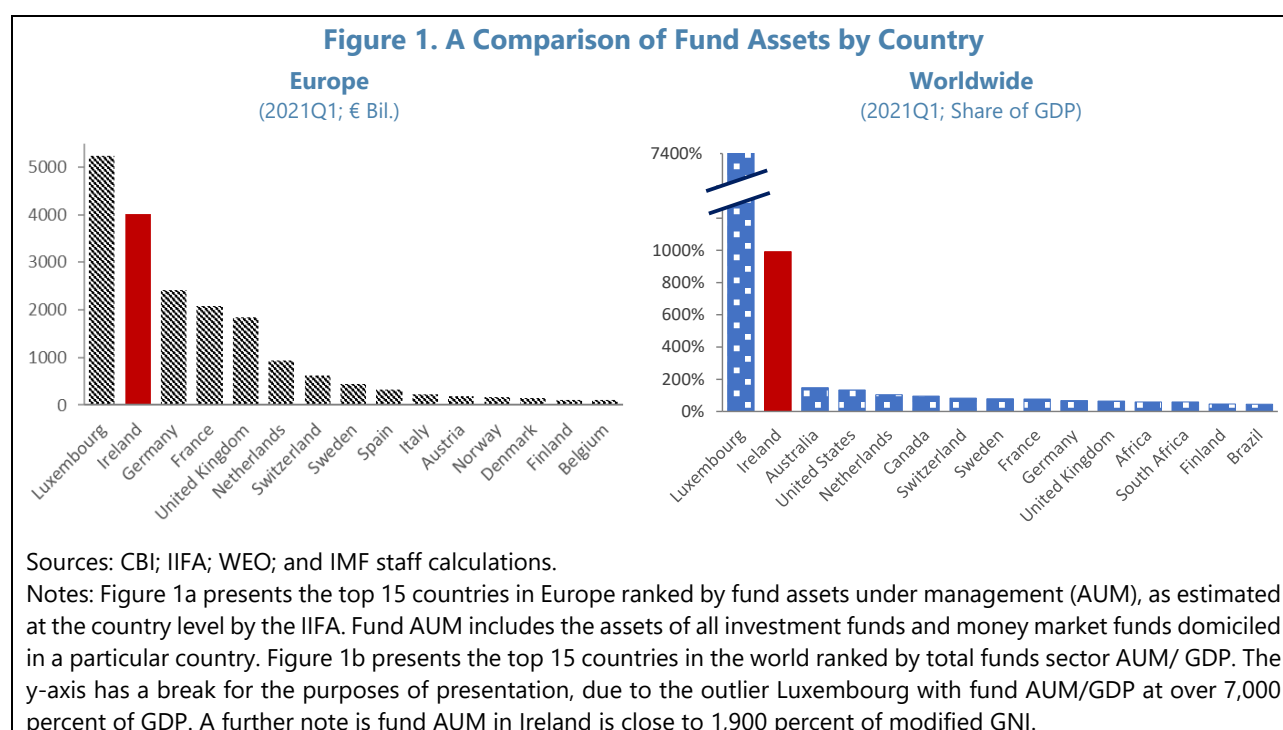
* C = Continuous; I = Immediate (within one year); ST = Short Term (within 1-3 years); MT = Medium Term (within 3-5 years).

** H = High; M = Medium; L = Low.

MARKET-BASED FINANCE IN IRELAND—AN OVERVIEW

A. Overview

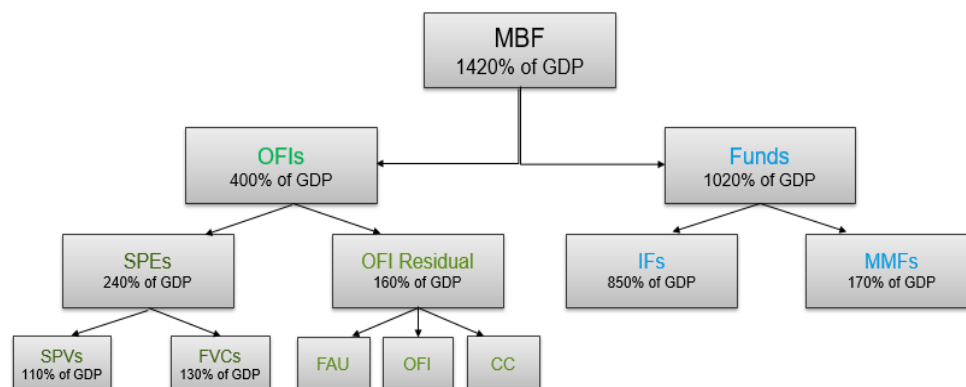
1. Ireland is among the top domiciles in the world for MBF institutions, which comprise of money market funds (MMFs), investment funds (IFs), and OFIs, with the total assets of the funds sector alone corresponding to about ten times GDP (Figure 1).^{4,5} Ireland is a domicile of choice for the MBF sector due to factors including its high degree of local expertise in the financial industry, transparent and efficient regulatory practices, and favorable tax and legal regimes conducive to non-bank financial operations.⁶ Although Ireland accounts for under 0.4 percent of global GDP, the fast-growing Irish funds sector has become the third largest funds sector in the world, after the United States and Luxembourg. While much of the Irish funds sector activities are overseas, even minor linkages to the domestic economy could have important financial stability implications given the size of the funds sector relative to the domestic economy. The structure of the MBF sector, the largest component of the domestic financial system with total assets at over 14 times Irish GDP, are shown in Figure 2.



⁴ While money market funds (MMFs) are a specific type of investment fund, this note makes a distinction between MMFs and non-MMF investment funds, a convention also followed by countries in the Euro Area. Non-MMF investment funds as referred to as “investment funds (IFs)” for simplicity. Accordingly, the term “Irish funds sector” in this technical note comprises of all investment funds (IFs) and money market funds (MMFs) domiciled in Ireland.

⁵ The other financial institutions (OFIs) group comprise of (1) special purpose entities (SPEs) – which include financial vehicle corporations (FVCs) and special purpose vehicles (SPVs) – and (2) the OFI residual, which comprises of financial auxiliaries, other financial intermediaries, and central counterparties.

⁶ Ireland has a 12.5 percent corporate tax rate as of January 2022, no taxes on the income and gains of funds and income and gains of foreign investors in funds that do not invest in Irish property, and double taxation treaties with over 70 countries. Since Ireland is also a European Union (EU) member state, Irish-domiciled funds benefit from an EU-wide passport. Regulation of the MBF sector has been evaluated in a separate technical note.

Figure 2. The Irish-Domiciled Market-Based Finance Sector

Sources: CBI; and IMF staff calculations.

Notes: Numbers represent balance sheet assets/GDP as of 2020Q4. MBF – marker-based finance sector, IFs – investment funds, MMFs – money-market funds, OFIs – other financial institutions, SPEs – special purpose entities, SPVs – special purpose vehicles, FVCs – financial vehicle corporations, FAU – financial auxiliaries, OFI – other financial intermediaries, CC – central counterparties. Data is not available on the split of assets among the sub-components of the OFI residual.

2. The Irish funds sector has been the leading driver of growth in the overall financial system.

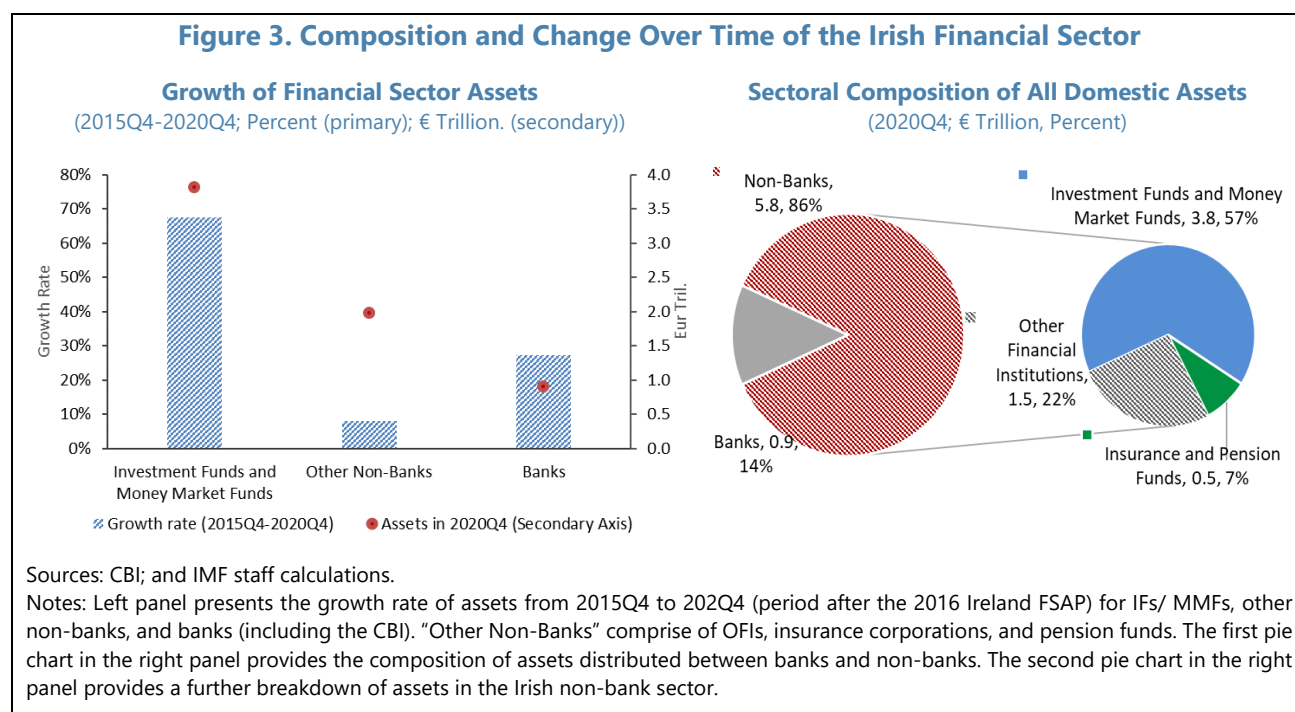
The size of the Irish funds sector by assets under management (AUM) amounted to around €3.8 trillion in 2020Q4, an increase of around 35 percent compared to just three years earlier, and close to 70 percent compared to 2015Q4. While partly reflective of new flows in the sector, the CBI has assessed that an increase in asset valuations has been a key contributing factor to the headline growth of total AUMs of the fund sector. In comparison, assets in the other parts of the non-bank sector and banking sector grew by 8 and 27 percent respectively since 2015Q4 (Figure 3).⁷ In 2020Q4, bank assets accounted for just 14 percent of financial sector assets in Ireland, while the remaining 86 percent were held by non-banks. The assets of the Irish funds sector (IF/MMF) accounted for over 65 percent of non-bank assets. The size and accelerating growth rate of the Irish funds sector since the 2016 FSAP, which took an initial stock of risks associated with the funds industry, motivates this further analysis.

3. The non-bank sector, led by the funds, accounts for a significantly larger share of the financial sector in Ireland compared to many other countries.

There has been a general global trend of non-banks increasing in significance over the years, with non-bank assets reaching 49.5 percent of global financial assets in end-2019 (FSB, 2020).⁸ The relative growth of non-bank assets in Ireland has surpassed the global trend (Figure 3). Furthermore, banks are the largest sector of the financial system in 22 out of the 29 largest advanced and emerging market economies (FSB, 2020), but are the smallest segment in Ireland. To a large extent, this reflects the fact that Ireland has become a leading hub for the funds industry globally. The dominant non-bank presence in Ireland underscores the need to continue to deepen understanding the systemic risks associated with its links to the domestic economy.

⁷ This technical note considers “other non-banks” as comprising of insurance companies (IC), pension funds (PF), and other financial institutions (OFI).

⁸ <https://www.fsb.org/2020/12/global-monitoring-report-on-non-bank-financial-intermediation-2020/>

Figure 3. Composition and Change Over Time of the Irish Financial Sector

4. The funds sector is distinguished by a number of unique characteristics that may affect financial stability. First, IFs and MMFs are fiduciary agents for their clients, implying that gains and losses of fund portfolios are borne primarily by the investors. Second, the tendency of fund managers to "herd," or base their investing decisions on the trades of other fund managers, can lead to greater ownership concentration in certain asset classes, increasing fire sale risks for those assets. Third, although open-ended funds offer daily liquidity to investors, they may hold illiquid assets and they do not have access to public backstops such as deposit insurance or discount window access. Fourth, the sheer size and growth of the funds industry also leads to concerns about spillover risks, with the growth of funds over the past decade – at a global level – having been buoyed by relatively lighter regulation compared to that for banks after the global financial crisis (GFC). Finally, the extended period of very low interest rates has led to a search-for-yield by investors, which can result in higher risk taking.

5. OFIs can also pose risks to financial stability in certain circumstances. OFIs in Ireland comprise of SPEs and the OFI residual, with assets at around 240 percent and 160 percent of GDP, respectively. SPEs are subsidiaries created by a parent company and are used for a multitude of purposes including to legally transfer risk away from the parent company, optimize taxes, and manage credit and liquidity risk. However, SPEs can be opaque, fail due to poor risk management, and engender poor asset quality and credit risk in domestic capital markets (BIS, 2009).⁹ The OFI residual includes entities that engage in non-bank financial intermediation. While non-bank financial intermediation has benefits including increased risk sharing and a more diversified funding pool for economic activity, it can pose risks to financial stability depending on factors such as whether their portfolios are associated with excessive leverage, liquidity mismatches, and maturity mismatches within the non-bank entity. In

⁹ <https://www.bis.org/publ/joint23.pdf>

the Euro Area, there has been an increase in leverage and riskiness of OFI asset portfolios in recent years (NBFI Monitor, 2020).¹⁰

6. Analyzing the interconnectedness of funds and other MBF institutions with other financial institutions and the real sector is an important first step in assessing potential systemic risks. In general, the stronger the interconnectedness is of a particular financial sector with the real sector and other parts of the financial system, the greater is the potential for contagion to arise were the entity to face adverse shocks. Significant linkages of the MBF sector through the credit and funding channels can be of concern for the entire financial system.

B. Scope of the Technical Note

7. This technical note provides an empirical investigation of the interconnectedness of the MBF sector, with a particular focus on funds. While IFs and MMFs have become increasingly important players in the global financial landscape over the past decade, previous data gaps and methodological challenges have resulted in incomplete empirical evidence on the interconnectedness and channels of contagion associated with the funds industry globally, including in Ireland (IMF, 2021).¹¹

8. Chapters 2 and 3 of this note analyze confidential direct exposure data through complementary network and balance sheet approaches to assess potential channels of contagion. Chapter 2 discusses interconnectedness through a full system-wide *network approach* that allows for an integrated assessment of the financial interlinkages between investment funds, other non-banks, banks, and the non-financial sectors (households, government, and the corporate sector). Given the outsize importance of the funds sector in the Irish financial system, Chapter 3 provides a deeper dive into the exposures of the different categories of Irish funds through a *balance sheet approach*.

9. There are two key differences between the datasets used in the network and balance sheet chapters. First, the network chapter uses a new confidential network dataset that was prepared for the FSAP and is a more detailed version of the statistical “who-to-whom detail” dataset on sectoral financial exposures reported publicly for all Euro Area countries.¹² The balance sheet chapter also uses a confidential dataset but, in contrast, covers only the funds sector, and full balance sheet exposures. The TN starts with an analysis of the network data as this provides a picture of direct and indirect financial linkages among all sectors of the Irish economy. The second difference is that the network chapter treats investment funds as one category and looks at the sectoral exposures of this sector as a whole, while the balance sheet chapter disaggregates the large IF sector into six major categories of fund types based on their different investment strategies. The balance sheet chapter thus builds on the aggregate picture of interlinkages for the entire fund sector developed in the network chapter, and analyzes domestic financial and non-financial linkages of the funds sector by type of fund.

¹⁰ https://www.esrb.europa.eu/pub/pdf/reports/nbfi_monitor/esrb.202010_eunon-bankfinancialintermediationriskmonitor2020~89c25e1973.en.pdf

¹¹ <https://www.imf.org/en/Publications/Departmental-Papers-Policy-Papers/Issues/2021/09/13/Investment-Funds-and-Financial-Stability-Policy-Considerations-464654>

¹² The financial exposures covered in the “who-to-whom detail” dataset are: (1) deposits, (2) short-term loans, (3) long-term loans, (4) short-term debt securities, (5) long-term debt securities, (6) listed shares, (7) fund shares. Certain balance sheet items such as derivatives and physical assets are excluded. For additional details on coverage, see Appendix 2.

FINANCIAL INTERCONNECTEDNESS FROM A NETWORK APPROACH

A. Introduction

10. Complex financial interlinkages necessitate a system-wide network perspective to assess financial stability. The system-wide view can produce relevant insights that go beyond the conclusions drawn from analyzing the financial system purely on a sector-by-sector basis. Mapping the interconnectedness between the bank, non-bank, and real sectors in Ireland leads to the creation of multi-layer financial networks, which can be used to assess potential channels of contagion and systemic risks based on direct exposures. In a multi-layer financial network, the layers correspond to various financial instrument types. A layer-by-layer analysis of the financial network allows for the mapping of the financial system distinguished by the *type* of financial exposures, such as credit versus equity, instead of analyzing the aggregate exposures between entities. The Irish network is characterized by multiple layers, each of which corresponds to an instrument type and a relevant horizon (e.g., short-term loans). Nodes in the network are sectors and edges are the financial exposures between sectors. The weights measure the value of exposures between pairs of nodes, and the direction of the arrows represents the issuance of a particular instrument type.

11. The FSAP team applied a multi-layer network approach to a new time series dataset compiled by the CBI on the direct bilateral exposures between Irish funds, other non-banks, banks, and the real sector. The starting point for the compilation of the final dataset used for the FSAP was the standard whom-to-whom dataset provided publicly by CBI, which is based on the European System of Accounts (ESA). The mission requested CBI to provide additional information to better understand the complex interlinkages of the MBF sector, by specifically disaggregating the “monetary and financial institutions” (MFI) sector into MMFs and banks. This allowed the mission to provide new insights by analyzing the intricate web of interlinkages of the entire MBF sector with other parts of the financial system, importantly including the direct financial connections between funds and domestic banks.¹³ The analysis was undertaken for the period 2015Q4 to 2020Q4.

12. The network analyses in Chapter II cover the financial instruments captured in the “who-to-whom detail” dataset for twelve sectors of the economy. The CBI has made significant strides in its data collection efforts, and the network dataset analyzed in this chapter was compiled over several months during the FSAP from various internal data sources. The twelve sectors in the network are (1) investment funds, (2) money market funds, (3) banks, (4) special purpose vehicles, (5) financial vehicle corporations, (6) other financial institutions residual, (7) pension funds, (8) insurance corporations, (9) households, (10) government, (11) non-financial corporations, and (12) rest of the world. On the non-bank segment of the financial system, the chapter makes a distinction between the funds sector

¹³ The publicly reported whom-to-whom dataset groups banks and money market funds into one category called monetary financial institutions (MFI), comprising of five different types of institutions: domestic MFI, foreign MFI, MFI residual, CBI, and MMFs. This level of aggregation, and in particular the grouping together of banks and MMFs, precludes an analysis of the domestic network connections of MMFs on an instrument-by-instrument basis and makes it impossible to analyze the connections of the funds sector to banks.

(IF/MMF) and “other non-banks”, which consist of pension funds, insurance corporations, and OFIs. The financial instruments that create the linkages in the network are loans, deposits, debt securities, listed shares (equity), and fund shares (investment and money market). Of note is that these instruments in the network dataset comprise around two-thirds of total balance sheet financial linkages in Ireland, with the specific mapping between network and full balance sheet instruments provided in Figure 7. This chapter conducts its network analyses based on the detailed financial interlinkages in the network dataset which provides a partial coverage of the full financial interlinkages between sectors.

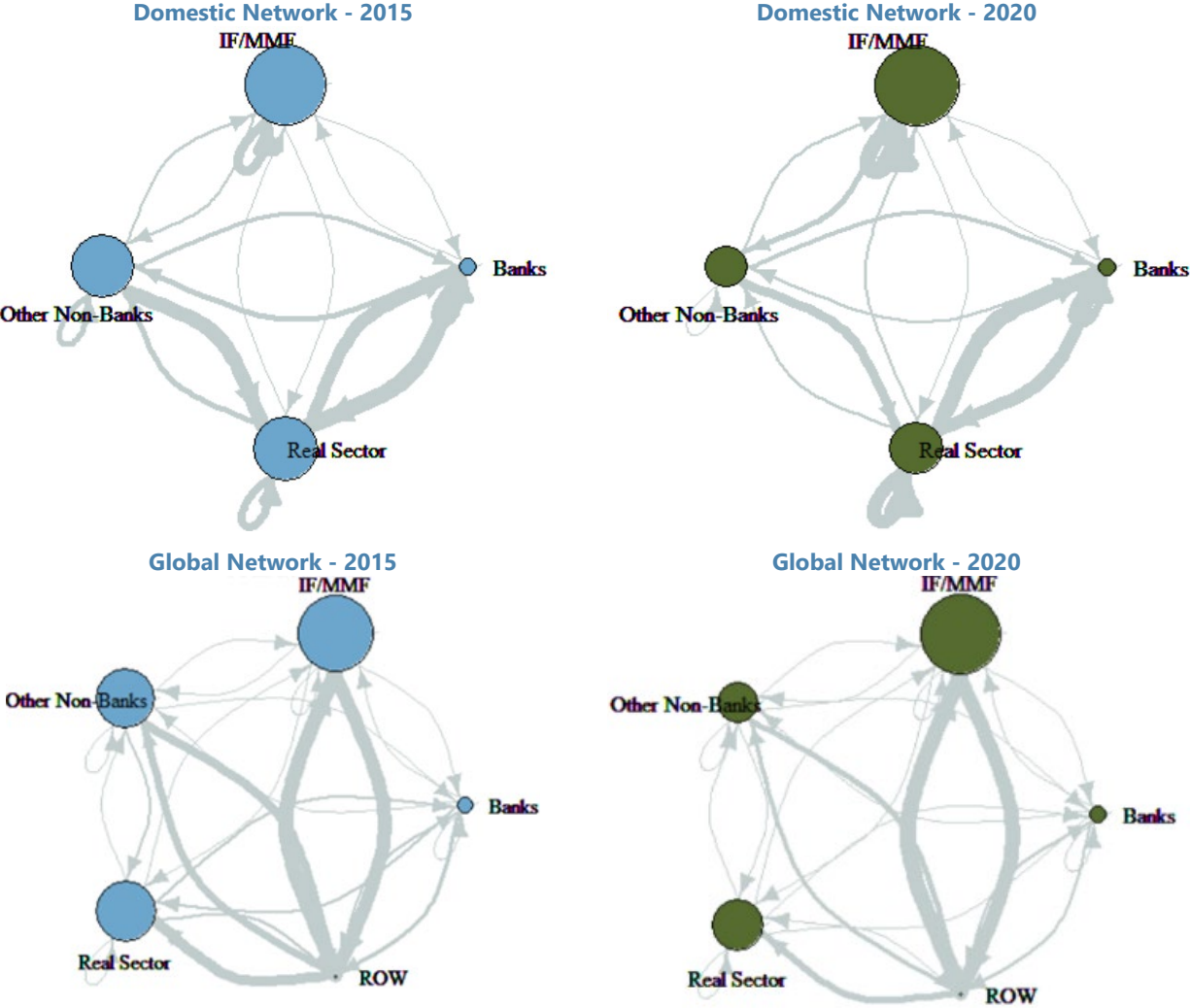
13. The rest of this chapter is structured as follows. Section B provides a high-level overview of the financial linkages using the network dataset. Sections C and D analyze spillover risks through a detailed instrument-by-instrument network analysis over time of some of the financial interlinkages in Ireland. Section F concludes and provides policy recommendations. A Technical Annex provides further supporting figures and detailed definitions of the instruments and sectors in the Irish financial network.

B. A Bird’s Eye View of the Irish Financial Network

14. The Irish financial network is characterized by substantial cross-border asset and liability exposures, increasing interlinkages between the Irish financial system and the global economy and potentially exposing the economy to external financial shocks. Irish funds have the strongest cross-border interlinkages, due to Ireland’s role as a leading global hub for the funds industry (Figure 4). In 2020Q4, the funds sector’s network asset claims on the rest of the world amounted to over €3 trillion, or 67 percent of the financial sector’s network cross-border asset claims (Figure 5). Other non-banks accounted for 21 percent, while banks accounted for 12 percent of total cross-border asset claims.

15. The linkages of the Irish funds sector with the Irish-resident other non-banks have increased, while bank-fund linkages have decreased slightly in recent years. The non-bank sector’s liabilities to funds close to tripled from under 1.5 percent of balance sheet assets in 2015Q4 to around 4 percent of balance sheet assets in 2020Q4. Over the same period, non-bank claims on funds also doubled to 1.5 percent of balance sheet assets in 2020Q4. In comparison, bank linkages with Irish funds are more limited. On the asset side, bank claims on the funds sector were negligible from 2015Q4 to 2020Q4, while their liabilities to funds increased from 2015Q4 to 2018Q4 before falling back to around 1.5 percent in 2020Q4. Real sector claims on funds doubled to 1.2 percent of total real sector assets from 2015Q4 to 2020Q4, while its liabilities to funds remained under 1 percent over this period. These patterns indicate that while the funds sector has minimal financial linkages with the Irish banking sector, it has become a more important source of funding for the non-bank sector in Ireland in recent years.

Figure 4. Linkages between Funds, Other Non-Banks, Banks, and the Real Sector in Ireland



Sources: IMF staff calculations based on CBI data.
Notes: Node sizes are proportional to total assets of the sectors, and edges reflect total network exposures (as reported in the who-to-whom network dataset) between pairs of nodes. Banks comprises of DMFIs, FMFIs, and CBI. IF/MMF – the funds sector comprising of investment funds and money market funds. Other non-banks comprises of PF, IC, SPV, FVC, and OFI residual. Real Sector – comprises of NFCs, households, and government. ROW – rest of the world (asset size of the ROW node was excluded from the figure for presentational purposes given its substantial size relative to all domestic sectors. For example, the size of the ROW node is around 200 percent of the IF/MMF node).

Figure 5. Ireland: Cross-Sectoral Assets and Liabilities

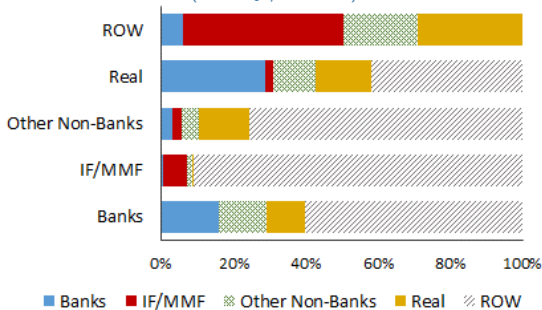
Adjacency Matrix
(2015Q4; € Bil.)

	Banks	IF/MMF	Other Non-Banks	Real	ROW
Banks	83.9	0.5	69.5	196.7	336.3
IF/MMF	8.2	124.5	24.1	9.0	1694.0
Other Non-Banks	40.1	30.6	62.8	180.8	982.2
Real	170.4	11.9	69.8	90.7	244.8
ROW	237.4	1749.1	805.8	1150.3	NA

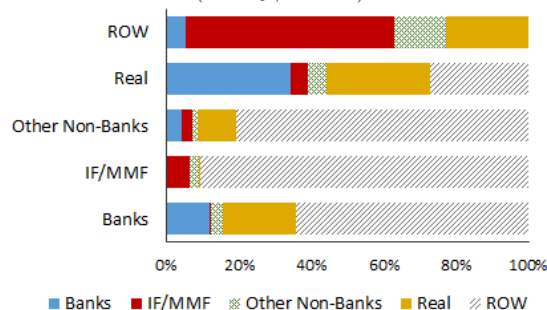
Adjacency Matrix
(2020Q4; € Bil.)

	Banks	IF/MMF	Other Non-Banks	Real	ROW
Banks	114.3	0.7	34.1	191.0	531.2
IF/MMF	7.6	208.6	78.6	16.5	3005.9
Other Non-Banks	50.2	32.8	18.5	122.9	935.2
Real	220.0	29.7	33.0	185.1	174.2
ROW	276.9	3033.1	765.9	1191.7	NA

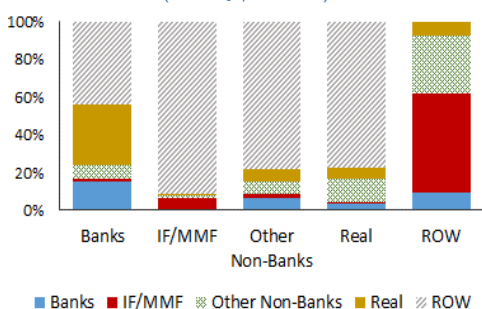
Asset Composition of Nodes
(2015Q4; Percent)



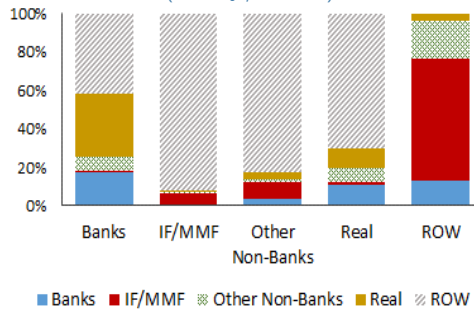
Asset Composition of Nodes
(2020Q4; Percent)



Liability Composition of Nodes
(2015Q4; Percent)

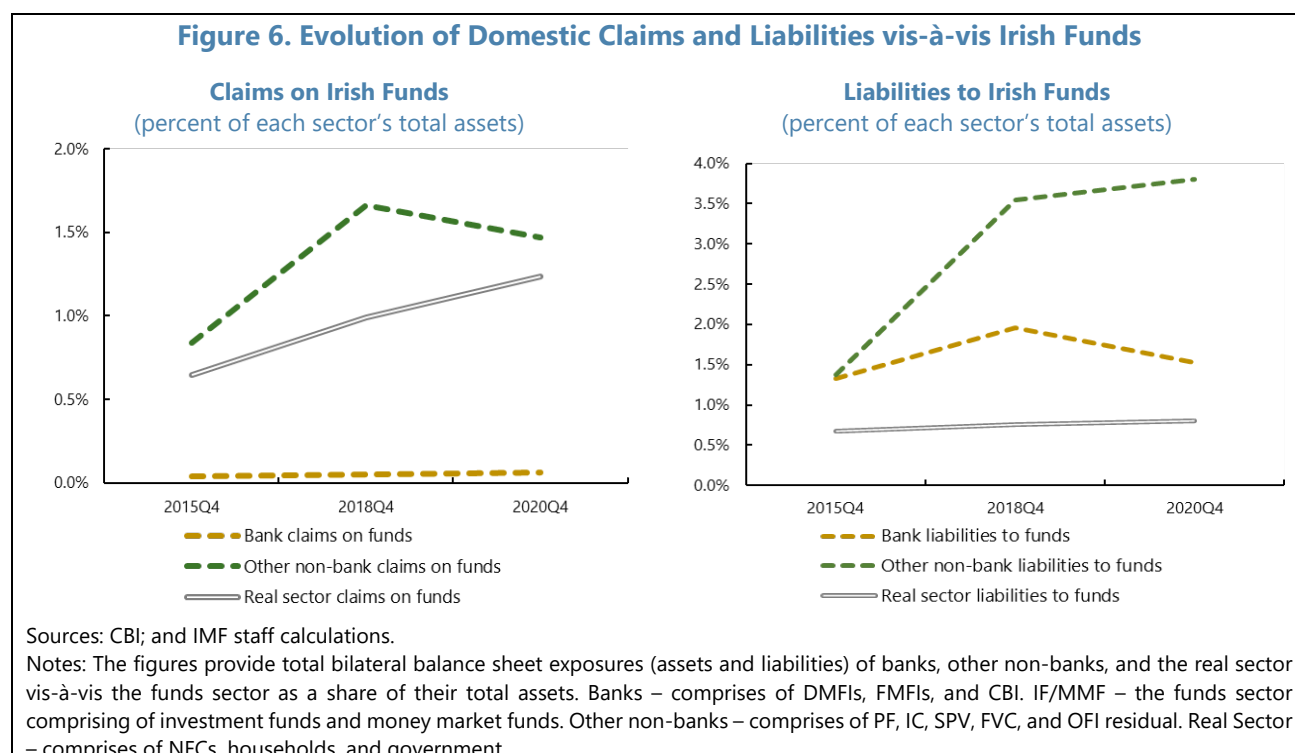


Liability Composition of Nodes
(2020Q4; Percent)



Sources: IMF staff calculations based on CBI data.

Notes: The numbers in the adjacency matrices represent the asset claims of the sectors in each row on the sectors in each column based on claims reported in the who-to-whom network dataset. The reported numbers correspond to the networks in Figure 4. Banks – comprises of DMFIs, FMFIs, and CBI. IF/MMF – the funds sector comprises of investment funds and money market funds. Other non-banks – comprises of PF, IC, SPV, FVC, and OFI residual. Real Sector – comprises of NFCs, households, and government. ROW – rest of the world.

Figure 6. Evolution of Domestic Claims and Liabilities vis-à-vis Irish Funds

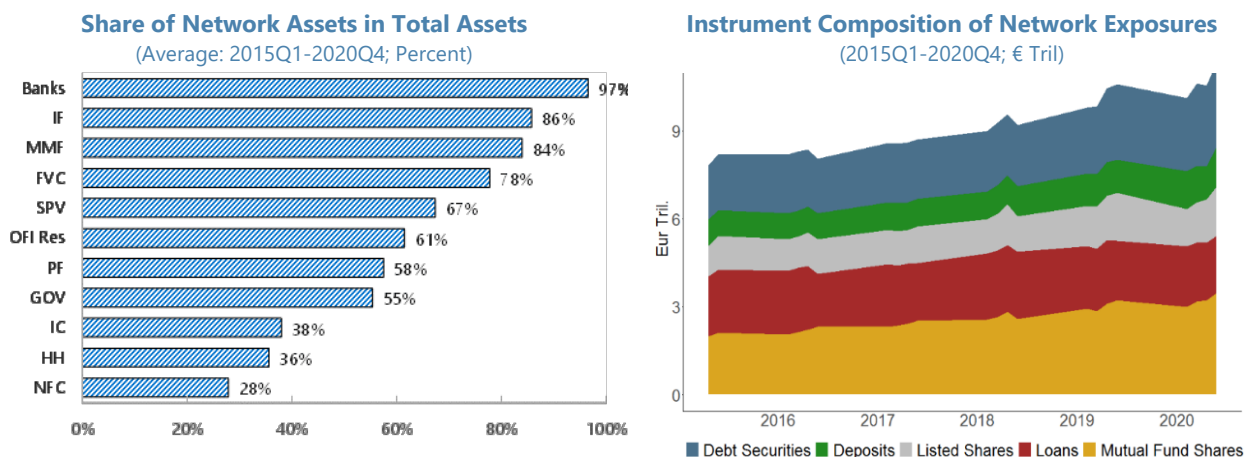
C. Key Interlinkages in the Irish Financial Network

16. This section provides a closer investigation of the key interlinkages in the Irish financial network, with the aim of assessing the network structure and potential channels of contagion.

Direct financial asset and liability exposures, on a first counterparty basis, are analyzed between twelve financial and non-financial sectors.¹⁴ Cross-border network exposures refer to linkages with the rest of the world, which includes the rest of the Euro Area. The analysis utilizes the financial instruments reported in the who-to-whom network dataset which are a subset of each sector's total balance sheet instruments.¹⁵ This network dataset represents a significant proportion of each sector's total balance sheet assets, with the maximum representation of instruments in the network for banks and Irish funds (Figure 7). Fund shares, debt securities, and loans comprise the bulk of the exposures in the Irish financial network, followed by deposits and listed shares (equity). The mapping between the network instruments and full balance sheet instruments can be found in Figure 7. Further properties of the nodes in the network are provided in Appendix 2.

¹⁴ Some of the exposures in the networks are confidential and not provided by the authorities, and those considered relevant to the discussion will be highlighted as necessary.

¹⁵ This technical note refers to the exposures reported in the who-to-whom network dataset as "network exposures" or "network assets."

Figure 7. Network Assets as Share of Total Assets and Network Instrument Composition**Instrument Mapping between the Network and Balance Sheet Datasets**

Instrument in the Network Dataset	Instrument in the Balance Sheet Dataset
Deposits	
Short-Term Loans	= Cash Deposits and Loans
Long-Term Loans	
Short-Term Debt Securities	= Debt Securities
Long-Term Debt Securities	
Listed Shares	= Equity
IF Shares	
	Property and Land
	Overdraft Accounts
	Unsettled Trades and Accrued Income
	Expenses
Not included	Securities Borrowing
	Securities Lending
	Derivatives
	Other Assets
	Other Liabilities

Sources: CBI; and IMF staff calculations.

Key Financial Network Linkages of the Irish Funds Sector

17. In line with Ireland's role as one of the global hubs of the funds industry, the vast majority of the assets and liabilities of the Irish funds sector are located outside of Ireland. The cross-border financial linkages of IFs and MMFs are large and have grown significantly in recent years. As of 2020Q4, the cross-border shares of the IF's network assets and liabilities were 89 and 92 percent, respectively. The cross-border shares for MMFs were even higher at 99 percent and 93 percent. Cross-border network assets and liabilities of IFs amounted to €2.5 trillion and €2.45 trillion in 2020Q4 (Figure 8), representing growth rates of 94 percent and 86 percent respectively since 2015Q4. MMF cross-border network assets and liabilities grew by 23 and 32 percent, respectively, to reach €500 billion and €580 billion in 2020Q4. Investments in foreign debt securities represent most of the cross-border network assets of IFs and MMFs, while most of cross-border liabilities are in the form of fund shares.

Figure 8. Adjacency Matrices of Total Network Exposures

(2020Q4; € Million)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV
Banks	114,318	18,263	67,565	86,955	856	553	122	36,453	11,799	3	531,153	3,183
FVC	4,635	11,357	-	36,804	-	-	-	6,714	-	-	331,790	68
GOV	25,316	-	9,072	1,267	2	4,635	121	448	4,457	-	1,934	-
HH	121,940	-	23,063	-	6	3,465	295	2,699	333	-	-	-
IC	4,278	607	2,051	-	-	-	532	697	240	-	63,202	430
IF	6,676	10,522	801	-	21	169,001	38,507	15,746	15,119	-	2,503,077	47,920
MMF	931	4,659	-	-	-	-	1,070	-	343	-	502,821	-
NFC	72,699	2,102	14	-	-	15,739	5,416	148,515	5,928	-	172,283	20,186
OFI Res	36,280	-	8,933	214	-	6,764	-	663	-	-	305,239	-
PF	2,034	-	320	-	-	25,169	381	653	1,513	-	41,659	-
ROW	276,946	48,136	137,647	3,700	3,708	2,452,440	580,655	1,050,375	636,412	-	-	77,607
SPV	2,968	4,153	25	6,858	-	-	-	58,936	-	-	193,296	135

Relative Claims Matrix (2020Q4; Percent of Total Network Financial Assets of Each Sector)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV	
Banks	13.1%	2.1%	7.8%	10.0%	0.1%	0.1%	0.0%	4.2%	1.4%	0.0%	61.0%	0.4%	100%
FVC	1.2%	2.9%	0.0%	9.4%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	84.8%	0.0%	100%
GOV	53.6%	0.0%	19.2%	2.7%	0.0%	9.8%	0.3%	0.9%	9.4%	0.0%	4.1%	0.0%	100%
HH	80.3%	0.0%	15.2%	0.0%	0.0%	2.3%	0.2%	1.8%	0.2%	0.0%	0.0%	0.0%	100%
IC	5.9%	0.8%	2.8%	0.0%	0.0%	0.0%	0.7%	1.0%	0.3%	0.0%	87.7%	0.6%	100%
IF	0.2%	0.4%	0.0%	0.0%	0.0%	6.0%	1.4%	0.6%	0.5%	0.0%	89.2%	1.7%	100%
MMF	0.2%	0.9%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.1%	0.0%	98.6%	0.0%	100%
NFC	16.4%	0.5%	0.0%	0.0%	0.0%	3.6%	1.2%	33.5%	1.3%	0.0%	38.9%	4.6%	100%
OFI Res	10.1%	0.0%	2.5%	0.1%	0.0%	1.9%	0.0%	0.2%	0.0%	0.0%	85.2%	0.0%	100%
PF	2.8%	0.0%	0.4%	0.0%	0.0%	35.1%	0.5%	0.9%	2.1%	0.0%	58.1%	0.0%	100%
ROW	5.3%	0.9%	2.6%	0.1%	0.1%	46.6%	11.0%	19.9%	12.1%	0.0%	0.0%	1.5%	100%
SPV	1.1%	1.6%	0.0%	2.6%	0.0%	0.0%	0.0%	22.1%	0.0%	0.0%	72.6%	0.1%	100%

Relative Liabilities Matrix (2020Q4; Percent of Total Network Financial Liabilities of Each Sector)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV	
Banks	17.1%	18.3%	27.1%	64.0%	18.6%	0.0%	0.0%	2.8%	1.7%	100.0%	11.4%	2.1%	
FVC	0.7%	11.4%	0.0%	27.1%	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	7.1%	0.0%	
GOV	3.8%	0.0%	3.6%	0.9%	0.0%	0.2%	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%	
HH	18.2%	0.0%	9.2%	0.0%	0.1%	0.1%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	
IC	0.6%	0.6%	0.8%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	1.4%	0.3%	
IF	1.0%	10.5%	0.3%	0.0%	0.5%	6.3%	6.1%	1.2%	2.2%	0.0%	53.9%	32.0%	
MMF	0.1%	4.7%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.1%	0.0%	10.8%	0.0%	
NFC	10.9%	2.1%	0.0%	0.0%	0.0%	0.6%	0.9%	11.2%	0.9%	0.0%	3.7%	13.5%	
OFI Res	5.4%	0.0%	3.6%	0.2%	0.0%	0.3%	0.0%	0.1%	0.0%	0.0%	6.6%	0.0%	
PF	0.3%	0.0%	0.1%	0.0%	0.0%	0.9%	0.1%	0.0%	0.2%	0.0%	0.9%	0.0%	
ROW	41.4%	48.2%	55.2%	2.7%	80.7%	91.6%	92.6%	79.5%	94.1%	0.0%	0.0%	51.9%	
SPV	0.4%	4.2%	0.0%	5.0%	0.0%	0.0%	0.0%	4.5%	0.0%	0.0%	4.2%	0.1%	
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	

Sources: CBI; and IMF staff calculations.

Notes: The numbers in the Financial Exposures matrix represents the asset claims of the sectors in each row on the sectors in each column. The percentages in the Relative Claim (Relative Liability) matrix add up to a row total (column total) of 100 percent and represent the *share* of each row (column) sector's asset claims (liabilities) on other sectors.

18. Irish funds have limited network linkages with domestic banks and households. In 2020Q4, the liabilities of banks to the funds sector comprised only a minimal share of their total liabilities, while households did not have any liabilities to funds. Bank liabilities to funds comprises mostly of deposits, followed by loans and debt securities, valued at around 2 percent of GDP. Asset claims on Irish funds comprised around 2.5 percent of the total network asset claims of households, while banks had

negligible share of their assets in the form of claims on funds. Household asset claims on funds are in the form of fund shares, valued at around 1 percent of GDP.

19. Irish funds have sizeable linkages with domestically-resident OFIs and moderate yet growing linkages with NFCs, the latter of which mainly relate to internationally focused MNEs resident in Ireland. The financial asset claims of Irish funds on Irish-domiciled OFIs and NFCs amounted to around 21 percent and 4 percent of GDP respectively in 2020Q4, while fund liabilities to OFIs and NFCs were around 2 percent and 6 percent of GDP.¹⁶ Much of the OFI sector in Ireland is internationally focused according to CBI and CSO. In addition, the links with NFCs largely reflect activities of multinational enterprises (MNEs) domiciled in Ireland. Due to various business reasons, including the more favorable tax regime, the legal system as well as membership of the Single Market, the Irish-domiciled NFC sector is largely comprised of foreign-owned MNEs, which exist alongside Irish indigenous corporations and small and medium enterprises (SMEs).¹⁷ Ireland ranks among the top jurisdictions in the Euro Area with respect to value added of foreign controlled enterprises as a share of total value added.¹⁸

20. CBI has estimated that most transactions between Irish funds and NFCs are not representative of the linkages to domestic economic activity as these are claims on internationally focused MNEs with a large international presence. CBI estimates, which are based on an asset-side breakdown of funds' claims on NFCs, are based on the premise that Irish NFCs comprise primarily of foreign multinational companies domiciled in Ireland whose links to the domestic economy are limited due to their large, internationally focused activities and revenues. Annually, the CSO publish details of the NFC foreign-controlled vs domestic-controlled financial accounts split by instrument.¹⁹ However, there is no precise breakdown between foreign-controlled versus domestic-controlled NFCs in the network data, which prevents a systematic analysis of the extent of the fund and OFI linkages with the domestic economy.

21. While CBI has also estimated that most transactions between Irish funds and OFIs do not affect domestic economic activity, important data gaps remain on the OFI residual. The OFI sector consists of SPVs, FVCs, and the OFI residual. SPVs and FVCs are vehicles used by Irish funds for financial transactions such as securitization.²⁰ CBI has estimated that the majority of SPV and FVC transactions do not directly affect domestic economic activity, as, for example, SPV links are tax-driven accounting mechanisms whereby a fund invests part of its portfolio through an SPV – the money flows to the SPV from the fund with total returns channeled back to the fund. Likewise, funds investing in FVC debt will not affect domestic activity unless the FVC is securitizing the assets of Irish issuers and borrowers. CBI estimates, which are based on a manual categorization of funds' claims on listed debt and equity of entities in the OFI residual, suggest that those entities do not appear to be linked to domestic economic

¹⁶ Fund assets and liabilities to OFIs and NFCs are higher if non-financial instruments are included, and missing network data is addressed. See chapter 2 for the complete balance sheet exposures of fund to OFIs and NFCs.

¹⁷ <https://www.cso.ie/en/releasesandpublications/ep/p-isanff/isanff2018/nfc/>

¹⁸ <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20200414-1>

¹⁹ <https://www.cso.ie/en/releasesandpublications/ep/p-isanff/institutionalsectoraccountsnon-financialandfinancial2020/fa/tbl2.9/>

²⁰ [https://www.centralbank.ie/docs/default-source/publications/economic-letters/vol-2018-no-11-shining-a-light-on-special-purpose-entities-in-ireland-\(golden-and-hughes\).pdf?sfvrsn=4](https://www.centralbank.ie/docs/default-source/publications/economic-letters/vol-2018-no-11-shining-a-light-on-special-purpose-entities-in-ireland-(golden-and-hughes).pdf?sfvrsn=4)

activity. However, as there is little granular information on the balance sheets of those OFI residual entities, the full interlinkages remain unknown. Similarly, while CBI has estimated that some of the transactions of the OFI residual²¹ do not affect domestic economic activity, the true extent of domestic linkages of these transactions remains unknown to CBI. As discussed in more detail below, the OFI sector has sizeable connections to the domestic economy, hence, the fund sector's linkages with OFIs have the potential to create indirect linkages of Irish funds to the domestic economy. In particular, the OFI residual's linkages with other sectors of the Irish-resident financial system and economy warrants a better understanding of the true extent of domestic linkages of these entities and their transactions.

22. Recommendation 1: The CBI and CSO should co-ordinate to disaggregate the OFI residual into foreign controlled versus indigenous entities to better understand linkages to the domestic economy.

23. The FSAP's recommendation on closing the data gaps on the OFI residual in Ireland is also consistent with the findings of the IMF 2018 Euro Area FSAP as well as the ESRB 2021 NBFi Monitor. The Euro Area FSAP found that, due to statistical challenges, at least half of the OFI sector could not be categorized at the euro area level, thereby hindering their monitoring and risk appraisal.²² The NBFi Monitor re-iterated the systemic importance in Europe of the opacity of the OFI residual and pointed toward the importance of closing OFI residual data gaps to aid in the monitoring of systemic risks in the financial sector.²³

24. Data gaps also still exist on the composition of the investor base of the funds sector, which is mostly foreign. A concentrated investor base in a few Irish funds could increase the possibility that idiosyncratic shocks to a few foreign investors could create or amplify systemic risks through fire sales of those assets held by these large investors in times of market stress, especially for less liquid funds with more leverage. It would be useful for CBI to continue data gathering and analytical efforts to improve visibility on the investor base of Irish-domiciled funds.

Key Financial Linkages of OFIs and NFCs

25. The OFIs and the NFC sectors in Ireland are large relative to the size of the economy, reflecting the presence of internationally focused activities in both sectors. In 2020Q4, OFI financial assets and liabilities as shares of GDP were 270 and 250 percent, respectively, while they were 120 and 350 percent of GDP for NFCs.²⁴

26. The cross-border linkages of OFIs and NFCs represent significant portions of their total financial exposures. In 2020Q4, OFI cross-border assets and liabilities as shares of GDP were over 220 percent and 200 percent respectively of GDP, while this was close to 45 and 280 percent for NFCs. In terms of the specific components of the OFI sector, the cross-border assets of SPVs, FVCs, and the OFI residual represented 85 percent, 85 percent, and 73 percent of their total asset holdings, respectively

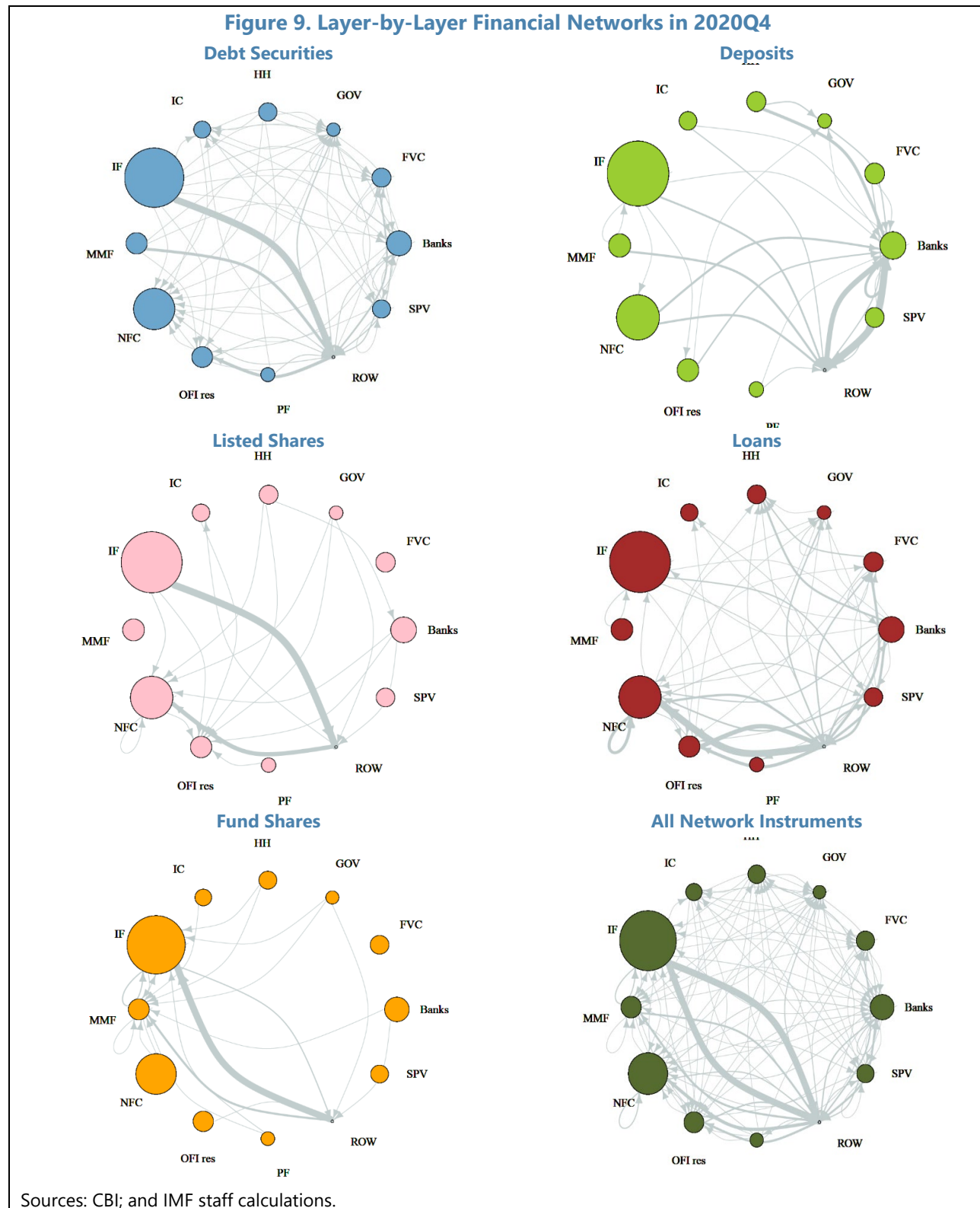
²¹ OFI residual represented close to 40 percent of Irish funds claims on the overall OFI sector as of 2020Q4.

²² <https://www.imf.org/en/Publications/CR/Issues/2018/07/19/Euro-Area-Policies-Financial-Sector-Assessment-Program-Technical-Note-Bank-Resolution-and-46106>

²³ https://www.esrb.europa.eu/pub/reports/nbfi_monitor/html/index.en.html

²⁴ This represents *financial* assets and liabilities, as in the network analysis, which are a subset of the total balance sheet assets (financial plus non-financial). As shown in figure 7, financial assets are 78, 67, 61, and 28 percent of total assets respectively for FVCs, SPVs, the OFI residual, and NFCs. Total assets are 400 and 530 percent of GDP for OFIs and NFCs.

(Figure 8). Their cross-border liabilities amounted to 52 percent, 48 percent, and 94 percent of their total liabilities, respectively. The cross-border assets and liabilities of the NFC sector respectively amounted to 39 percent and 79 percent of total NFC assets and liabilities.



27. A large majority of financial liabilities of NFCs in Ireland are in the form of loans, followed by issuance of equity and debt securities. NFC loan liabilities amounted to over 175 percent of GDP in 2020Q4 (approximately €650 billion). With the NFC sector being largely dominated by multinational enterprises (MNEs) and foreign-controlled entities, the majority of the NFC loan liabilities are cross-border, which amounted to around €400 billion in 2020Q4 (see Figure 9 and Appendix 5).

28. Loan assets of NFCs are also significant, amounting to 75 percent of GDP, with more than half in the form of intra-NFC sector lending. Significant volume of intra-sector lending by NFCs is relatively rare in other jurisdictions and is likely to be related to the large presence of MNEs in Ireland. The lending activity of the large MNEs in the NFC sector could be motivated by several factors, but the opacity around the extent of their integration into the domestic financial system presents a gap in understanding of potential vulnerabilities.²⁵ The financial assets and total balance sheet assets of the NFC sector are 120 and 530 percent of GDP, respectively, and the nature of NFCs' financial transactions is sometimes opaque. Additional data on the domestic linkages of Irish-domiciled NFCs and the motivation behind NFC financial transactions are likely to enhance financial stability monitoring capabilities of the authorities.

29. NFCs and SPEs²⁶ in Ireland have strong inter-sectoral funding linkages. Within the Irish financial system, SPEs are the largest source of loan funding to NFCs with a balance of €63 billion in 2020Q4 (close to 10 percent of total loans to NFCs), playing a much larger funding role for NFCs than the Irish banking sector (close to 6 percent of total loans). At the same time, the SPV sector was the third-largest borrower in Ireland in 2020Q4 with its loan liabilities amounting to €140 billion, with 14 percent of these loans originating from the NFC sector. According to CBI, the majority of these links relate to financing activities of internationally focused Irish MNEs or the purchase of existing NPL books following the financial crisis. But some of this SPE activity also relates to new non-bank lending to indigenous NFCs, including SMEs. While this has benefits in terms of diversification of funding sources to SMEs, it also has the potential to contribute to vulnerabilities, including through indebtedness. With the SPEs playing a growing role as a fund provider to the domestic NFC sector, it is essential to understand the risk profile of this lending and how much these loans add to the indebtedness of NFCs.

30. Recommendation 2: The CBI and CSO should co-ordinate to deepen understanding of the risks and vulnerabilities associated with loans between SPEs and NFCs and from SPEs to SMEs and households.

31. The OFI sector has sizeable interconnections with banks, households, and NFCs. OFI liabilities to banks, households, and NFC sector amounted to 16 percent of GDP in 2020Q4. Asset claims on banks, households, and NFCs were at 41 percent of GDP, with details on these claims as follows:

- OFI asset claims on **banks** are primarily in the form of deposits placed in banks by OFIs. This amounted to €43 billion (of this amount, 85 percent was placed by the OFI residual), representing **7 percent of total bank deposits** in 2020Q4.
- OFI asset claims on **households** are primarily in the form of loan assets to households held by SPEs. This amounted to €44 billion (of this amount, 84 percent was extended by the FVC part of SPEs), representing about

²⁵ <https://www.imf.org/en/News/Articles/2021/06/16/sp061721-bigtech-in-financial-services>

²⁶ The SPE group consists of SPVs and FVCs.

32 percent of household stock of loan assets in 2020Q4. The majority of this relates to residential mortgage-backed securitization (RMBS) vehicles. This includes RMBS sponsored by Irish banks and retained for liquidity purposes. A smaller share of loan assets are held by RMBS vehicles sponsored by non-banks, which have had a growing presence in new mortgage lending recently. Risks around household indebtedness through the mortgage market are addressed through the CBI's mortgage rules, which apply to new lending by both banks and non-banks.

- OFI asset claims on **NFCs** are primarily in the form of loan assets extended by SPEs to NFCs. This amounted to around €63 billion (of this amount, 92 percent were extended by the SPV part of SPEs), representing about **10 percent of NFC stock of loan assets** in 2020Q4. The majority of these links relate to financing activities of internationally focused MNEs resident in Ireland or the purchase of existing NPL books following the financial crisis. But some of this SPE activity also relates to new non-bank lending to indigenous NFCs, including SMEs.

32. While parts of the OFI sector have sizeable domestic linkages, largely in the form of providing funding, their linkages and business models are often not fully transparent, especially for entities in the OFI residual, posing a potential source of risk transmission. The total domestic asset and liabilities of OFIs are sizeable at 50 and 44 percent of GDP, respectively. The opacity of some OFI transactions – especially those in the OFI residual – could be a source of risk transmission under some circumstances, as noted also by the Financial Stability Board (FSB, 2017).²⁷ Given its sizeable connections to the domestic economy, closer monitoring of parts of the OFI sector is warranted, especially those OFIs that provide new lending to domestic borrowers. To assess the magnitude and concentration of risks arising from OFI activities, the authorities could utilize entity-level data, carry out an assessment of business models, and an analysis on the extent of liquidity mismatch, maturity mismatch, and leverage of these entities.

33. Recommendation 3: Intensify the collaboration between the CBI, the CSO, and international regulators on the nature of the OFI residual linkages to the domestic economy.

34. Recommendation 4: The CBI and CSO should co-ordinate to conduct risk analysis of the OFI residual at a granular balance sheet level.

Irish Households and Banks: Linkages to Market-based Finance

35. Within the MBF sector, banks have much higher linkages with the OFIs than with funds. The liabilities of banks to OFIs (mainly in deposits) comprised around 7 percent of their total liabilities in 2020Q4 while bank liabilities to funds were around 1 percent of their total liabilities (also mainly in deposits). Therefore, OFIs – driven by OFI residual entities – are a meaningful source of funding for the banking sector. Albeit risks to bank funding and liquidity are captured by liquidity regulation of the banking system, with more limited information on the OFI residual, it is more difficult for policymakers to assess the potential for contagion of shocks from those entities to the banking system via this funding. On the asset side, bank claims on the Irish funds sector are negligible while bank claims on OFIs were close to 4 percent of their total asset claims in 2020Q4. Banks' asset linkages are primarily in the form of lending to FVCs and, to a lesser extent, the OFI residual and holding of debt securities issued by these entities. A substantial portion of the FVC linkages relate to retained securitizations by the banking system, which do not expose banks to additional credit risk.

²⁷ <https://www.fsb.org/2017/07/assessment-of-shadow-banking-activities-risks-and-the-adequacy-of-post-crisis-policy-tools-to-address-financial-stability-concerns/>

36. Households have significant liabilities to the OFI sector, largely explained by FVCs securitization of Irish mortgages.

In 2020Q4, the liabilities of households to the OFI sector comprised around 32 percent of their total liabilities. Household liabilities comprise of loans only, with 64 percent coming from banks, 27 percent from FVCs, 5 percent from SPVs, with no liabilities to the funds sector. Households liabilities to OFIs has remained stable between 2015Q4 and 2020Q4 at around €44 billion. In terms of assets, households have a small amount of claims on the MBF sector with the vast majority of household claims on the financial sector taking the form of bank deposits. The majority of the OFI sector's claims on households relate to mortgage securitizations, including retained securitization by banks. Where this relates to new lending, by either banks or non-banks, these loans would be captured by the CBI's mortgage measures, guarding against a loosening in lending standards.

D. The Evolution of Domestic Interlinkages**37. This section examines the evolution of financial linkages of key sectors in the Irish financial network in recent years.**

The purpose of the analysis is to assess the evolution of sectoral concentration risks and spillover risks. The network analysis in this section removes the ROW node and focuses strictly on domestic linkages. Figures 10 and 11 present the domestic loans and debt security networks in Ireland,²⁸ with Appendix 3 containing the evolution of the deposits, fund shares, and listed shares networks. Appendices 3, 4, and 5 also contain heatmaps and the numbers underlying the networks in Figures 10-11. Four main themes emerge from the analysis of the data:

- **Intra-NFC loans:** Intra-NFC sector loans have increased significantly in recent years.
- **Fund sector-OFI loans:** IF loan linkages with OFIs have increased in recent years.
- **NFC and OFI links with domestic banks:** NFCs and the OFI residual have shifted more of their deposits from cross-border to domestic banks in recent years.
- **Fund sector links with NFCs and OFIs:** IFs have increased their holdings of NFC and OFI shares in recent years.

38. Intra-NFC sector loans have become an overriding feature of the Irish loan network. Intra-NFC sector loans increased from €57 billion in 2015Q4 to over €148 billion in 2020Q4, representing a growth rate of 160 percent (Figure 10 and Appendix 5). While ad-hoc analyses by the CBI and CSO suggest that most of the intra-sector NFC loans are intra-company loans, there is no systematic dataset that provides a breakdown of these exposures.

39. Irish fund-OFI lending interlinkages have increased over time, though part of this could be due to revised data reporting requirements. In 2020Q4, IF loans to SPVs amounted to €41 billion of loans to SPVs, around 70 percent of total IF loans.²⁹ IFs have borrowed more over time from the OFI

²⁸ The debt securities network is composed of short-term and long-term debt securities, while the loans are comprised of short-term loans and long-term loans. Some of these exposures represent confidential data and are thus not shown (for example, the short-term debt securities issued by the OFI residual to ICs and PFs in 2020Q4, short-term debt securities issued by banks to MMFs in 2015Q4, and the short-term debt securities issued by FVCs to banks in 2020Q4).

²⁹ Of note is that SPV was introduced as a sector code for investment fund statistical reporting in 2017Q3, with loans to SPVs changing from "not available" in 2017Q2 and before, to €32 billion in 2017Q3.

residual sector as well, with IF borrowing from OFI residual increasing from 45 percent of their loan liabilities in 2015Q4 to 60 percent in 2020Q4. Along with the increased loan linkages of IFs, MMF's holdings of short-term debt securities issued by FVCs more than doubled from €2 billion to €4.6 billion from 2015Q4 to 2020Q4 (see Figures 10-11 and Appendix 5).

40. NFCs and the OFI residual have shifted more of their deposits from cross-border banks to domestic banks becoming more important source of funding for the domestic banking system.

NFCs and the OFI residual placed €73 billion and €36 billion of deposits in Irish banks in 2020Q4, which represented growth rates of around 70 percent and 80 percent since 2015Q4, respectively. The OFI residual shifted its domestic bank share of deposit placements from 65 percent in 2015Q4 to 100 percent in 2020Q4. Similarly, NFCs increased their domestic bank share of deposit by 6 percentage since 2015 to 50 percent of their total deposits in 2020Q4 (see Appendices 4 and 5).

41. Entities in the rest of the world have also increased their deposit placements in Irish banks.

From 2015Q4 to 2020Q4, bank cross-border liabilities and assets grew by around 17 percent and 58 percent to reach 75 percent and 150 percent of GDP, respectively. The increasing cross-border nature of the aggregate banking system in recent years is in line with the larger presence of international banks in Ireland in the aftermath of Brexit.

42. The fund sector has increased its holdings of shares issued by NFCs and OFI residual, becoming a larger source of financing for these sectors.

IF holdings of NFC shares increased from around €8 billion in 2015Q4 to €15 billion in 2020Q4. Over the same period, IF holdings of shares issued by the OFI residual also increased from around €0.5 billion in 2015Q4 to €3.2 billion in 2020Q4, contributing to the fast-growing footprint of the OFI residual sector in the Irish financial system. Of note, however, is that while there has been a proportionately large increase in fund holdings, this still makes up quite a small portion of total issuances of shares by the OFI residual and NFCs.

Figure 10. The Evolution of the Domestic Loans Network

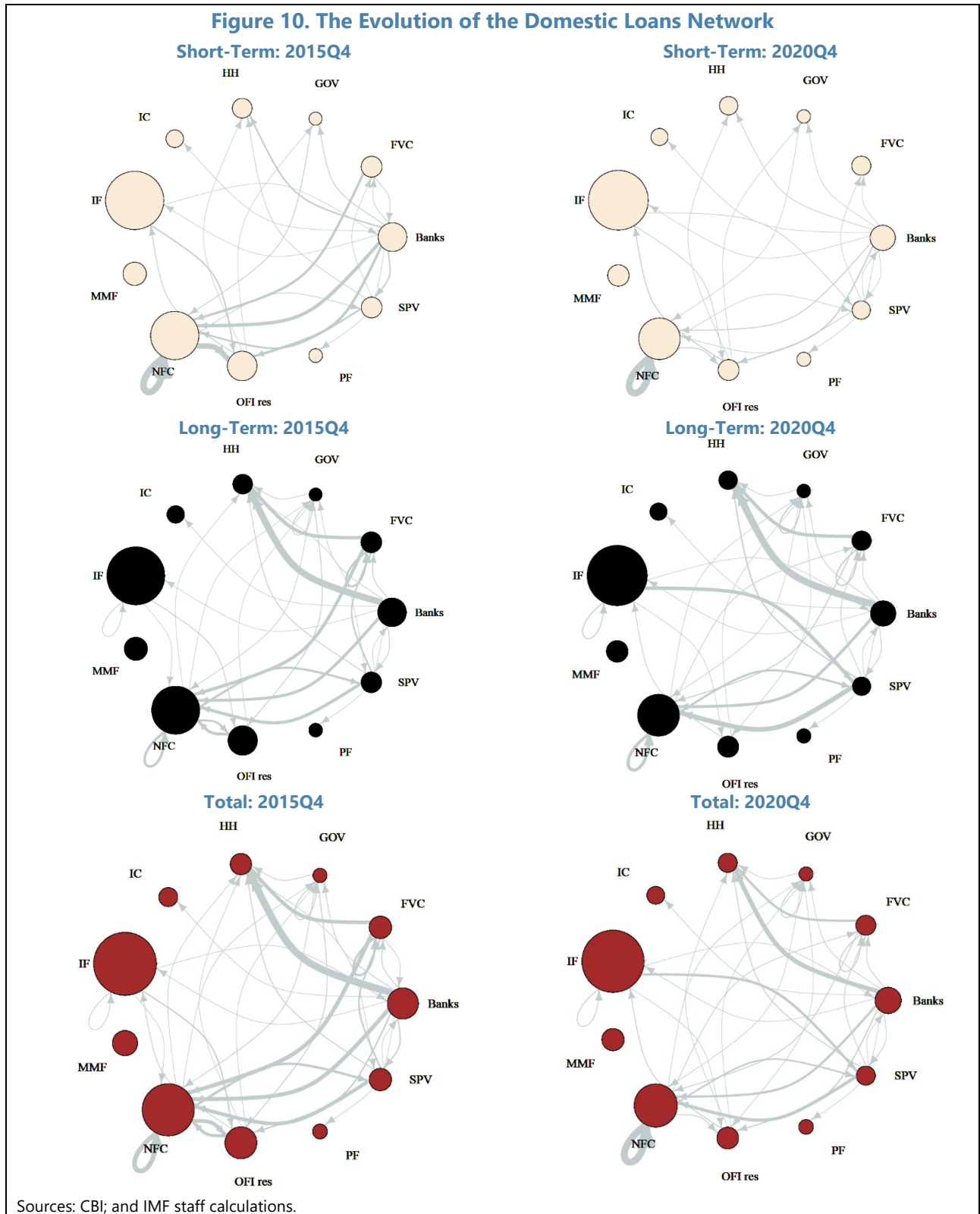
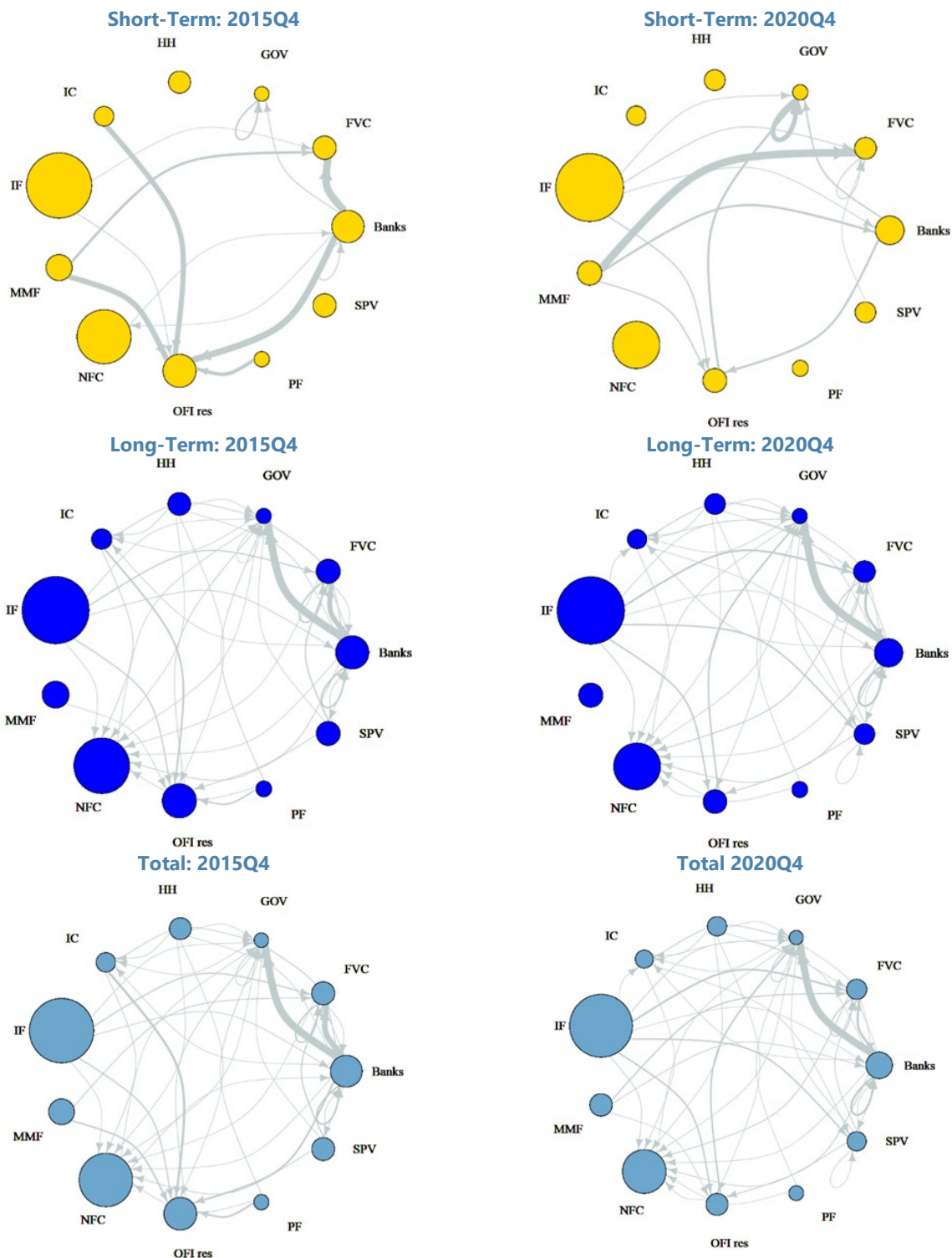


Figure 11. The Evolution of the Domestic Debt Security Networks



Sources: CBI; and IMF staff calculations.

INVESTMENT AND MONEY MARKET FUND BALANCE SHEET EXPOSURES

A. Introduction

43. Given the outsized importance of the funds sector within the Irish financial system, this chapter provides a deeper dive into the balance sheet exposures of Irish funds with a particular focus on their domestic linkages. This analysis builds on the financial stability assessment of the previous chapter with two additional contributions: (1) analysis of the structure of domestic exposures at the granular fund type level (categorized based on investment strategies), and (2) inclusion of financial as well as non-financial exposures (such as property and land holdings) providing a coverage of the full balance sheets of funds. The confidential balance sheet dataset enables a more complete analysis of the fund sector's interlinkages to the domestic economy of Ireland. The confidential fund balance sheet data provided by the CBI to the FSAP team is a more detailed and disaggregated version of the publicly available Quarterly Financial Accounts (QFA) for Ireland.

44. The proprietary dataset used by the FSAP breaks down the publicly reported MFI category into separate groups for MMFs and banks. As with the network analysis, this is a particularly important step in analyzing the balance sheet exposures of all Irish funds to domestic banks, other non-banks, and the real sector.³⁰ Using this dataset, this chapter covers seventeen sectors: (1) investment funds, (2) money market funds, (3) deposit-taking corporations (DTC), (4) households, (5) central government, (6) state government, (7) local government, (8) non-financial corporations, (9) central counterparties, (10) financial auxiliaries, (11) financial vehicle corporations, (12) special purpose vehicles, (13) other financial intermediaries, (14) pension funds, (15) insurance corporations, (16) social security funds, and (17) real estate. Appendix 1 provides detailed definitions of these sectors.³¹

45. The analysis suggests that different categories of Irish funds are connected with the domestic economy to varying extents and that spillover risk seems minimal at present but should be monitored. Fund asset and liability linkages with the domestic banks were limited (at around 4 and 3 percent of GDP in 2021Q1, respectively), but certain categories of funds with less liquidity and higher leverage have relatively higher linkages with the banks. Fund sector linkages with the real sector are dominated by funds' holding of NFC equities with minimal linkages with households and the government. Fund exposures to CRE properties are small as a fraction of total fund assets, but account for over 40 percent of "invested CRE" sector³² in Ireland, representing a potential channel of risk transmission from funds to the CRE sector. Of note is that Irish funds asset and liability exposures to the OFI sector correspond to close to 30 and 50 percent of Irish GDP respectively in 2021Q1 and have

³⁰ The public QFA dataset groups banks and MMFs into one category called monetary financial institutions (MFI), as compiled for the European System of Accounts. That precludes the analysis of balance sheet exposures of money market funds as a separate category, as well as an analysis of the balance sheet linkages of MMFs and IFs to banks. However, the data provided by CBI for this Technical note splits the MFI category into banks and money market funds.

³¹ The 17 sectors listed here have the same coverage of the financial system as the network dataset used in Chapter 2 but provide additional granularity. For a mapping of the sectors across the two datasets, see Appendix 2.

³² The term invested CRE refers to the equity-based financing provided to professionally managed CRE properties in Ireland. This excludes debt finance provided to CRE (e.g., bank and non-bank lending).

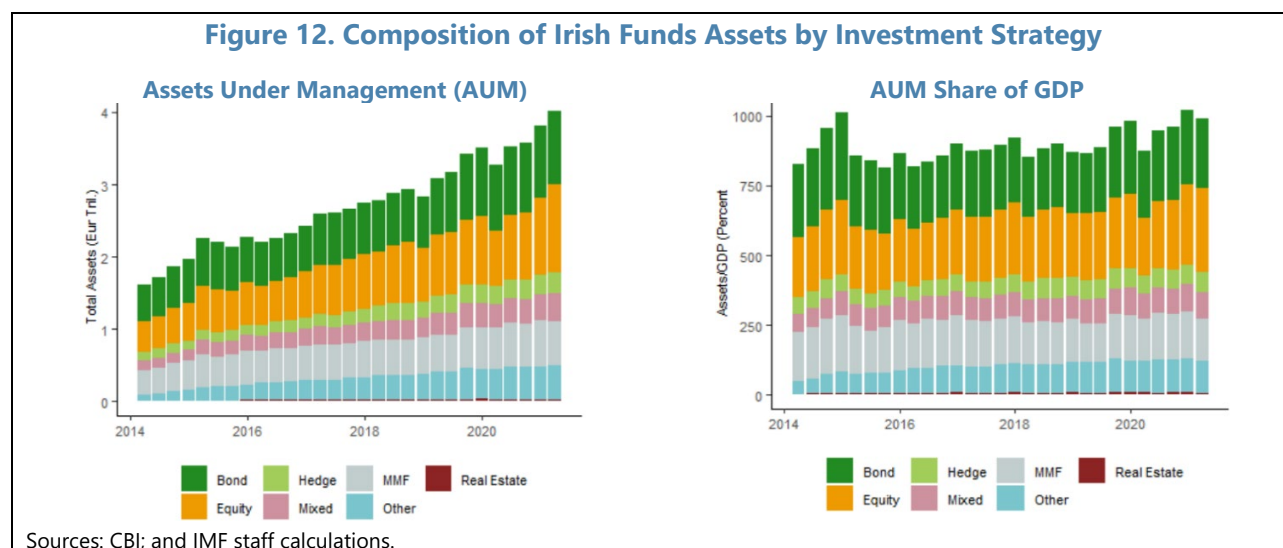
grown significantly in the last five years.³³ However, spillover risks to the domestic economy based on the fund-OFI links appear limited at present as the majority of OFI domestic exposures are estimated by CBI to be against foreign-controlled entities with minimal connections to the domestic economy.

46. The rest of the chapter is structured as follows. Section B discusses the different categories of funds domiciled in Ireland, looks at their stability metrics, and assesses the extent of their cross-border and domestic linkages. Section C provides a deeper dive into the asset and liability exposures of Irish funds to the domestic economy. Section E takes a closer look at the CRE holdings of funds. Section G consolidates the findings provides policy recommendations. Appendix VI discuss the instrument decomposition of Irish funds balance sheets and domestic exposures.

B. Stability Metrics and Domestic Linkages of Funds

47. Irish funds are classified into seven categories according to their investment strategies.

Based on the European System of Accounts (ESA) adopted by CBI, these categories are: MMFs, equity, fixed-income, mixed, hedge, real estate, and other.³⁴ Total fund assets have increased significantly as a share of GDP since 2015, reaching around 1,000 percent of GDP in 2021Q1. Bond and equity funds are the largest groups, together comprising over 55 percent of total AUM in 2021Q1 (Figure 12).³⁵ MMFs are the next largest category, comprising around 15 percent in 2021Q1. Hedge funds, mixed funds, and other funds together comprised around 28 percent in 2021Q1. Real estate funds in Ireland are the smallest category, with around €33 billion of assets in 2021Q1. This number represents less than 1 percent of total AUM but corresponds to 7 percent of GDP.



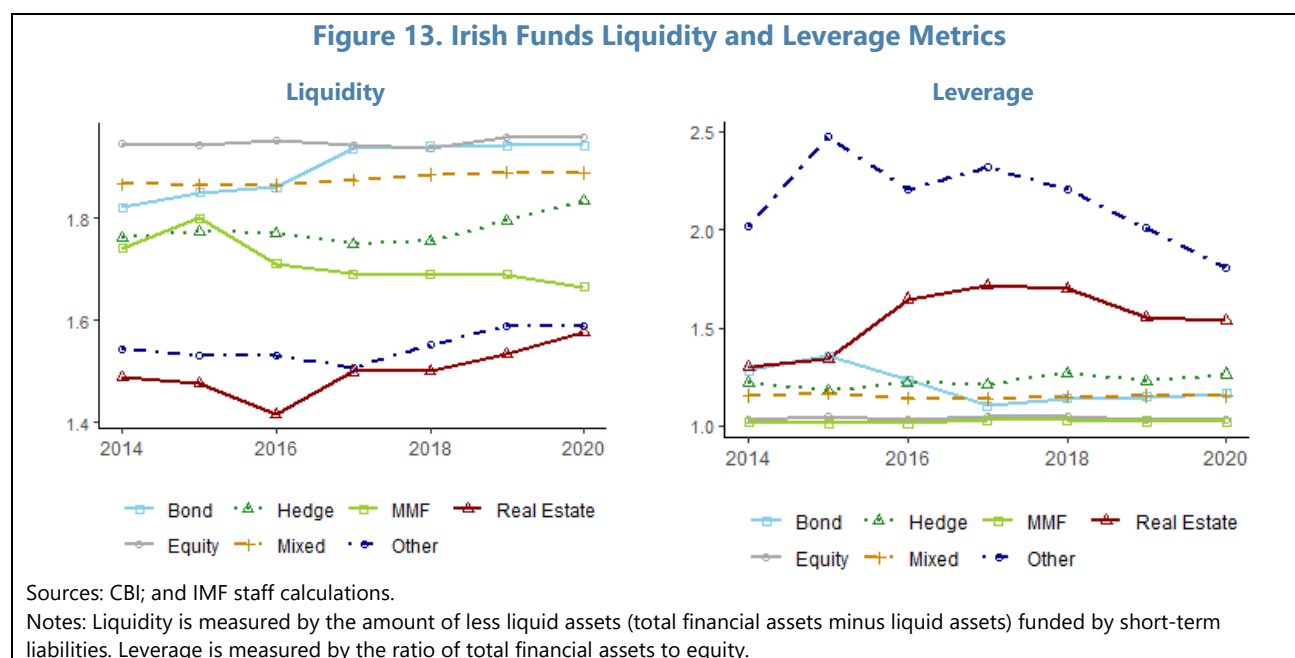
³³ The Irish-domiciled OFI sector comprises of: i) special purpose entities (SPEs), which can be further broken down into special purpose vehicles (SPVs) and financial vehicle corporations (FVCs); and ii) the OFI residual, which can be further broken down into financial auxiliaries, other financial intermediaries, and central counterparties.

³⁴ Equity and fixed-income funds are investment funds that invest primarily in equities and bonds, respectively. Mixed funds invest in both equity and bonds. Hedge funds are funds that apply unconstrained investment strategies (including taking on leverage) to obtain positive returns. Real estate funds invest in real estate, and “other” funds is a catch-all category for funds that do not fall into any of the previous categories.

³⁵ The figures contain around 96-98 percent of total funds sector AUM depending on the quarter, as data for around 2-4 percent of AUM are masked for confidentiality reasons when the sector AUM is disaggregated by investment strategy.

48. The CBI collects detailed fund balance sheet information, allowing it to construct different liquidity and leverage metrics, including those based on FSB guidelines. For the purposes of the analysis in this note, risk metrics have been compiled at the fund category level, and the metrics follow the same formula as used by the FSB in their annual NBFi monitor.³⁶ Liquidity risk is measured by liquidity transformation which represents the amount of less liquid assets (total financial assets minus liquid assets) funded by short-term liabilities,³⁷ approximated by short-term liabilities minus liquid assets. The leverage metric is the ratio of total financial assets to equity, which is not risk-based, similar to the Basel 3 leverage ratio which is used as a measure of bank leverage. One is that this definition of leverage does not cover synthetic leverage which can have important loss amplification effects.

49. Irish funds differ in their liquidity and leverage characteristics depending on their investment strategy. Other funds, which are funds that do not follow any of the other five specific investment strategies, contain funds that are among the most leveraged and others that are the least liquid (Figure 13).³⁸ Total AUM of these funds correspond to about 120 percent of GDP in 2021Q1. Real estate funds are also among the least liquid and most leveraged funds. MMFs have low leverage but are involved in more liquidity transformation than several other types of funds. MMFs, with AUM corresponding to 150 percent of GDP in 2021Q1, consist of three sub-categories based on the measurement of their asset values: constant net asset value (CNAV) MMFs, low volatility net asset value (LVNAV) MMFs, and variable net asset value (VNAV) MMFs. CBI has done some granular risk analysis for selected cohorts of funds, but such analysis should continue to be strengthened in the future.



³⁶ <https://www.fsb.org/2021/12/global-monitoring-report-on-non-bank-financial-intermediation-2021/>

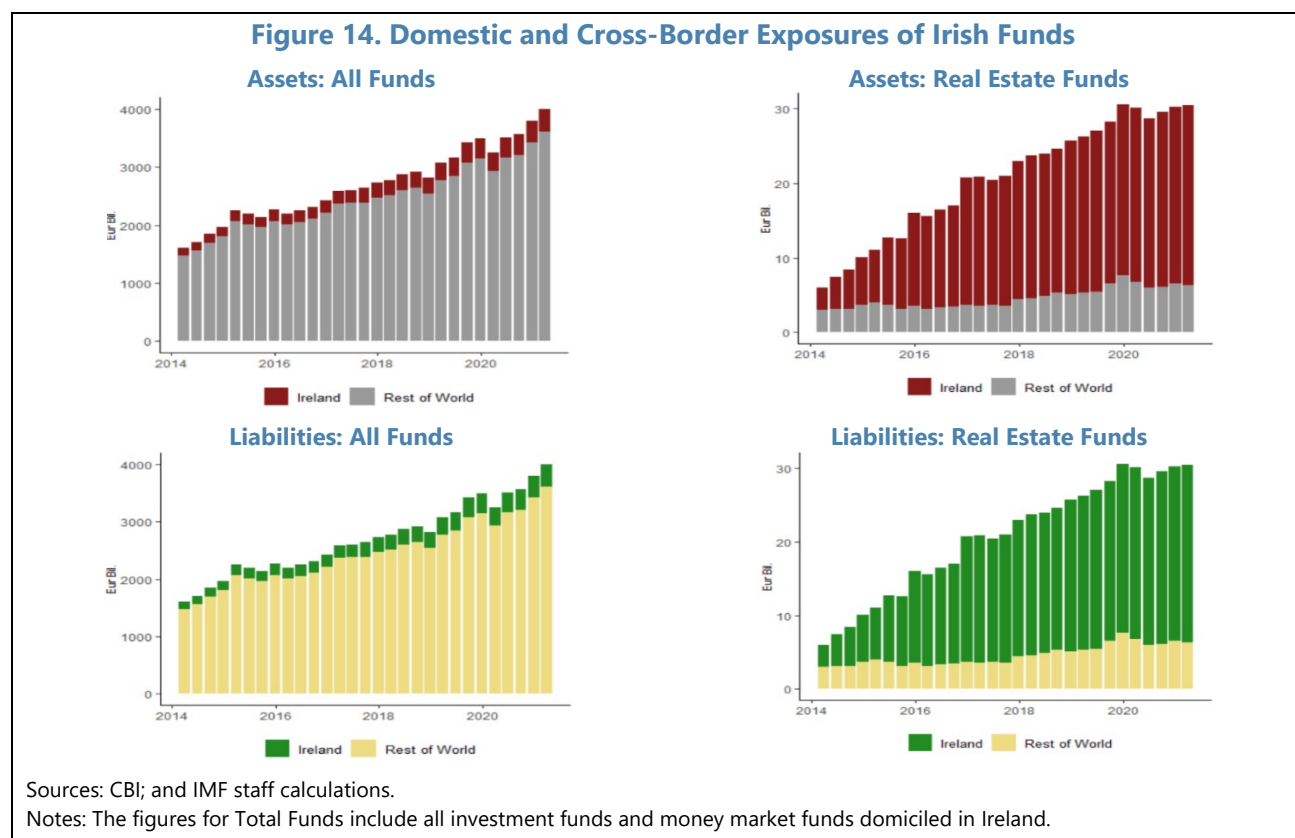
³⁷ In the case of collective investment vehicles (CIVs), shares redeemable for cash or underlying assets are also included in the short-term liabilities calculation.

³⁸ The other funds category consists of funds with a mix of investment strategies, such as commodities. Liability Driven Funds (LDI) drive leverage up in the other funds category, These act on behalf of pension funds and match asset returns to future pension liabilities by hypothecating government securities. Many of these holdings are in UK sovereign debt.

50. Recommendation 5: The CBI should conduct more deep-dives and enhance the monitoring of risks of sub-segments of the funds sector.

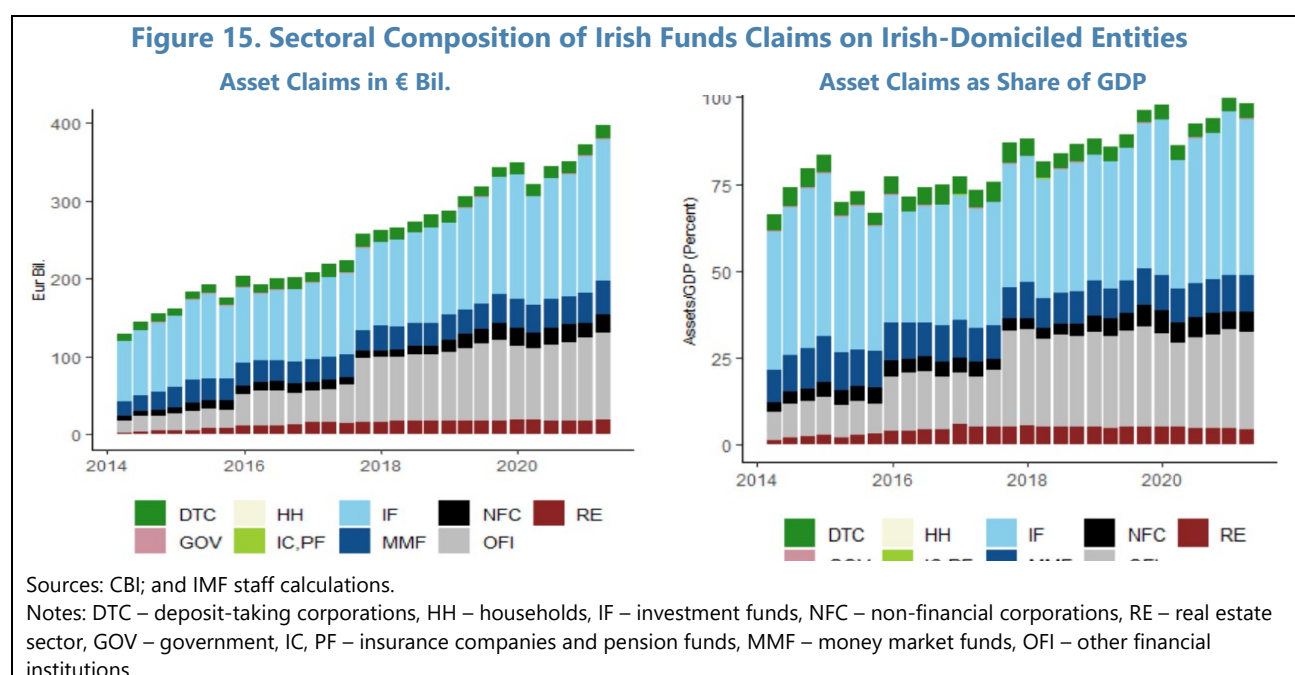
51. The funds sector has substantial cross-border exposures, but there are also meaningful domestic linkages. Cross-border balance sheet assets and liabilities of the funds sector amounted to €3.6 trillion and €3.7 trillion, respectively, in 2021Q1 (Figure 14), or around 9 times GDP. In the same quarter, domestic assets amounted to around €400 billion, or close to 100 percent of Irish GDP (although around half of these were intra-fund sector), with domestic liabilities amounting to €340 billion.³⁹ This domestic exposure is large in the cross-country context as well. For example, in the United States and Netherlands, which are two countries with significant presence of funds, *total* fund assets (domestic plus cross-border) correspond to around 135 and 105 percent of their GDPs, respectively.

52. Real estate funds have the largest domestic exposures as a share of their total assets. All other fund types have a similar proportion of domestic to cross-border exposures as the total fund sector, where approximately 10 percent of total AUM consists of domestic exposures (shown in Figure 13). However, real estate funds diverge from this trend with most of their assets and a significant proportion of their liabilities tied to the domestic economy. In 2021Q1, the domestic assets of real estate funds amounted to around €24 billion, or around 80 percent of total real estate fund assets, whereas liabilities to the domestic economy amounted to around €11 billion, or close to 35 percent of total real estate fund liabilities.



³⁹ Domestic assets and liabilities are defined as the assets and liabilities of Irish funds to Irish-domiciled entities.

53. The asset claims of Irish funds on Irish-domiciled entities were mostly in the form of claims on the financial sector.⁴⁰ A significant portion of fund asset claims on the domestic economy are on other IFs and MMFs, amounting to close to €220 billion, or 53 percent of GDP in 2021Q1 (Figure 15). Fund claims on OFIs also constitute a significant share of the total domestic fund assets, having increased significantly from around €31 billion in 2015Q1 to around €131 billion in 2021Q1, or over 30 percent of GDP. IF and MMF claims on DTCs have remained relatively constant over time at around 4 percent of GDP. Fund asset claims on the real sector, comprising of households, government, and NFCs, increased from around 4.4 percent of GDP in 2015Q1 to 7 percent of GDP in 2021Q1.



C. Fund Balance Sheet Exposures to Banks, the Real Sector, and OFIs

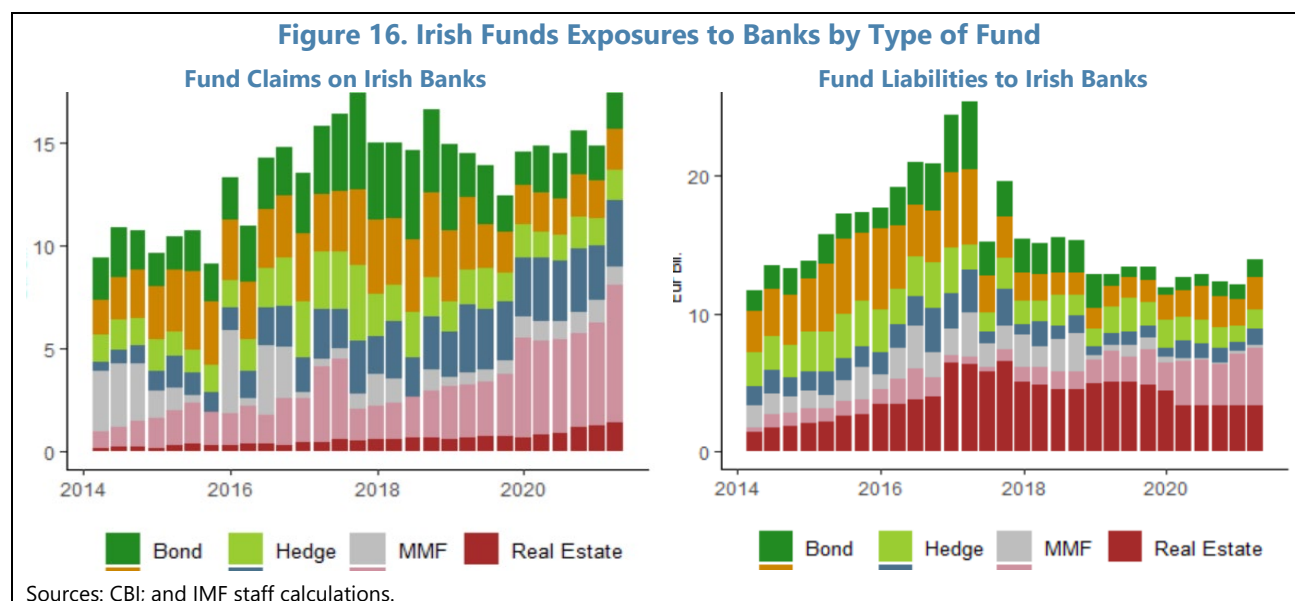
54. The direct balance sheet exposures of funds provide an indication of sectoral concentration risks and spillover risks. The analysis of fund balance sheets by type of fund at a sectoral level can serve as a useful tool to diagnose risks and identify potential channels of contagion, noting that shocks to funds could spill over to the domestic sectors they are interconnected with. This section provides a more detailed analysis of the direct exposures of Irish funds to domestic banks, the real sector, and OFIs.

55. While the direct exposures between the aggregate funds sector and banks are limited, funds that are relatively more leveraged and less liquid have higher asset claims on banks. Funds hold banking sector assets as part of their liquidity management needs with most of their bank assets taking the form of cash deposits and overdraft accounts. Total bank assets held by the total funds sector

⁴⁰ The fund balance sheet dataset includes IF and MMF exposures to sixteen domestic sectors, which are grouped into nine sectors in the figures as follows: GOV = Sum of Central Government, Local Government, State Government, Social Security Funds; OFI = Sum of Financial Vehicle Corporations, Special Purpose Vehicles, Financial Auxiliaries, Other Financial Intermediaries, Central Counterparties; HH = Households; IC,PF = Sum of insurance companies, pension funds; IF = investment funds; MMF = money market funds; DTC = sum of domestic banks, foreign banks, CBI; RE = real estate.

stood at around €17 billion in 2021Q1, which corresponds to around 2 percent of total banking system liabilities. This limited exposure indicates that the funds sector is not a major source of funding for the Irish banking sector. At the same time, the category of Other funds, which are among the most leveraged and least liquid funds, have the largest share of asset claims on Irish banks (40 percent of total fund sector in 2021Q1) and have also contributed to the increased asset claims of the funds sector on banks in recent years.

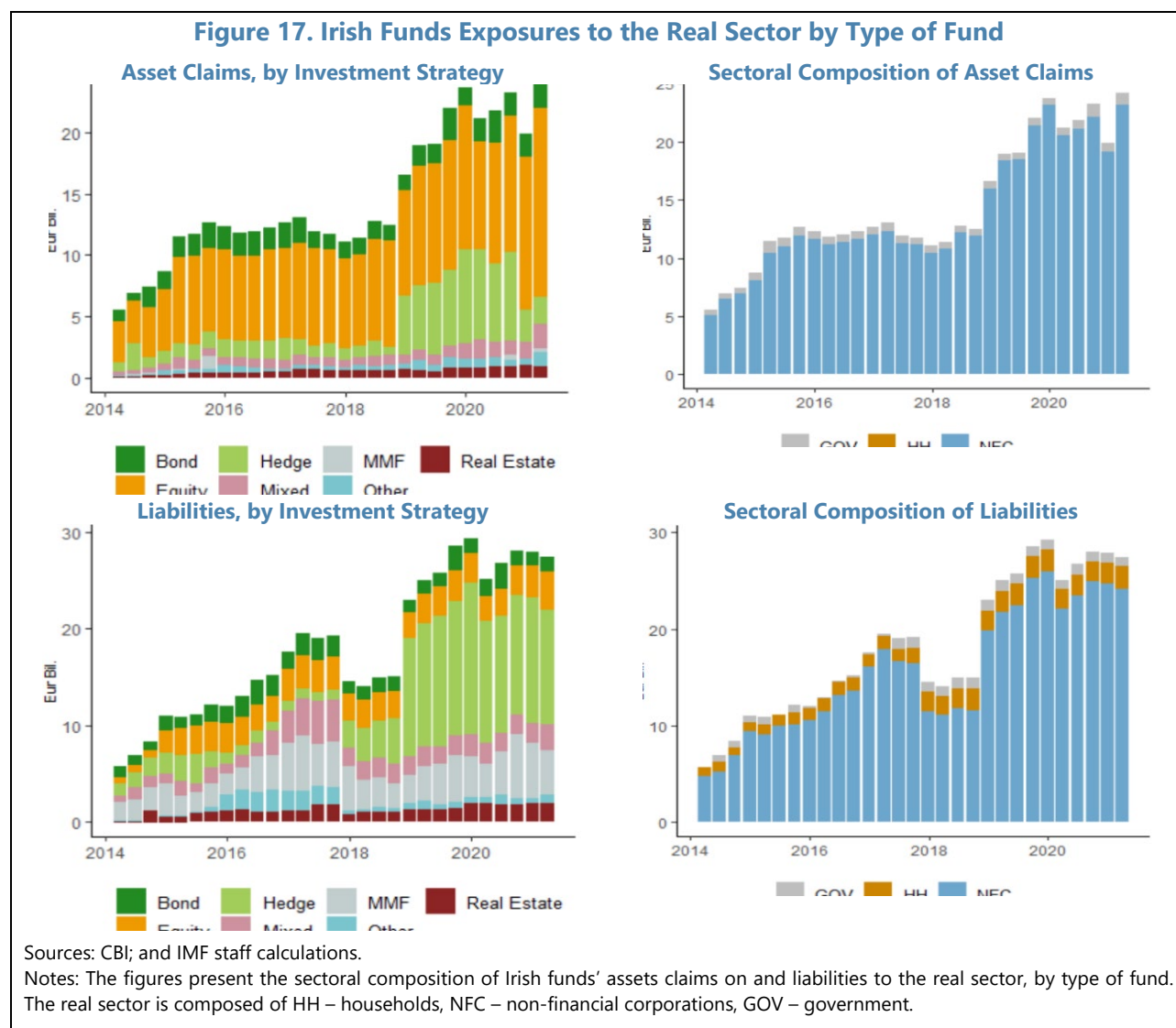
56. More leveraged and less liquid funds also have the most liabilities to Irish banks. Irish funds' liabilities to banks peaked at €25 billion in 2017Q1 before declining over the next four years to €14 billion in 2021Q1 (Figure 15). This amount corresponds to around 1.5 percent of total banking system assets. Of the fund sector's total liabilities to banks, over 50 percent are from other funds and real estate funds, which are among the most leveraged and least liquid categories of funds.



57. Analysis of common asset holdings of Irish funds and domestic banks could enhance the monitoring of potential channels of spillovers. While the direct linkages between funds and banks are relatively small, the substantial size of the securities holdings of the funds sector warrants analyzing common asset holdings of banks and funds to assess portfolio similarity and concentration risk. In the case of significant common asset holdings between the two sectors, fire sales of securities by investment funds in illiquid markets, can lead to indirect spillovers to those banks that hold those securities under a fair value-based accounting treatment. Information on the common asset holdings of banks and funds could be utilized for assessing the importance of this channel of contagion and enhancing the macroprudential stress testing of banks and funds.

58. The linkages of Irish funds to the real sector are relatively low but have been increasing in recent years, primarily due to the increased cross-sectoral holdings of equities between funds and NFCs, albeit this is mainly related to Irish-domiciled MNEs. Fund asset claims on the real sector, most of which are claims on the NFCs, increased by over 100 percent since 2015Q1 to reach €23 billion in 2021Q1, which corresponds to around 6 percent of GDP. Similarly, liabilities to the real sector increased by 150 percent, from €11 billion in 2015Q1 to €27 billion in 2021Q1 (Figure 16). A vast majority of fund sector's asset claims on the NFCs are in the form of their holding of NFC equities.

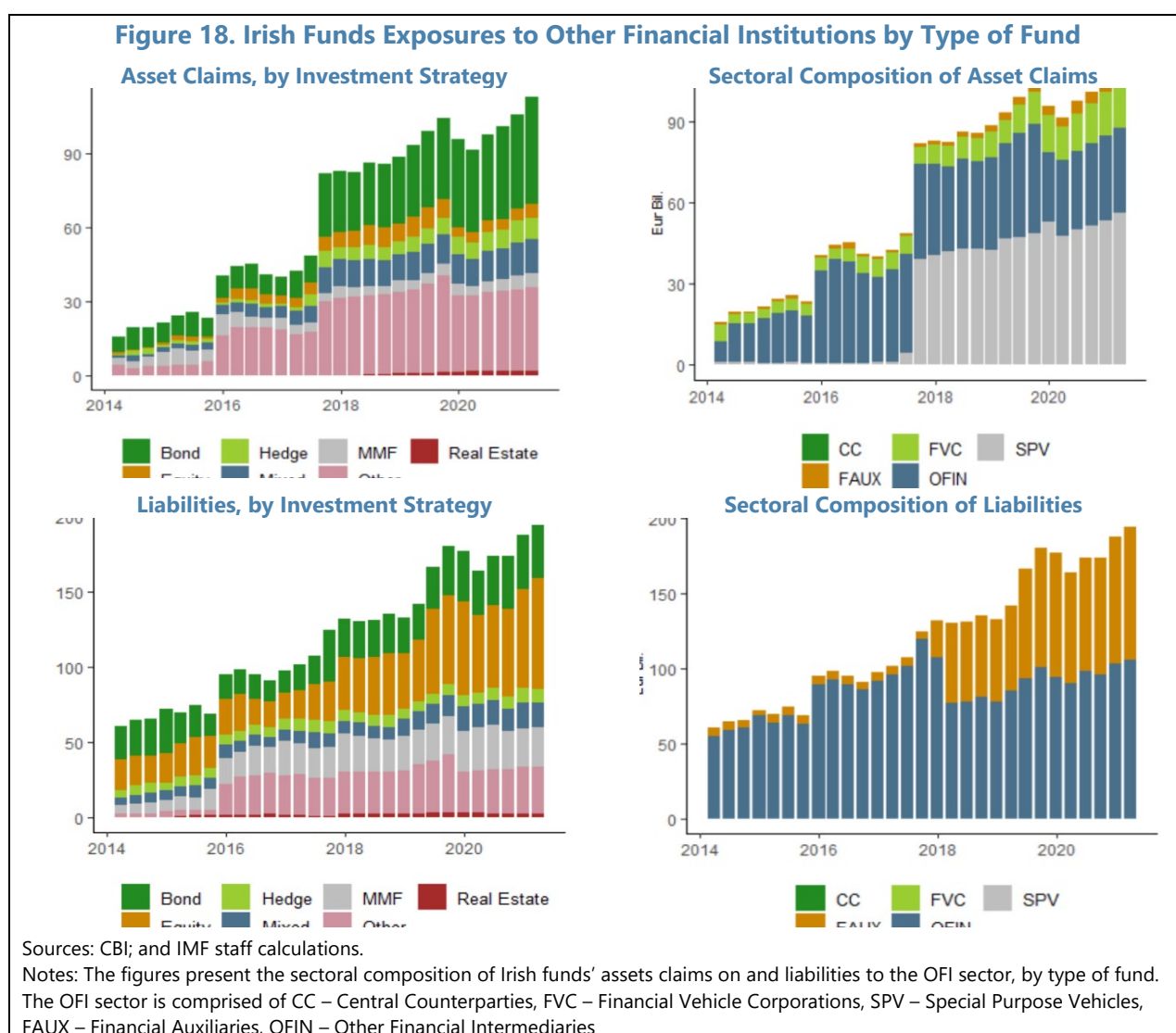
Within that, most of these claims are holdings of shares issued by large, internationally oriented MNEs that are domiciled in Ireland, rather than indigenous NFCs. Hedge funds have increased their holdings of NFC equities over time, with hedge funds and equity funds having some of the largest claims on the real sector. On the liability side, funds liabilities to the NFC sector are mostly in the form of NFCs' holdings of fund shares.



59. The Irish funds sector's asset and liability exposures to other financial institutions (OFIs) have significantly increased since the 2016 FSAP. Fund assets and liabilities to OFIs reached close to 30 percent and 50 percent of GDP respectively in 2021Q1, up by around 20 percentage points each over the last five years.

60. Irish funds' exposures to the OFI sector are primarily through SPVs, FVCs, other financial intermediaries, and financial auxiliaries. In 2021Q1, the majority of fund asset claims were on SPVs and other financial intermediaries (Figure 17). The data series displays an abrupt increase in fund claims on SPVs from €5 billion in 2017Q2 to €44 billion in 2017Q3, related to enhanced data gathering.

61. The CBI has enhanced its data collection on the activities of SPEs, but specific aspects of OFI residual activity in Ireland remain opaque. CBI has made significant strides since the 2016 FSAP to enhance data collection on SPVs and FVCs. However, data gaps remain on certain aspects of market-based finance sector in Ireland, in particular the activities and network linkages of the OFI residual. The opaqueness of these links precludes a full assessment of the extent of these cross-sectoral exposures. While some activities of the OFI residual are related to the MNEs in Ireland which is collected by the CSO; the existing data are not detailed enough in this analysis to determine the exact portion of the fund asset claims on OFIs residual that ultimately goes to funding the economic activity in Ireland.



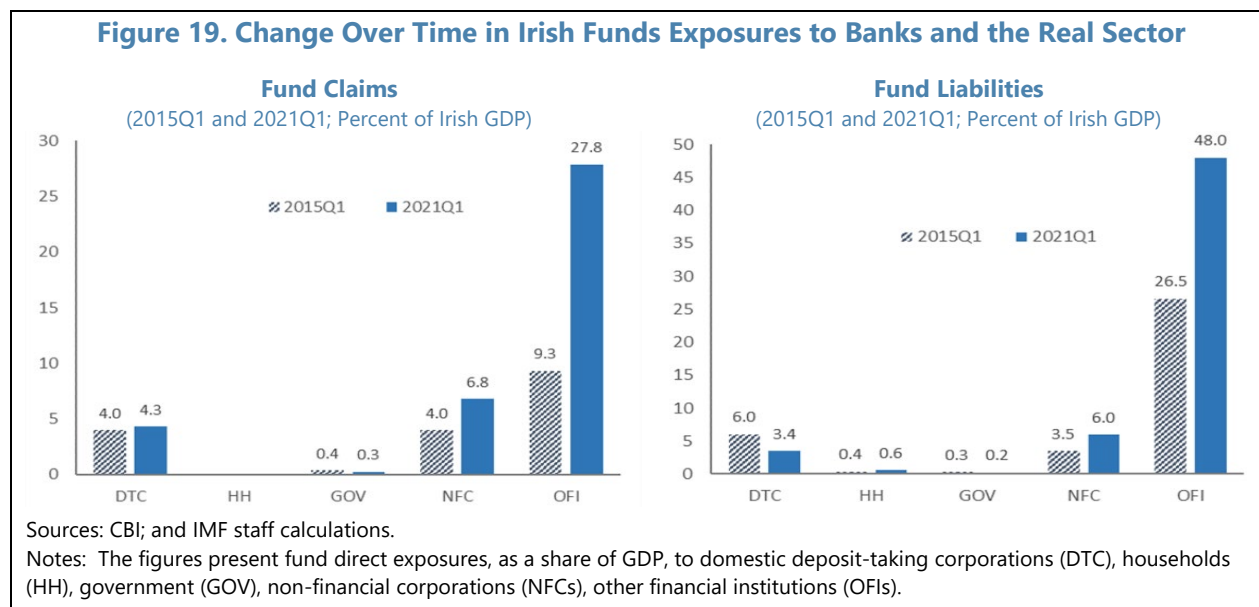
62. To summarize, Irish funds' linkages to domestic banks and the real sector are relatively low, but funds have significant linkages with the OFI sector. While the majority of the OFI sector is also internationally focused, this raises the potential for *indirect* linkages between the funds sector and the domestic economy. One caveat, however, is that the observed links can be the result of statistical aggregation within OFI (particularly, OFI residual) classes of very heterogeneous composition. The linkages between funds and OFIs have increased significantly since 2015, with fund assets and liabilities to OFIs close to 30 percent and 50 percent of GDP, respectively, in 2021Q1. With sizeable increases in

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these claims in recent years, assessing potential indirect linkages between the funds sector and the domestic economy via the OFI sector would help enhance the overall understanding of the network.

63. Recommendation 6: The CBI should conduct further in-depth analyses of the indirect linkages of the funds sector to the domestic economy, with a focus on funds' claims on the SPEs and OFI residual sectors.

64. Recommendation 7: Ensure sufficient resources at the CBI MBF unit to allow it to monitor developments and conduct the analyses recommended in this technical note.



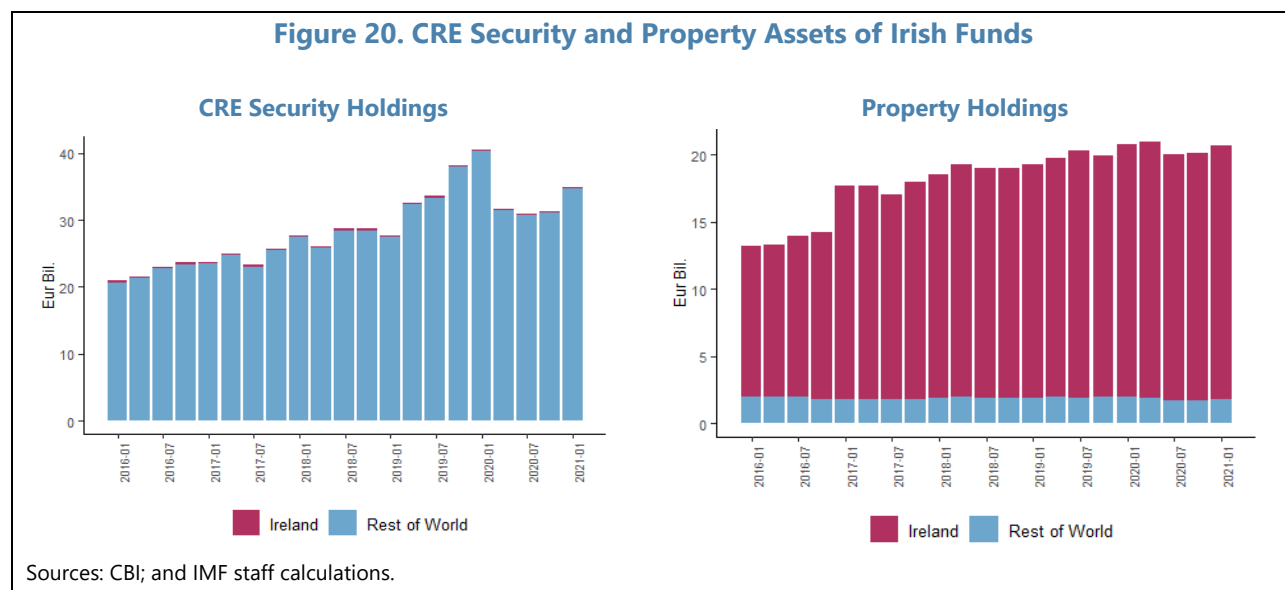
D. Fund Exposures to Commercial Real Estate

65. The CRE sector has been an amplifier of shocks in several previous financial crises. Examples includes the Swedish financial crisis of the early 1990s and the U.S. financial crisis of 2007-09. A significant fall in CRE prices could adversely affect bank and non-bank investors in CRE through channels including their direct loans and investments (GFSR, 2021).⁴¹ On the other hand, if faced with redemption pressures, funds could fire sell CRE assets which could lead to significant impact on CRE prices due to the high illiquidity of CRE. Depending on the extent of financing from banks and other financial institutions, the CRE sector could act as a source or amplifier of shocks that originate in separate parts of the financial system.

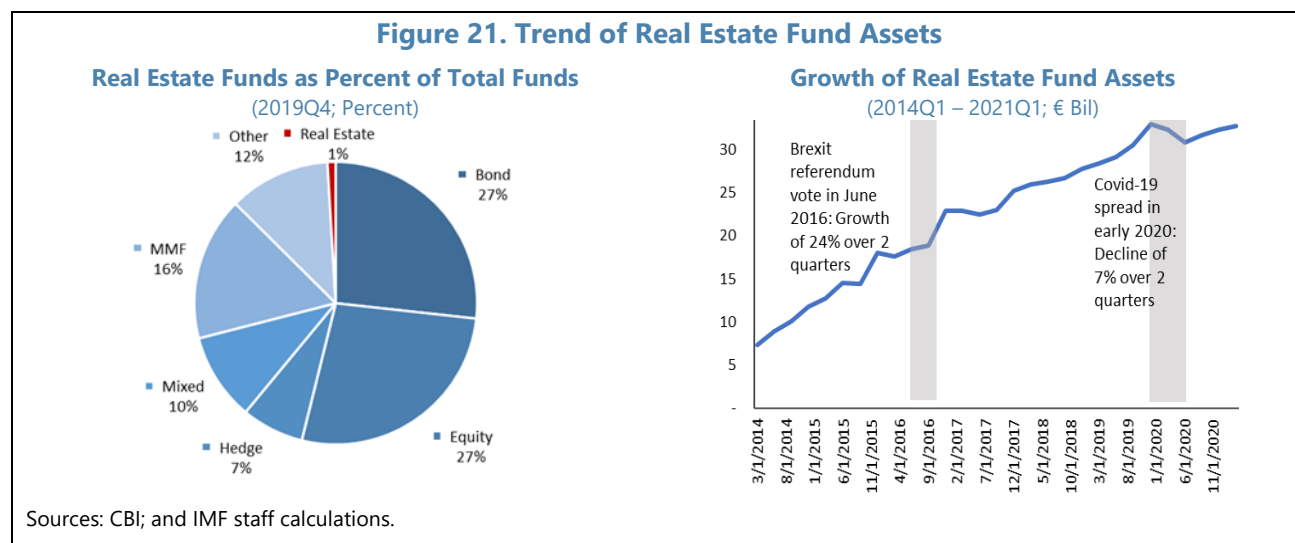
66. Irish funds are exposed to CRE through their holdings of securities and real property assets. The total CRE holdings of funds are around €55 billion in 2020Q4 (Figure 20), with approximately 65 percent in CRE securities and the rest in property holdings. There has been an upward trend in both CRE security and property assets over time, with CRE securities increasing from €21 billion to €35 billion from 2015Q1 to 2020Q4, and property assets increasing from €13 billion to €21 billion over the same

⁴¹ <https://www.imf.org/en/Publications/GFSR/Issues/2021/04/06/global-financial-stability-report-april-2021#chapter3>

period. While almost all the CRE securities of the funds sector are cross-border claims, over 90 percent of their real property holdings are located in Ireland.

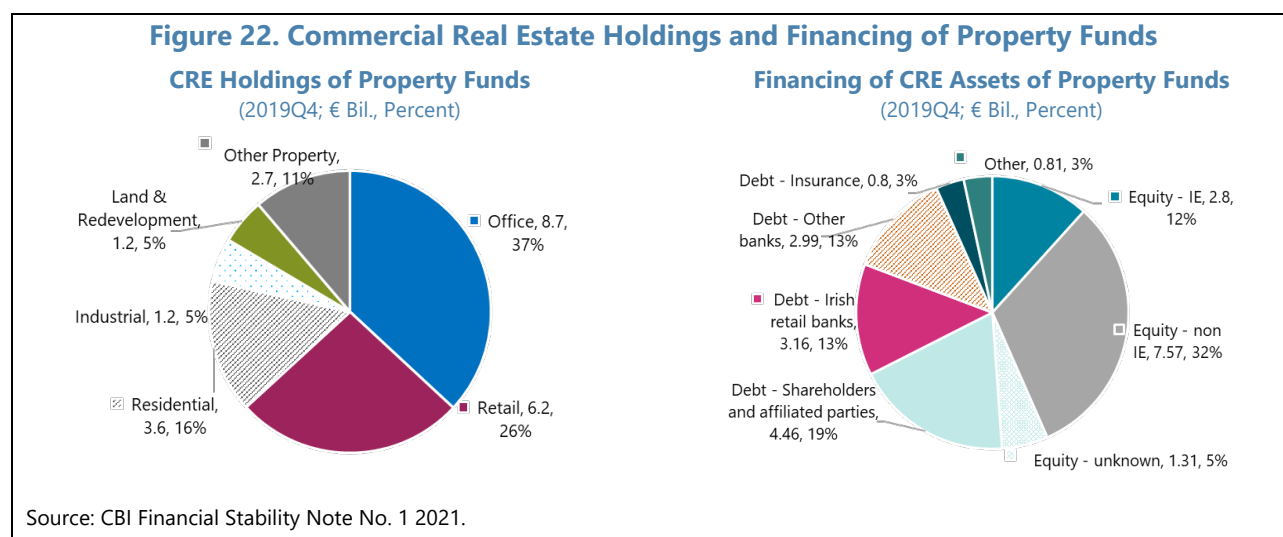


67. All of the fund sector’s investments in Irish property are held by the specialized fund category of real estate funds. Real estate funds are a relatively small part of the Irish funds sector, but real estate fund assets experienced strong growth by increasing from around €13 billion in 2015Q1 to close to €33 billion in 2021Q1 (Figure 21). This represented a growth rate of 60 percent, superseding the growth rate of around 45 percent for the entire investment fund sector over this 6-year period.



68. A deep-dive analysis carried out by CBI indicates that property funds finance their CRE investments by issuing debt and equity in roughly equal proportions. CBI has made significant strides in analyzing the CRE sector through its Deep Dive. Property funds are real estate funds that invest in physical property and land as opposed to just instruments such as debt securities or equity. Equity financing accounted for around €11.7 billion of CRE investments, whereas debt financing accounted for around €11.4 billion in 2019Q4 (Figure 22). Of the total amounts they invested in CRE,

over 60 percent was in office and retail spaces. Residential property was the next largest category, accounting for over 15 percent of the CRE investments of property funds.



69. While the CRE investments make up to a small portion of the fund sector's total assets, they are a significant source of funding for the domestic CRE property market. Direct fund investments correspond to over 40 percent of the total invested CRE sector in Ireland. CBI estimated that the size of the invested CRE property market in Ireland was around €55 billion in 2019Q4 (Figure 23).⁴² Investment by property funds accounted for 43 percent of this total, followed by Irish insurance corporations and real estate investment trusts (REITs) at 8 percent and 5 percent, respectively. The remaining 44 percent of investments were held by counterparties that cannot be identified in the available data, including domestic and international investors.

70. The CRE sector creates common exposures across multiple segments of the Irish financial system. In addition to the direct property investments by funds, insurance corporations, and REITs discussed above, Irish banks also provide debt financing to the CRE sector. Total lending by retail banks to the CRE sector stood at about €10.9 billion as of 2019Q4, of which €3.6 billion is in the form of loans to property funds and REITs that invest in CRE. Non-retail banks' indirect exposure (via loans to property funds and REITs) stood at €3 billion while there were no data available on the size of their direct loans to the CRE sector. Similarly, pension funds' indirect exposure (via their investments in property funds) stood at €1.1 billion with no data available on the size of their direct investments to the CRE sector.

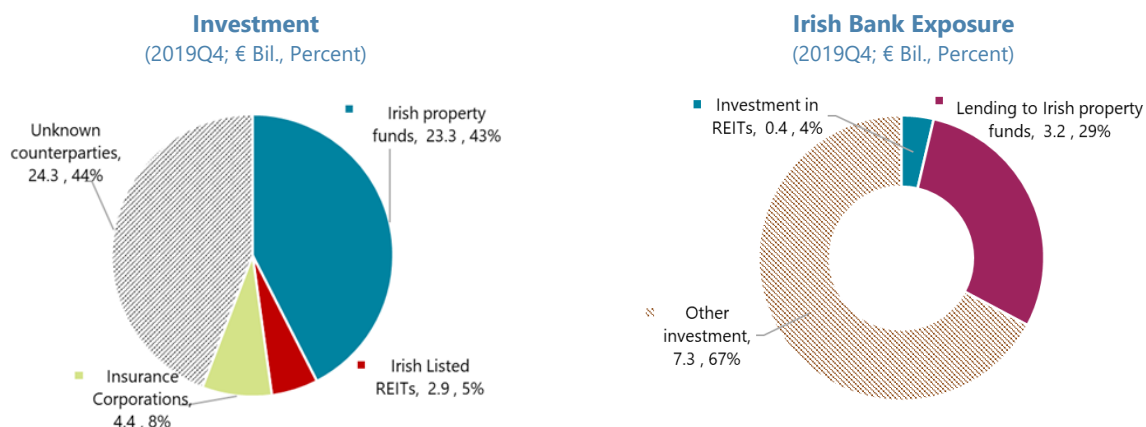
71. While the aggregate investment into the CRE sector corresponds to a small amount within the total Irish financial system assets, it creates linkages across almost all segments of the system. There is potential risk reduction due to the greater diversification of CRE financing as compared to the past when the CRE exposures were concentrated in the banking sector. However, the dense interconnections of CRE with the Irish financial system could pose a risk to institutions with large exposures to CRE even when the initial shock originates from outside that sector. For example, external liquidity shocks to the funds sector could lead to pressure on the CRE sector, which in turn could result in losses for banks that have larger exposures to CRE, despite the limited direct connections between

⁴² <https://www.centralbank.ie/docs/default-source/publications/financial-stability-notes/no-6-who-invests-in-the-irish-commercial-real-estate-market-an-overview-of-non-bank-institutional-ownership-of-irish-cre.pdf>

funds and banks. Additionally, there is limited information on the cross-border financing to the CRE sector in Ireland.

72. Recommendation 8: the CBI should reduce the remaining gaps in the non-bank lending and cross-border financing of the CRE sector.

Figure 23. Irish Funds and Banks Exposures to Irish Commercial Real Estate



Sources: Deep Dive Database on Irish Property Funds, REITs Annual Reports, Solvency II Returns, Quarterly Summary Financial Return V2 ("QSFR") and CBI calculations.

Appendix I. Definitions of the Network and Balance Sheet Sectors

	Sector	Definition
DTC or MFI	Deposit-taking Corporation	The deposit-taking corporations sector includes all financial corporations and quasi-corporations which are principally engaged in financial intermediation and whose business is to receive deposits and/or close substitutes for deposits from institutional units, and to grant loans and/or to make investments in securities.
MMF	Money Market Funds	The MMF sector, as collective investment schemes, consists of all financial corporations and quasi-corporations whose business is to issue investment fund shares or units as close substitutes for deposits, and to make investments primarily in money market fund shares/units, short-term debt securities, and/or deposits.
CGV	Central Government	The central government consists of the institutional unit or units making up the central government plus those non-market Non-Profit Institutions (“NPIs”) that are controlled by central government.
LGV	Local Government	The local government consists of local governments that are separate institutional units plus non-market NPIs controlled by local governments.
SGV	State Government	The state government consists of state governments that are separate institutional units plus non-market NPIs controlled by state governments.
SSF	Social Security Funds	Social security funds are separately organized from the other activities of government units and hold their assets and liabilities separately from the latter; they are separate institutional units because they are autonomous funds, they have their own assets and liabilities and engage in financial transactions on their own account.
OFI	Other Financial Intermediaries	The other financial intermediaries sector, excluding insurance corporations and pension funds and investment funds, consists of all financial corporations and quasi-corporations who are engaged in financial intermediation by incurring liabilities in forms other than currency, deposits, or investment fund shares, or in relation to insurance, pension and standardized guarantee schemes from institutional units.
IC	Insurance Corporations	The insurance corporations sector consists of all financial corporations and quasi-corporations who are engaged in financial intermediation as the consequence of the pooling of risks mainly in the form of direct insurance or reinsurance.
PF	Pension Funds	The pension funds sector consists of all financial corporations and quasi-corporations who are engaged in financial intermediation as the consequence of the pooling of social risks and needs of the insured persons (social insurance).
CCP	Central Counterparties	A central counterparty (CCP) is an entity that legally interposes itself between counterparties to contracts traded in financial markets, becoming the buyer to every seller and the seller to every buyer.

	Sector	Definition
NFC	Non-financial Corporations	The non-financial corporations sector consists of institutional units which are independent legal entities, and market producers, and whose principal activity is the production of goods and non-financial services. The non-financial corporations sector also includes non-financial quasi-corporations.
IF	Investment Funds (excl. MMFs)	The non-MMF investment funds sector consists of all collective investment schemes, except those classified in the MMF sub-sector, which are principally engaged in financial intermediation. Their business is to receive from institutional units, issue investment fund shares or units which are not close substitutes for deposits, and, on their own account, to make investments primarily in financial assets other than short-term financial assets and in non-financial assets. Non-MMF investment funds cover investment trusts, unit trusts and other collective investment schemes whose investment fund shares or units are not seen as close substitutes for deposits.
FVC	Financial Vehicle Corporations	Financial vehicle corporations (FVC) are entities that undertake or intend to undertake securitization transactions and are insulated from the risk of bankruptcy or any other default of the originator. An FVC issues, or intends to issue, securities, securitization fund units, other debt instruments and/or financial derivatives and/or legally or economically owns, or may own, assets underlying the issue of securities, securitization fund units, other debt instruments and/or financial derivatives that are offered for sale to the public or sold on the basis of private placements.
FAU	Financial Auxiliaries (including Captive Financial Institutions and Money Lenders)	The financial auxiliaries sector consists of all financial corporations and quasi-corporations which are principally engaged in activities closely related to financial intermediation, but which are not financial intermediaries themselves. The captive financial institutions and money lenders sector consists of all financial corporations and quasi-corporations which are neither engaged in financial intermediation nor in providing financial auxiliary services and where most of either their assets or their liabilities are not transacted on open markets.
HH	Households (including Non-profit institutions serving households)	The households sector consists of individuals as consumers and as entrepreneurs producing market goods and non-financial and financial services (market producers). The non-profit institutions serving households (NPISHs) sector consists of non-profit institutions which are separate legal entities, which serve households, and which are private non-market producers.
SPV	Non-securitization Special Purpose Vehicles	Non-securitization Special Purpose Vehicles (SPV) are legal entities created to fulfil a narrow, specific, or temporary objective. Where the vehicle engages in securitization activity, it is an FVC (see above). Typically, non-securitization SPVs have no or few employees and do not engage in production activity.

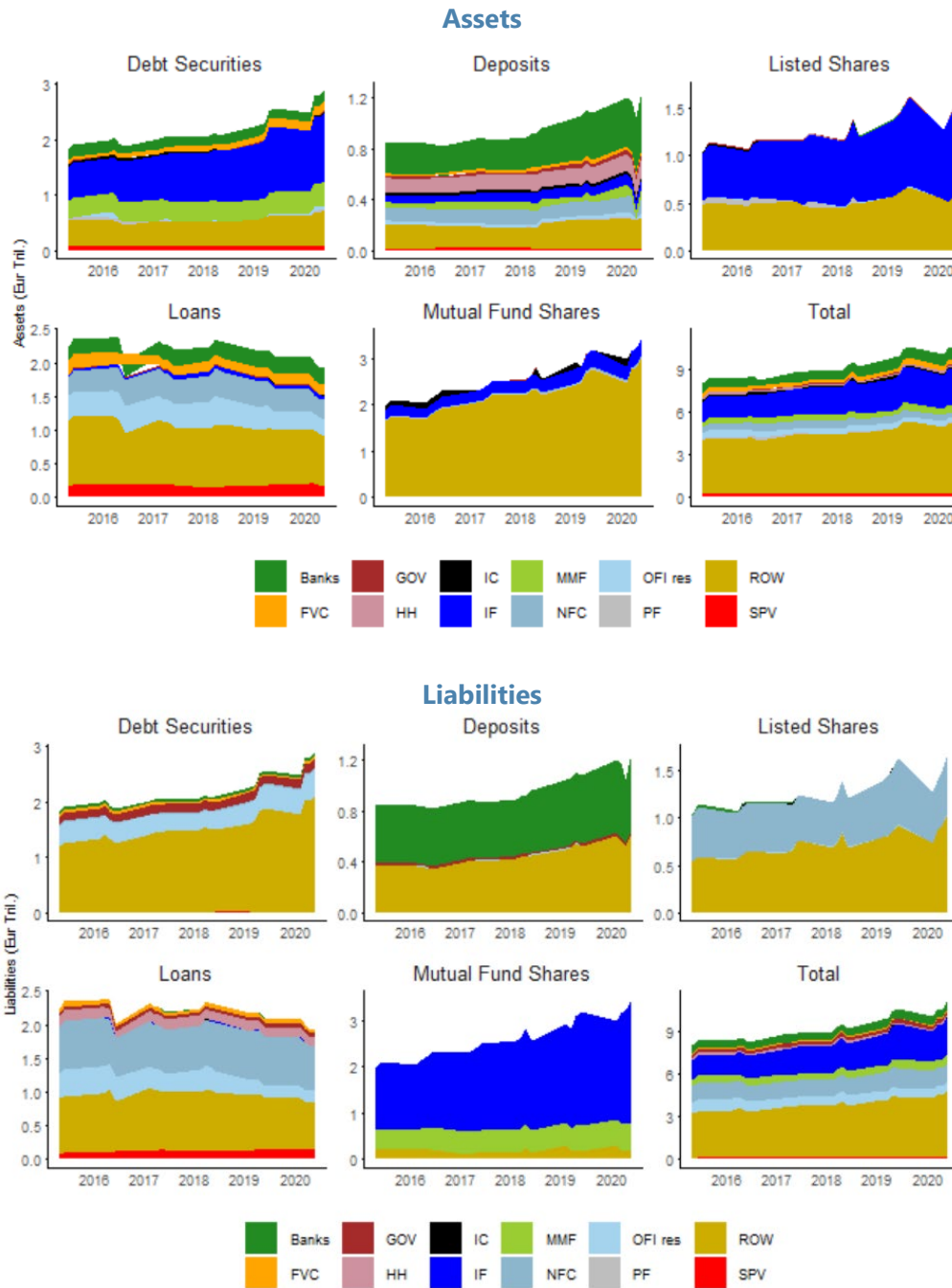
Appendix II. Mapping Between the Network and Balance Sheet Datasets

Sector in the Network Dataset	=	Sector in the Balance Sheet Dataset
IF	=	IF
MMF	=	MMF
Households	=	Households
Banks	=	Deposit-Taking Corporation
Government	=	Government
NFC	=	NFC
SPEs	=	Special Purpose Vehicles
	=	Financial Vehicle Corporations
	=	Other Financial Intermediaries
OFI residual	=	Financial Auxiliaries
	=	Central Counterparties
IC	=	IC
PF	=	PF
N/A	=	Real Estate

Source: CBI.

Appendix III. Properties of Nodes in the Financial Network

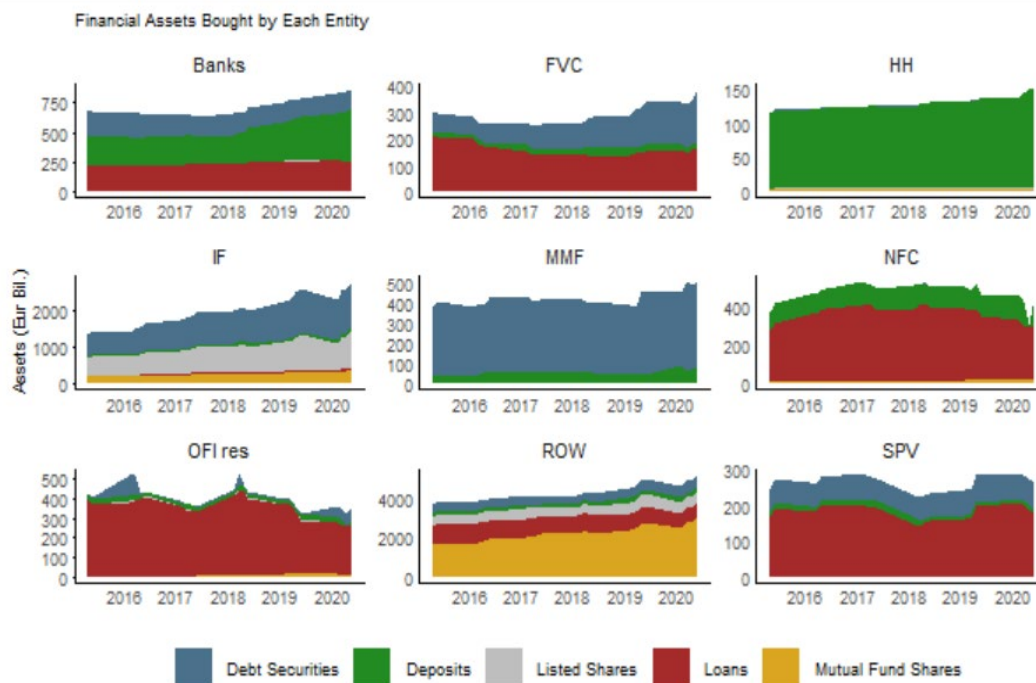
Figure A1. Sectoral Distribution of Assets and Liabilities in the Irish Financial Network



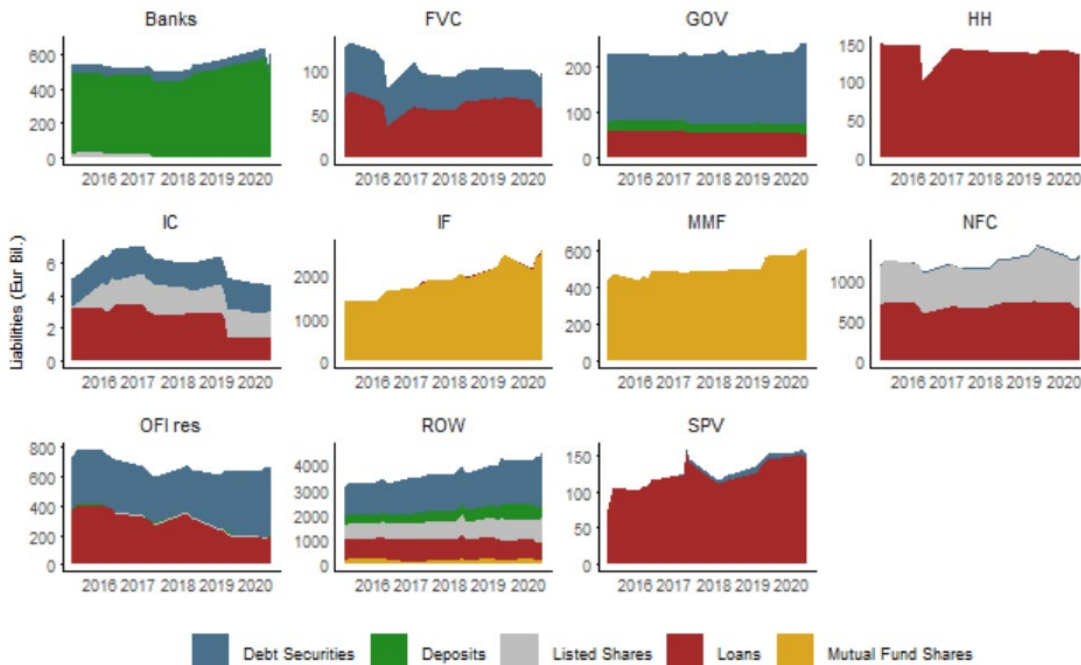
Sources: CBI; and IMF staff calculations.

Notes: The plots are based on network data extending from 2015Q1-2020Q4. Banks comprises of the MFI residual, DMFIs, and FMFIs, FVC – financial vehicle corporations, GOV – government, HH – households, IC – insurance corporations, IF – investment funds, MMF – money market funds, NFC – non-financial corporations, OFI res – other financial institutions residual, ROW – rest of the world, SPV – special purpose vehicles.

Figure A2. Sectoral Composition of Assets and Liabilities in the Irish Financial Network
Assets



Liabilities

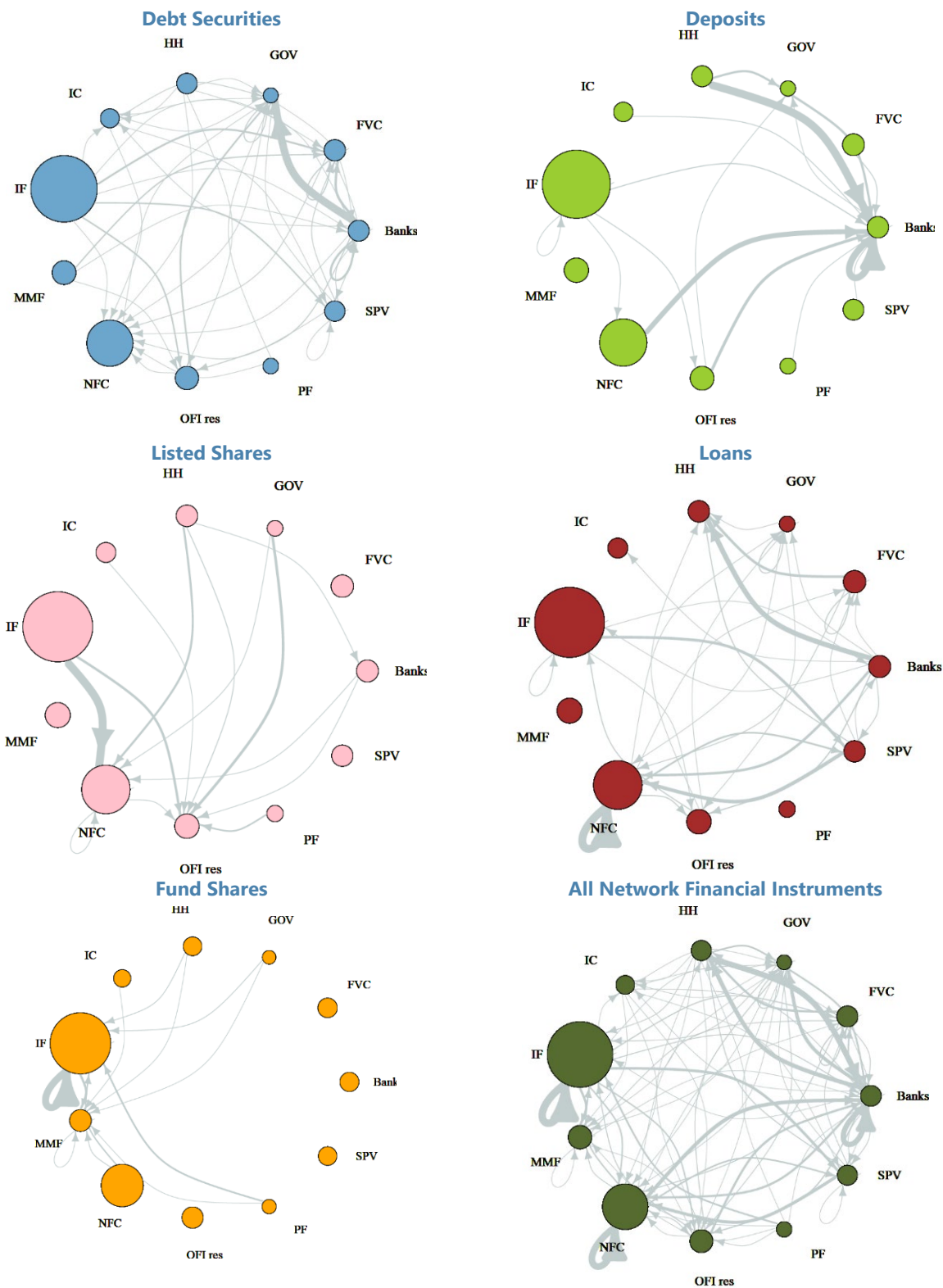


Sources: CBI; and IMF staff calculations.

Notes: In the Assets panel in this Figure, the evolution of assets of Gov, IC, and PF are excluded due to a significant amount of confidential statistics in the dataset.

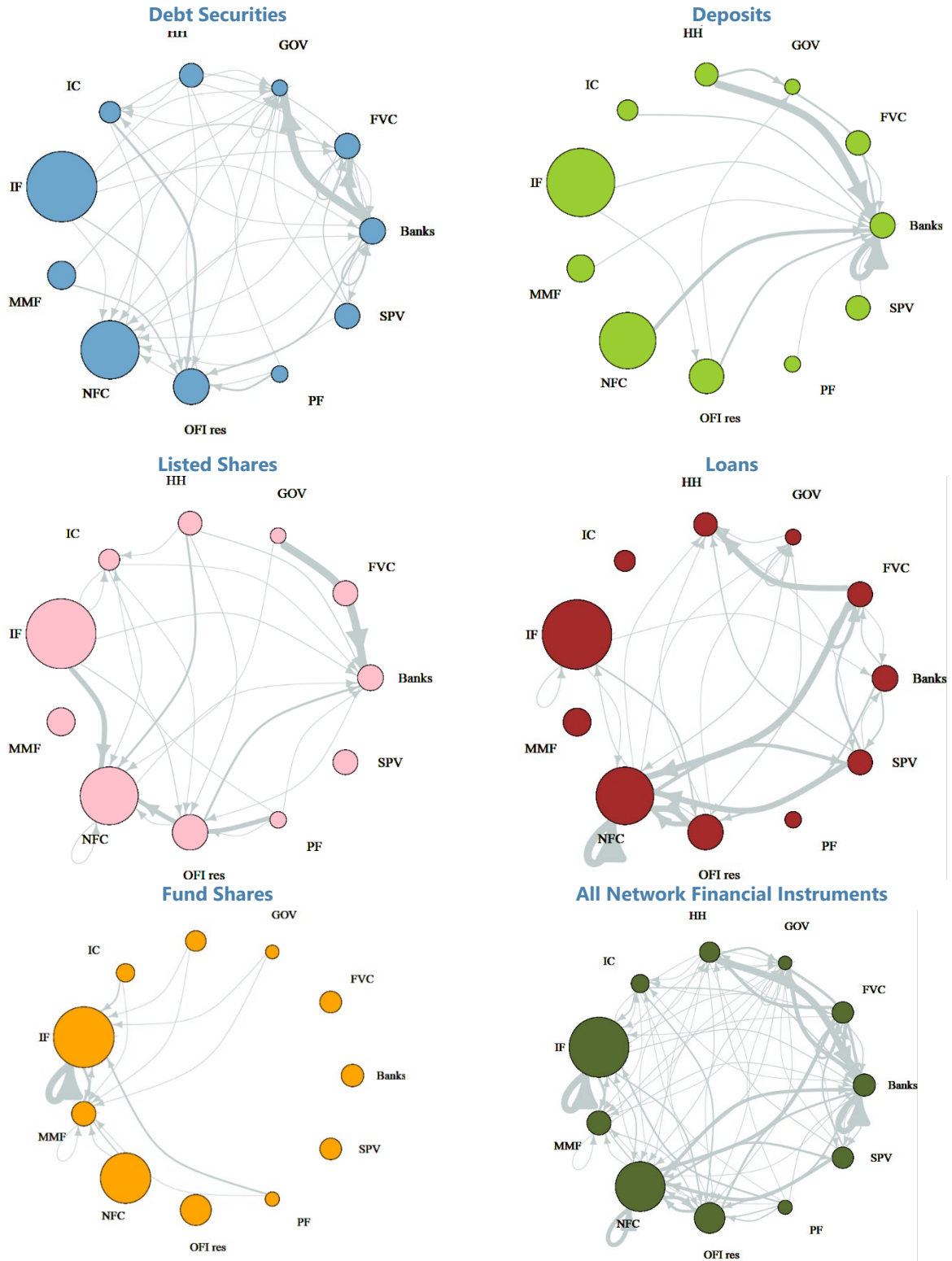
Appendix IV. Financial Network Connections in 2015 and 2020

Figure A3. Domestic Financial Interconnectedness in Ireland: 2020Q4



Sources: CBI; and IMF staff calculations.

Figure A4. Domestic Financial Interconnectedness in Ireland: 2015Q4



Sources: CBI; and IMF staff calculations.

Appendix V. Relative Claims and Obligations Matrices in 2020

Figure A5. Adjacency Matrices of Loans in 2020Q4

Bilateral Financial Exposures (€ Mil.)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV
Banks	-	2,405	1,517	86,955	214	553	-	36,200	8,931	3	112,021	3,183
FVC	-	7,485	-	36,804	-	-	-	4,752	-	-	115,282	-
GOV	-	-	6,376	1,267	-	-	-	263	682	-	336	-
HH	-	-	-	-	-	-	-	-	-	-	-	-
IC	-	-	-	-	-	-	-	-	-	-	5,250	-
IF	487	-	-	-	-	4,632	-	-	1,610	-	13,910	41,399
MMF	-	-	-	-	-	-	-	-	-	-	-	-
NFC	-	2,102	11	-	-	-	-	148,370	5,896	-	99,891	20,186
OFI Res	-	-	449	214	-	6,764	-	-	-	-	242,434	-
PF	-	-	-	-	-	-	-	-	-	-	-	-
ROW	-	48,136	44,369	3,700	1,250	-	-	404,766	161,125	-	-	77,607
SPV	527	2,322	-	6,858	-	-	-	57,845	-	-	107,718	-

Relative Claim Matrix (Percent of Total Assets of Each Sector)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV	
Banks	0.0%	1.0%	0.6%	34.5%	0.1%	0.2%	0.0%	14.4%	3.5%	0.0%	44.5%	1.3%	100%
FVC	0.0%	4.6%	0.0%	22.4%	0.0%	0.0%	0.0%	2.9%	0.0%	0.0%	70.2%	0.0%	100%
GOV	0.0%	0.0%	71.4%	14.2%	0.0%	0.0%	0.0%	2.9%	7.6%	0.0%	3.8%	0.0%	100%
HH	-	-	-	-	-	-	-	-	-	-	-	-	-
IC	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100%
IF	0.8%	0.0%	0.0%	0.0%	0.0%	7.5%	0.0%	0.0%	2.6%	0.0%	22.4%	66.7%	100%
MMF	-	-	-	-	-	-	-	-	-	-	-	-	-
NFC	0.0%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	53.7%	2.1%	0.0%	36.1%	7.3%	100%
OFI Res	0.0%	0.0%	0.2%	0.1%	0.0%	2.7%	0.0%	0.0%	0.0%	0.0%	97.0%	0.0%	100%
PF	-	-	-	-	-	-	-	-	-	-	-	-	-
ROW	0.0%	6.5%	6.0%	0.5%	0.2%	0.0%	0.0%	54.6%	21.7%	0.0%	0.0%	10.5%	100%
SPV	0.3%	1.3%	0.0%	3.9%	0.0%	0.0%	0.0%	33.0%	0.0%	0.0%	61.5%	0.0%	100%

Relative Obligation Matrix (Percent of Total Liabilities of Each Sector)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV
Banks	0.0%	3.9%	2.9%	64.0%	14.6%	4.6%	-	5.6%	5.0%	100.0%	16.1%	2.2%
FVC	0.0%	12.0%	0.0%	27.1%	0.0%	0.0%	-	0.7%	0.0%	0.0%	16.5%	0.0%
GOV	0.0%	0.0%	12.1%	0.9%	0.0%	0.0%	-	0.0%	0.4%	0.0%	0.0%	0.0%
HH	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	0.0%	0.0%	0.0%	0.0%	0.0%
IC	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	0.0%	0.0%	0.0%	0.8%	0.0%
IF	48.0%	0.0%	0.0%	0.0%	0.0%	38.8%	-	0.0%	0.9%	0.0%	2.0%	29.1%
MMF	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	0.0%	0.0%	0.0%	0.0%	0.0%
NFC	0.0%	3.4%	0.0%	0.0%	0.0%	0.0%	-	22.7%	3.3%	0.0%	14.3%	14.2%
OFI Res	0.0%	0.0%	0.9%	0.2%	0.0%	56.6%	-	0.0%	0.0%	0.0%	34.8%	0.0%
PF	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	0.0%	0.0%	0.0%	0.0%	0.0%
ROW	0.0%	77.1%	84.2%	2.7%	85.4%	0.0%	-	62.1%	90.4%	0.0%	0.0%	54.5%
SPV	52.0%	3.7%	0.0%	5.0%	0.0%	0.0%	-	8.9%	0.0%	0.0%	15.5%	0.0%
	100%	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%

Sources: CBI; and IMF staff calculations.

Notes: The numbers in the Financial Exposures matrix represents the asset claims of the sectors in each row on the sectors in each column. The percentages in the Relative Claim (Relative Liability) matrix add up to a row total (column total) of 100 percent and represent the *share* of each row (column) sector's asset claims (liabilities) on other sectors.

Figure A6. Adjacency Matrices of Debt Securities in 2020Q4

Bilateral Financial Exposures (€ Mil.)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV
Banks	13,264	15,857	65,335	-	642	-	-	140	2,867	-	67,246	-
FVC	-	3,872	-	-	-	-	-	1,962	-	-	196,823	68
GOV	73	-	2,696	-	2	-	-	158	-	-	1,107	-
HH	8	-	57	-	6	-	-	75	34	-	-	-
IC	-	607	2,051	-	-	-	-	697	-	-	39,067	430
IF	558	10,522	801	-	21	-	-	904	6,835	-	1,205,018	6,521
MMF	931	4,659	-	-	-	-	-	-	343	-	425,237	-
NFC	-	-	3	-	-	-	-	-	-	-	98	-
OFI Res	-	-	8,482	-	-	-	-	663	-	-	48,779	-
PF	-	-	320	-	-	-	-	653	-	-	37,676	-
ROW	35,112	-	93,278	-	928	-	-	42,534	475,287	-	-	-
SPV	512	1,831	25	-	-	-	-	1,091	-	-	74,817	135

Relative Claim Matrix (Percent of Total Assets of Each Sector)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV	
Banks	8.0%	9.6%	39.5%	0.0%	0.4%	0.0%	0.0%	0.1%	1.7%	0.0%	40.7%	0.0%	100%
FVC	0.0%	1.9%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%	97.1%	0.0%	100%
GOV	1.8%	0.0%	66.8%	0.0%	0.0%	0.0%	0.0%	3.9%	0.0%	0.0%	27.4%	0.0%	100%
HH	4.4%	0.0%	31.7%	0.0%	3.3%	0.0%	0.0%	41.7%	18.9%	0.0%	0.0%	0.0%	100%
IC	0.0%	1.4%	4.8%	0.0%	0.0%	0.0%	0.0%	1.6%	0.0%	0.0%	91.2%	1.0%	100%
IF	0.0%	0.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.6%	0.0%	97.9%	0.5%	100%
MMF	0.2%	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	98.6%	0.0%	100%
NFC	0.0%	0.0%	3.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	97.0%	0.0%	100%
OFI Res	0.0%	0.0%	14.6%	0.0%	0.0%	0.0%	0.0%	1.1%	0.0%	0.0%	84.2%	0.0%	100%
PF	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	97.5%	0.0%	100%
ROW	5.4%	0.0%	14.4%	0.0%	0.1%	0.0%	0.0%	6.6%	73.4%	0.0%	0.0%	0.0%	100%
SPV	0.7%	2.3%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	95.4%	0.2%	100%

Relative Obligation Matrix (Percent of Total Liabilities of Each Sector)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV
Banks	26.3%	42.5%	37.8%	-	40.2%	-	-	0.3%	0.6%	-	3.2%	0.0%
FVC	0.0%	10.4%	0.0%	-	0.0%	-	-	4.0%	0.0%	-	9.4%	1.0%
GOV	0.1%	0.0%	1.6%	-	0.1%	-	-	0.3%	0.0%	-	0.1%	0.0%
HH	0.0%	0.0%	0.0%	-	0.4%	-	-	0.2%	0.0%	-	0.0%	0.0%
IC	0.0%	1.6%	1.2%	-	0.0%	-	-	1.4%	0.0%	-	1.9%	6.0%
IF	1.1%	28.2%	0.5%	-	1.3%	-	-	1.8%	1.4%	-	57.5%	91.1%
MMF	1.8%	12.5%	0.0%	-	0.0%	-	-	0.0%	0.1%	-	20.3%	0.0%
NFC	0.0%	0.0%	0.0%	-	0.0%	-	-	0.0%	0.0%	-	0.0%	0.0%
OFI Res	0.0%	0.0%	4.9%	-	0.0%	-	-	1.4%	0.0%	-	2.3%	0.0%
PF	0.0%	0.0%	0.2%	-	0.0%	-	-	1.3%	0.0%	-	1.8%	0.0%
ROW	69.6%	0.0%	53.9%	-	58.0%	-	-	87.0%	97.9%	-	0.0%	0.0%
SPV	1.0%	4.9%	0.0%	-	0.0%	-	-	2.2%	0.0%	-	3.6%	1.9%
	100%	100%	100%	-	100%	-	-	100%	100%	-	100%	100%

Sources: CBI; and IMF staff calculations.

Notes: The numbers in the Financial Exposures matrix represents the asset claims of the sectors in each row on the sectors in each column. The percentages in the Relative Claim (Relative Liability) matrix add up to a row total (column total) of 100 percent and represent the *share* of each row (column) sector's asset claims (liabilities) on other sectors.

Figure A7. Adjacency Matrices of Listed Shares in 2020Q4

Bilateral Financial Exposures (€ Million)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV
Banks	-	-	-	-	-	-	-	113	1	-	487	-
FVC	-	-	-	-	-	-	-	-	-	-	-	-
GOV	-	-	-	-	-	-	-	27	3,775	-	462	-
HH	16	-	-	-	-	-	-	2,624	299	-	-	-
IC	-	-	-	-	-	-	-	-	240	-	-	-
IF	-	-	-	-	-	-	-	14,810	3,207	-	1,059,906	-
MMF	-	-	-	-	-	-	-	-	-	-	-	-
NFC	-	-	-	-	-	-	-	145	32	-	-	-
OFI Res	-	-	-	-	-	-	-	-	-	-	-	-
PF	-	-	-	-	-	-	-	-	1,513	-	-	-
ROW	-	-	-	-	1,530	-	-	603,075	-	-	-	-
SPV	-	-	-	-	-	-	-	-	-	-	-	-

Relative Claim Matrix (Percent of Total Assets of Each Sector)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV	
Banks	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	18.8%	0.2%	0.0%	81.0%	0.0%	100%
FVC	-	-	-	-	-	-	-	-	-	-	-	-	-
GOV	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	88.5%	0.0%	10.8%	0.0%	100%
HH	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	89.3%	10.2%	0.0%	0.0%	0.0%	100%
IC	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100%
IF	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	0.3%	0.0%	98.3%	0.0%	100%
MMF	-	-	-	-	-	-	-	-	-	-	-	-	-
NFC	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	81.9%	18.1%	0.0%	0.0%	0.0%	100%
OFI Res	-	-	-	-	-	-	-	-	-	-	-	-	-
PF	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100%
ROW	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	99.7%	0.0%	0.0%	0.0%	0.0%	100%
SPV	-	-	-	-	-	-	-	-	-	-	-	-	-

Relative Obligation Matrix (Percent of Total Liabilities of Each Sector)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV
Banks	0.0%	-	-	-	0.0%	-	-	0.0%	0.0%	-	0.0%	-
FVC	0.0%	-	-	-	0.0%	-	-	0.0%	0.0%	-	0.0%	-
GOV	0.0%	-	-	-	0.0%	-	-	0.0%	41.6%	-	0.0%	-
HH	100.0%	-	-	-	0.0%	-	-	0.4%	3.3%	-	0.0%	-
IC	0.0%	-	-	-	0.0%	-	-	0.0%	2.6%	-	0.0%	-
IF	0.0%	-	-	-	0.0%	-	-	2.4%	35.4%	-	99.9%	-
MMF	0.0%	-	-	-	0.0%	-	-	0.0%	0.0%	-	0.0%	-
NFC	0.0%	-	-	-	0.0%	-	-	0.0%	0.4%	-	0.0%	-
OFI Res	0.0%	-	-	-	0.0%	-	-	0.0%	0.0%	-	0.0%	-
PF	0.0%	-	-	-	0.0%	-	-	0.0%	16.7%	-	0.0%	-
ROW	0.0%	-	-	-	100.0%	-	-	97.1%	0.0%	-	0.0%	-
SPV	0.0%	-	-	-	0.0%	-	-	0.0%	0.0%	-	0.0%	-
	100%	-	-	-	100%	-	-	100%	100%	-	100%	-

Sources: CBI; and IMF staff calculations.

Notes: The numbers in the Financial Exposures matrix represents the asset claims of the sectors in each row on the sectors in each column. The percentages in the Relative Claim (Relative Liability) matrix add up to a row total (column total) of 100 percent and represent the *share* of each row (column) sector's asset claims (liabilities) on other sectors.

Figure A8. Adjacency Matrices of Fund Shares in 2020Q4

Bilateral Financial Exposures (€ Million)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV
Banks	-	-	-	-	-	-	122	-	-	-	200	-
FVC	-	-	-	-	-	-	-	-	-	-	-	-
GOV	-	-	-	-	-	4,635	121	-	-	-	29	-
HH	-	-	-	-	-	3,465	295	-	-	-	-	-
IC	-	-	-	-	-	-	532	-	-	-	-	-
IF	-	-	-	-	-	164,274	38,507	-	-	-	164,633	-
MMF	-	-	-	-	-	-	1,070	-	-	-	-	-
NFC	-	-	-	-	-	15,739	5,416	-	-	-	-	-
OFI Res	-	-	-	-	-	-	-	-	-	-	14,026	-
PF	-	-	-	-	-	25,169	381	-	-	-	-	-
ROW	-	-	-	-	-	2,452,440	580,655	-	-	-	-	-
SPV	-	-	-	-	-	-	-	-	-	-	-	-

Relative Claim Matrix (Percent of Total Assets of Each Sector)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV	
Banks	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	37.8%	0.0%	0.0%	0.0%	62.2%	0.0%	100%
FVC	-	-	-	-	-	-	-	-	-	-	-	-	-
GOV	0.0%	0.0%	0.0%	0.0%	0.0%	96.9%	2.5%	0.0%	0.0%	0.0%	0.6%	0.0%	100%
HH	0.0%	0.0%	0.0%	0.0%	0.0%	92.2%	7.8%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
IC	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
IF	0.0%	0.0%	0.0%	0.0%	0.0%	44.7%	10.5%	0.0%	0.0%	0.0%	44.8%	0.0%	100%
MMF	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
NFC	0.0%	0.0%	0.0%	0.0%	0.0%	74.4%	25.6%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
OFI Res	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100%
PF	0.0%	0.0%	0.0%	0.0%	0.0%	98.5%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
ROW	0.0%	0.0%	0.0%	0.0%	0.0%	80.9%	19.1%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
SPV	-	-	-	-	-	-	-	-	-	-	-	-	-

Relative Obligation Matrix (Percent of Total Liabilities of Each Sector)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV
Banks	-	-	-	-	-	0.0%	0.0%	-	-	-	0.1%	-
FVC	-	-	-	-	-	0.0%	0.0%	-	-	-	0.0%	-
GOV	-	-	-	-	-	0.2%	0.0%	-	-	-	0.0%	-
HH	-	-	-	-	-	0.1%	0.0%	-	-	-	0.0%	-
IC	-	-	-	-	-	0.0%	0.1%	-	-	-	0.0%	-
IF	-	-	-	-	-	6.2%	6.1%	-	-	-	92.0%	-
MMF	-	-	-	-	-	0.0%	0.2%	-	-	-	0.0%	-
NFC	-	-	-	-	-	0.6%	0.9%	-	-	-	0.0%	-
OFI Res	-	-	-	-	-	0.0%	0.0%	-	-	-	7.8%	-
PF	-	-	-	-	-	0.9%	0.1%	-	-	-	0.0%	-
ROW	-	-	-	-	-	92.0%	92.6%	-	-	-	0.0%	-
SPV	-	-	-	-	-	0.0%	0.0%	-	-	-	0.0%	-
	-	-	-	-	-	100%	100%	-	-	-	100%	-

Sources: CBI; and IMF staff calculations.

Notes: The numbers in the Financial Exposures matrix represents the asset claims of the sectors in each row on the sectors in each column. The percentages in the Relative Claim (Relative Liability) matrix add up to a row total (column total) of 100 percent and represent the *share* of each row (column) sector's asset claims (liabilities) on other sectors.

Figure A9. Adjacency Matrices of Deposits in 2020Q4

Bilateral Financial Exposures (€ Million)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV
Banks	101,054	-	713	-	-	-	-	-	-	-	351,199	-
FVC	4,635	-	-	-	-	-	-	-	-	-	19,685	-
GOV	25,243	-	-	-	-	-	-	-	-	-	-	-
HH	121,916	-	23,006	-	-	-	-	-	-	-	-	-
IC	4,278	-	-	-	-	-	-	-	-	-	18,885	-
IF	5,631	-	-	-	-	95	-	32	3,467	-	59,610	-
MMF	-	-	-	-	-	-	-	-	-	-	77,584	-
NFC	72,699	-	-	-	-	-	-	-	-	-	72,294	-
OFI Res	36,280	-	2	-	-	-	-	-	-	-	-	-
PF	2,034	-	-	-	-	-	-	-	-	-	3,983	-
ROW	241,834	-	-	-	-	-	-	-	-	-	-	-
SPV	1,929	-	-	-	-	-	-	-	-	-	10,761	-

Relative Claim Matrix (Percent of Total Assets of Each Sector)

	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV	
Banks	22.3%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	77.5%	0.0%	100%
FVC	19.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	80.9%	0.0%	100%
GOV	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
HH	84.1%	0.0%	15.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
IC	18.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	81.5%	0.0%	100%
IF	8.2%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	5.0%	0.0%	86.6%	0.0%	100%
MMF	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100%
NFC	50.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	49.9%	0.0%	100%
OFI Res	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
PF	33.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	66.2%	0.0%	100%
ROW	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
SPV	15.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	84.8%	0.0%	100%

Relative Obligation Matrix (Percent of Total Liabilities of Each Sector)

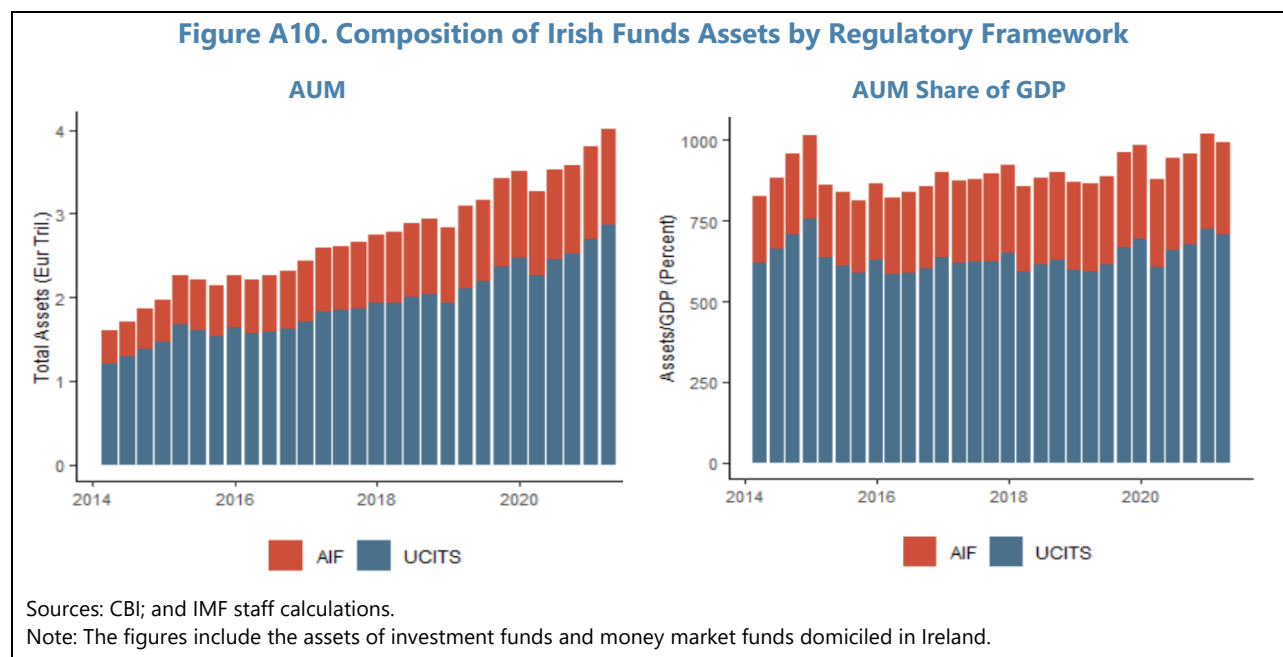
	Banks	FVC	GOV	HH	IC	IF	MMF	NFC	OFI Res	PF	ROW	SPV
Banks	16.4%	-	3.0%	-	-	0.0%	-	0.0%	0.0%	-	57.2%	-
FVC	0.8%	-	0.0%	-	-	0.0%	-	0.0%	0.0%	-	3.2%	-
GOV	4.1%	-	0.0%	-	-	0.0%	-	0.0%	0.0%	-	0.0%	-
HH	19.7%	-	97.0%	-	-	0.0%	-	0.0%	0.0%	-	0.0%	-
IC	0.7%	-	0.0%	-	-	0.0%	-	0.0%	0.0%	-	3.1%	-
IF	0.9%	-	0.0%	-	-	100.0%	-	100.0%	100.0%	-	9.7%	-
MMF	0.0%	-	0.0%	-	-	0.0%	-	0.0%	0.0%	-	12.6%	-
NFC	11.8%	-	0.0%	-	-	0.0%	-	0.0%	0.0%	-	11.8%	-
OFI Res	5.9%	-	0.0%	-	-	0.0%	-	0.0%	0.0%	-	0.0%	-
PF	0.3%	-	0.0%	-	-	0.0%	-	0.0%	0.0%	-	0.6%	-
ROW	39.2%	-	0.0%	-	-	0.0%	-	0.0%	0.0%	-	0.0%	-
SPV	0.3%	-	0.0%	-	-	0.0%	-	0.0%	0.0%	-	1.8%	-
	100%	-	100%	-	-	100%	-	100%	100%	-	100%	-

Sources: CBI; and IMF staff calculations.

Notes: The numbers in the Financial Exposures matrix represents the asset claims of the sectors in each row on the sectors in each column. The percentages in the Relative Claim (Relative Liability) matrix add up to a row total (column total) of 100 percent and represent the *share* of each row (column) sector's asset claims (liabilities) on other sectors.

Appendix VI. Trends in Irish Funds by Legal Classification

- This Annex analyses the evolution of Irish funds' assets by regulatory classification.** CBI classifies funds by investment strategy as well as by their legal status, and it is interesting to analyze the composition of assets and trends in the two types of funds by regulatory classification.
- For regulatory purposes, Irish funds are legally established either as Undertaking for Collective Investment in Transferable Securities (UCITS) or as Alternative Investment Funds (AIFs), and these differ in their risk profiles.** AIFs generally cater more toward institutional investors and are subject to fewer investment restrictions than UCITS, which operate on the principle of risk-spreading.¹ UCITS, which are open-ended funds² that can be sold to retail investors, comprise the majority of IFs and MMFs in Ireland, though AIFs have increased in proportion over the years (Figure 4).³ Comprising 25 percent of AUM in 2014Q1, AIFs increased to around 29 percent of the €4 trillion funds industry in 2021Q1. While both UCITS and AIFs are relevant from a financial stability perspective due to their sheer size, AIFs do not currently have any restrictions on their investments nor on their use of leverage. The regulatory restrictions on eligible assets, leverage and liquidity that apply to UCITS mean that the risk arising from any individual UCITS fund should in general be more limited.



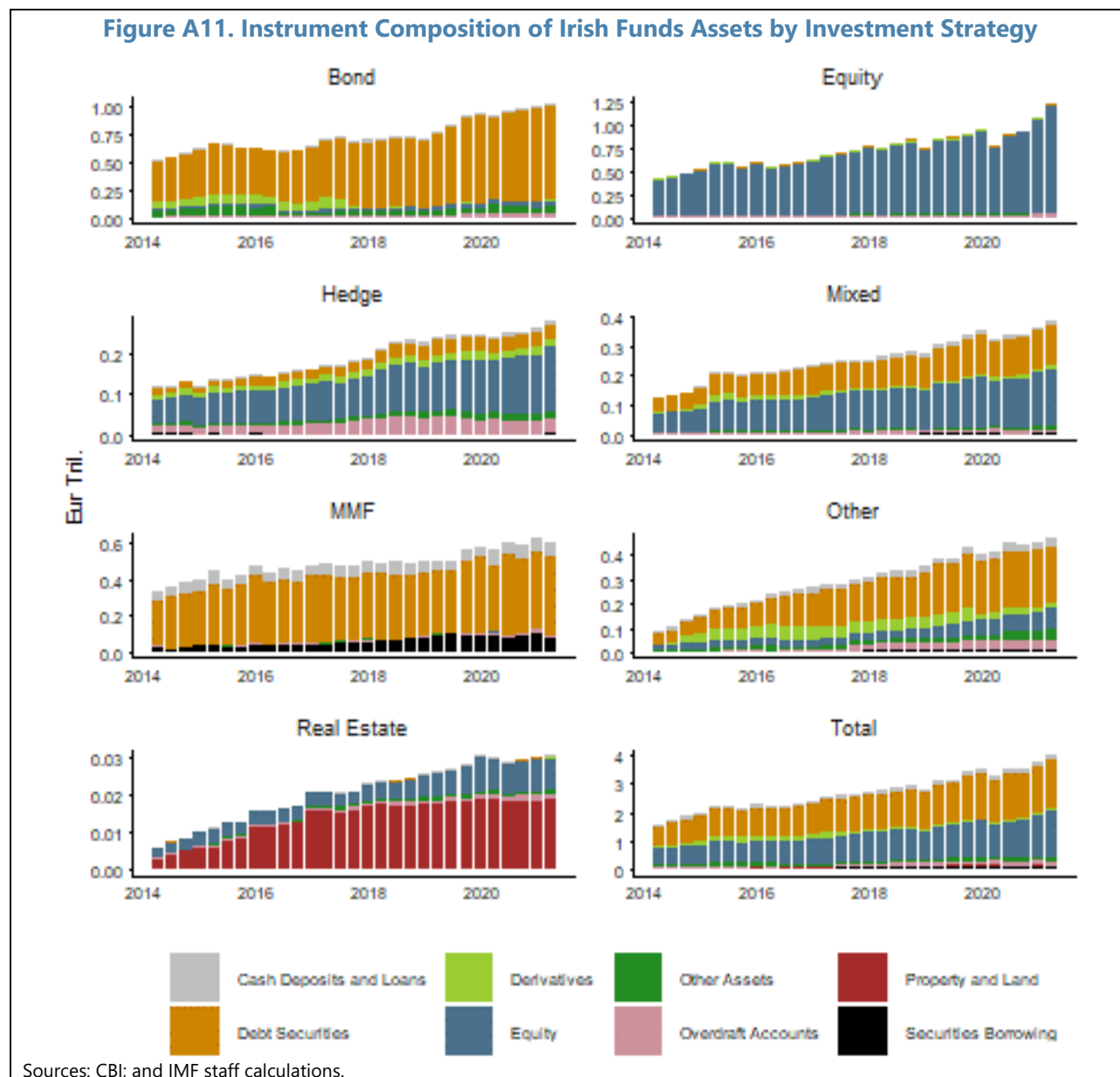
¹ A UCITS fund cannot invest more than 5 percent of its assets in securities issued by a single issuer according to the '5/10/40' rule. However, this limit can be increased up to 10 percent provided that where the 5 percent limit is exceeded, the exposure to these issuers, when added together, does not exceed 40 percent of the fund's assets.

² This means that they must pay the investor out in case a redemption occurs.

³ The figures contain around 96-98 percent of total AUM depending on the quarter, as 2-4 percent of AUM per quarter is not reported for confidentiality reasons when AUM is disaggregated each quarter by legal classification.

Appendix VII. Instrument Composition of Irish Funds Balance Sheets

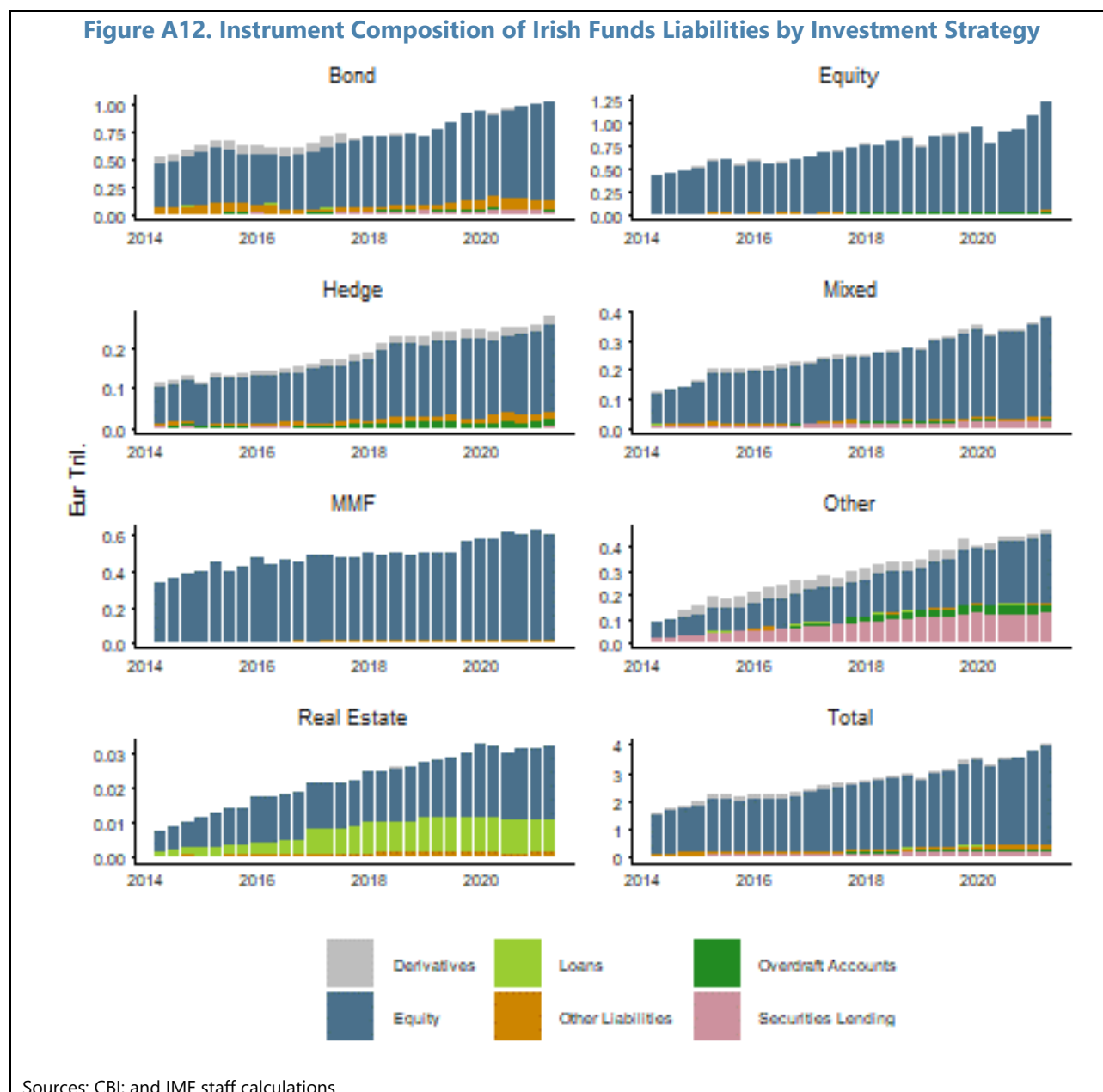
1. This annex analyzes the structure of balance sheet assets and liabilities of different categories of Irish funds, and fund exposures by instrument type to banks, the real sector, and OFIs. Balance sheet analysis is used for the purposes of identifying vulnerabilities and anticipating potential risks and spillovers by capturing the role that financial and non-financial exposures might play in creating fragility and amplifying shocks.



2. While the composition and risk profile of assets differs by investment strategy, Irish funds' assets are concentrated mainly in debt securities and equity. The total Irish funds sector, comprising of MMFs and the six types of IFs, bought debt securities amounting to around €1.7 trillion in 2021Q1, or 42 percent of total funds sector assets (Figure A11). The top investors in debt securities are bond funds, money market funds, other funds, and mixed funds. Equity is another major category that funds invest in, with total equity investments amounting to over €1.6 trillion in 2021Q1 or around

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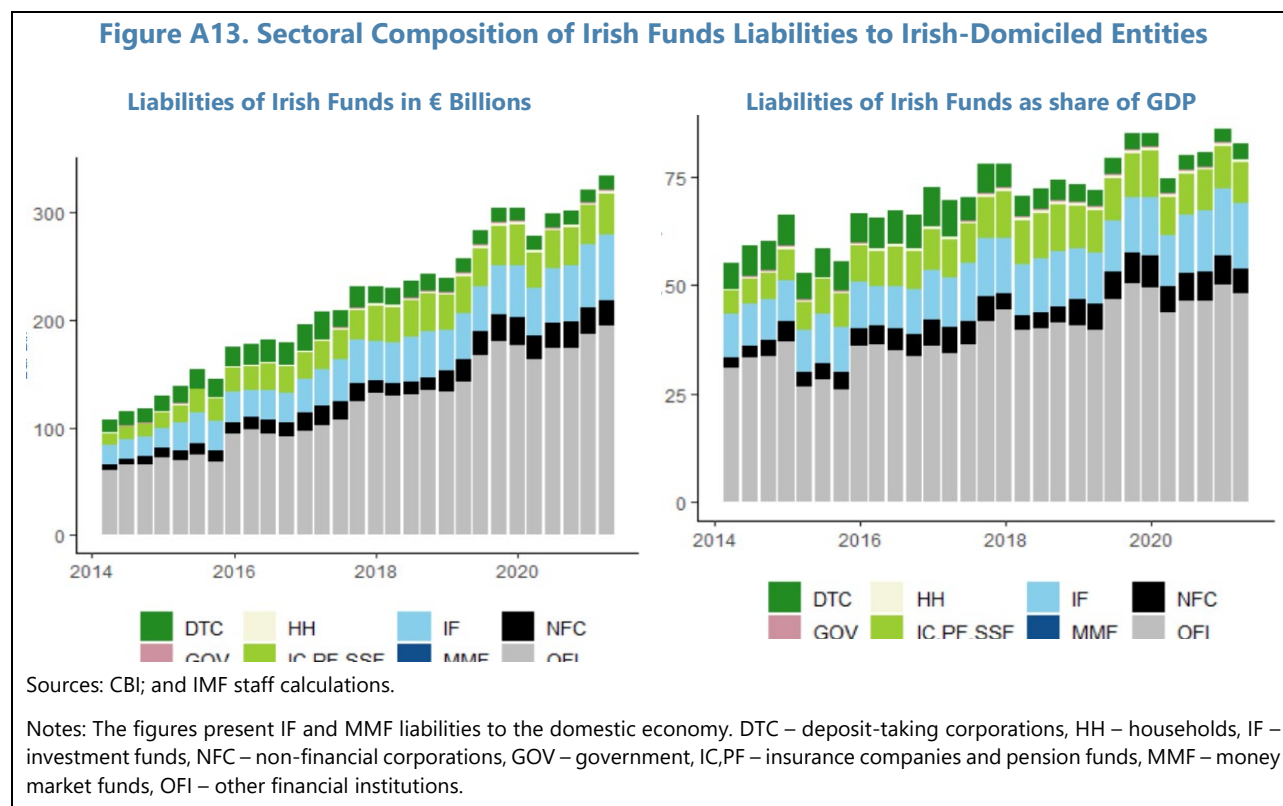
41 percent of fund assets. The top investors in equity are equity funds, mixed funds, and hedge funds. Irish real estate funds invest primarily in equity and property, although their holdings are small compared to the other funds. Derivatives, deposits and loans, securities borrowing, overdraft accounts, and other assets together comprised over 16 percent of total fund assets in 2021Q1. In the same quarter, property and land investments accounted for around €18.5 billion, or 0.5 percent of total funds sector assets, with 100 percent of property assets held by real estate funds.



3. The liabilities of Irish funds are generally highly liquid, as IF and MMF assets are funded primarily through the issuance of equity. Equity accounted for 87 percent of total funds sector liabilities in 2021Q1, with IFs and MMFs issuing around €3.5 trillion worth of equity (Figure A12). Other sources of financing on the balance sheets of funds are derivatives, loans, overdraft accounts, securities lending, and other liabilities, with these five categories together comprising around 13 percent of total

fund liabilities in 2021Q1. Besides equity financing, which is the key source of funding for all types of funds, the issuance of securities is a significant source of financing for other funds, while loans are a major source of funding for real estate funds. Securities and loans comprised around 25 and 30 percent respectively of other fund and real estate fund liabilities in 2021Q1.

4. As with assets, the domestic liabilities of Irish funds are also concentrated primarily within the fund and non-bank sectors. Domestic liabilities accounted for around 80 percent of GDP in 2020 and 2021Q1 (Figure A13). Around 30 percent of domestic liabilities are to other funds. Liabilities of the funds sector to other financial institutions (OFIs) reached close to 50 percent of GDP in 2021Q1.



5. Irish funds asset claims on the OFI sector are mainly on SPVs, FVCs, and other financial intermediaries, whereas liabilities are to other financial intermediaries and financial auxiliaries. The asset claims of funds on OFIs consist of debt securities (mainly with FVCs), cash deposits and loans (with SPVs) and a mix of overdraft accounts, equity, derivatives, debt securities, and other assets (with other financial intermediaries and financial auxiliaries). The liabilities of funds are mainly in IF and MMF shares. Of note is that some of the data is missing (especially fund liabilities to SPVs and FVCs due to data confidentiality, reclassifications and/or lack of availability of data), so that the extent of fund linkages with OFIs provided in the dataset is potentially an underestimate. **Irish funds asset claims on Irish banks have increased marginally since 2017 due to an increase in overdraft accounts, while their liabilities to banks have declined.** Fund claims on banks increased by 6 percent in 2021Q1 from €16 billion in 2017Q1 (Figure A14). This reflects a rise in the overdraft accounts of funds held at banks, which, as a percent of total fund claims on banks, increased from 36 percent in 2015Q1 to 63 percent in 2021Q1. Irish funds liabilities to the banking sector declined from 2017Q1 to 2021Q1 due to less

investment in IF and MMF shares by banks. Equity comprised over 54 percent of fund liabilities to banks from 2015Q1-2017Q1 and fell to around 21 percent in 2021Q1.

6. The Irish funds sector's exposures to the real sector comprise mostly of equity. The asset holdings of funds with respect to NFCs comprise primarily of shares issued by the corporate sector. However, other assets, which comprise of unsettled trades and accrued income, have increased over time. In 2021Q1, other assets and equity comprised 30 and 65 percent respectively of total fund claims on NFCs. Liabilities to NFCs comprise primarily of fund shares, which constituted around 80 percent of total liabilities to the non-financial corporate sector in 2021Q1. Households and the government have significantly less asset claims on funds, with their liabilities comprising of equity.

7. The cross-sectoral purchase of equities between Irish funds and NFCs has been the primary contributor to increased fund-real sector linkages. Balance sheet exposures to NFCs constitute around 95 and 90 percent of real sector assets and liabilities respectively held by Irish funds. The asset holdings of funds with respect to NFCs comprise primarily of shares issued by the corporate sector (Figure A15). However, other assets, which comprise of unsettled trades and accrued income, have increased over time. In 2021Q1, other assets and equity comprised 30 and 65 percent respectively of total fund claims on NFCs. Liabilities to NFCs comprise primarily of fund shares, which constituted around 80 percent of total liabilities to the non-financial corporate sector in 2021Q1.

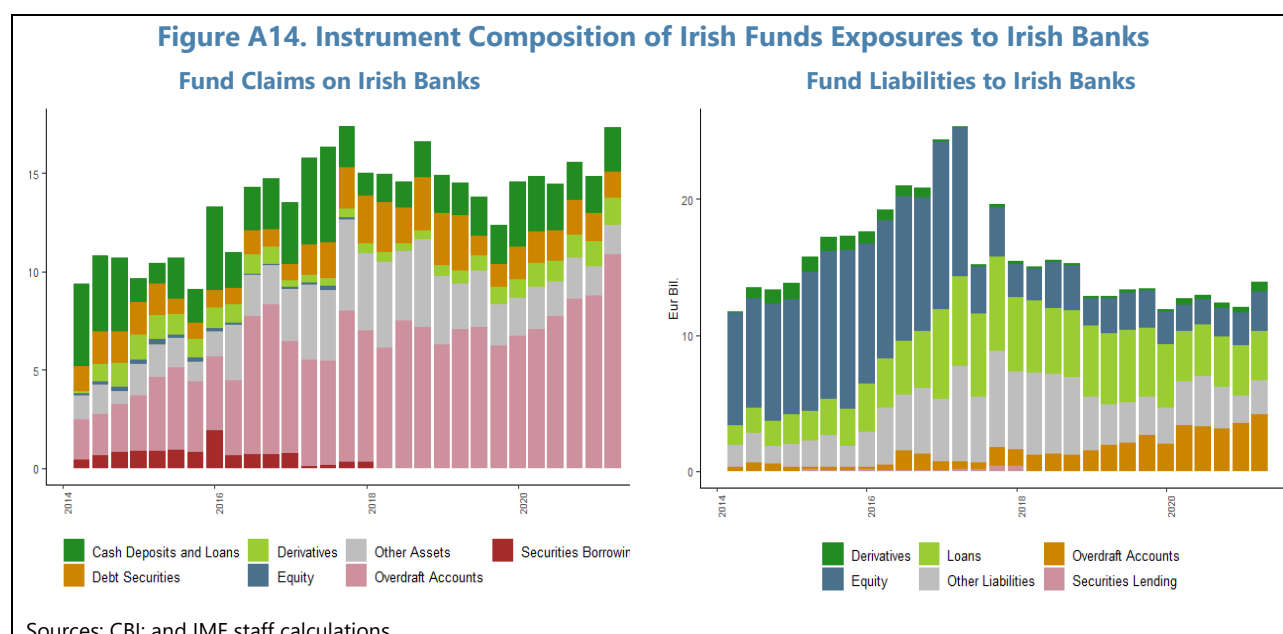
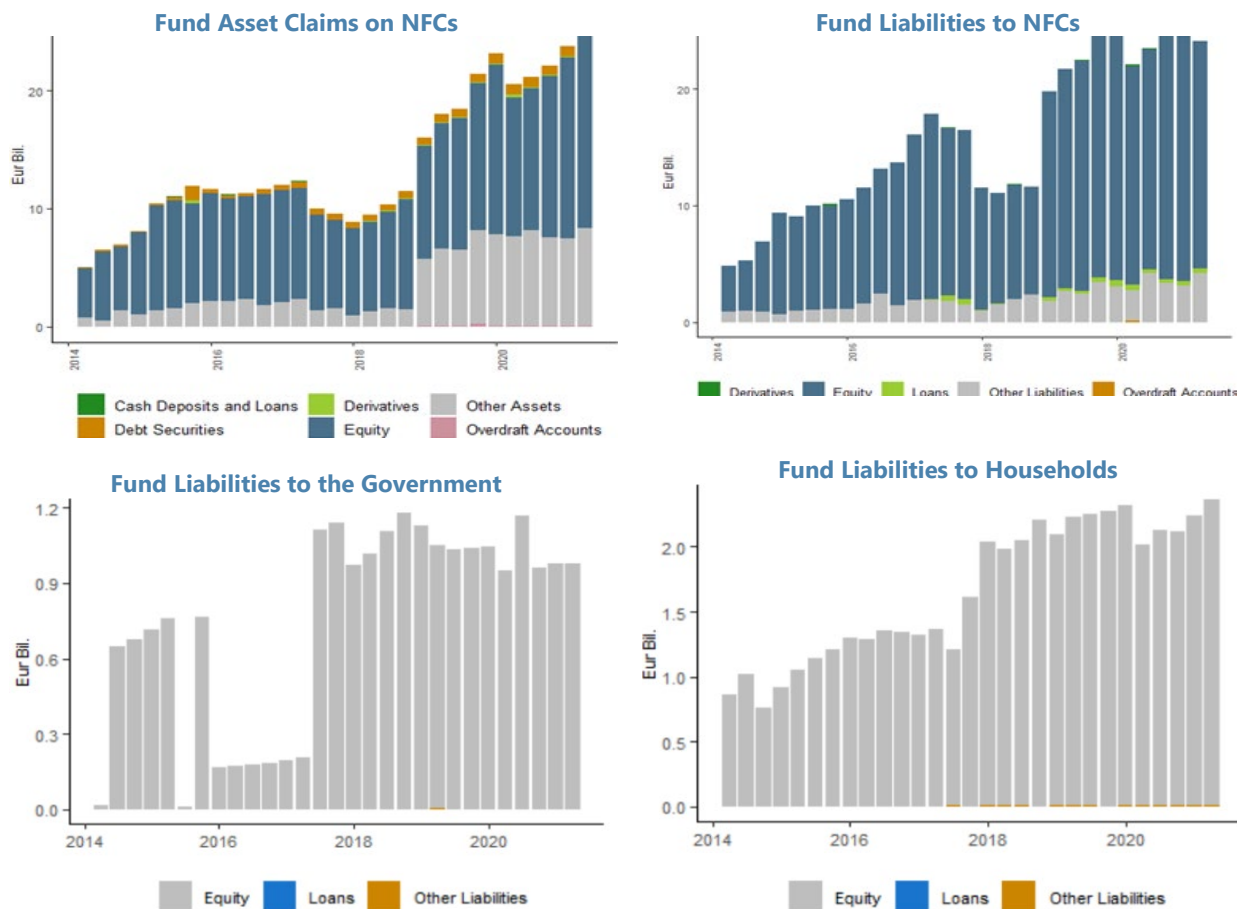


Figure A15. Instrument Composition of Irish Funds Exposures to the Real Sector



Sources: CBI; and IMF staff calculations.

Notes: The figures present the instrument and sectoral composition of total Irish funds' assets and liabilities to the real sector. The real sector is composed of HH – households, NFC – non-financial corporations, GOV – government.