ANALYSES

1. AN ANALYSIS OF THE LINKAGES BETWEEN THE BANKING AND SHADOW BANKING SECTORS IN LUXEMBOURG

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I. INTRODUCTION

At the nexus of the banking and non-bank sectors lies, what the Financial Stability Board (FSB) refers to as, the "shadow banking" system. The risk-taking activities conducted by non-bank financial intermediaries, or "shadow entities", hold the potential to generate adverse consequences for the real economy. In order to address the risks related to shadow banking activities, during the November 2010 Seoul Summit[2], the leaders of the G-20 nations requested the Financial Stability Board (FSB) to develop a set of recommendations that could strengthen the oversight and regulatory framework of the shadow banking system. The FSB considers the shadow banking system to be comprised of *"credit intermediation involving entities and activities (fully or partially) outside the regular banking system"* or, phrased more succinctly, non-bank credit intermediation. To illustrate this definition, money market funds fall under the auspices of "shadow banking" particularly in view of their activities involving liquidity and maturity transformation. However, a full and encompassing definition of shadow banking has not yet been finalized at the international level. Although the FSB's definition endeavours to "cast the net wide", from a policymaker's perspective a more precise and practical definition is needed in order to support and facilitate effective policy decisions. Notwithstanding the adoption of a comprehensive and operational definition of shadow banking in a prudential context, the oversight and regulation of the shadow banking system needs to remain adaptive in order to capture the evolving nature of shadow banking activities and risks.

In its reply to the Commission's Green Paper on Shadow Banking[3], the Eurosystem noted that, within the context of the FSB's definition of shadow banking, institutions such as finance companies, hedge funds, investment funds and entities involved in activities related to securitization, repo and securities lending, and MMFs are captured. Indeed, the shadow banking system can be viewed as a dynamic and "moving target" that may vary according to jurisdictions and regulatory frameworks. In fact, the ECB estimates that within Europe the value of assets held by "shadow entities" constitutes approximately one-half of the total assets of the banking system. Furthermore, within the euro area, there tends to be a high degree of interconnectedness between the banking and shadow banking sectors with some segments of the shadow banking sector representing an important source of funding for regulated banks[4]. In some cases, banks' off–balance sheet liabilities of financial vehicles may be guaranteed in some way by the originating banks further increasing the degree of interconnectedness. These interconnections can exacerbate the risk of runs related to the short-term deposit-like funding of non-bank entities and the high levels of leverage oftentimes associated with the use of non-deposit sources of collateralized funding, particularly if assets are over-evaluated along with low margins and/or haircut levels on secured financing.

1 Financial Stability Department, Banque centrale du Luxembourg
2 The November 2010 Seoul Summit Document, November 2010, paragraph 41.
3 The Eurosystem's reply to the Commission's Green Paper on Shadow Banking: *http://www.ecb.int/paym/sepa/pdf/2012-03-3_Eurosystem_reaction_to_EC_Green_Paper.pdf*
4 ECB Occasional Paper No. 133; "Shadow banking in the euro area: An Overview," April 2012.

Given the degree of interconnectedness between banks and shadow banks, in light of the potential for systemic risk to materialize it is important for the Eurosystem to continually monitor and assess the financial stability implications of shadow banking activities. The recent crisis experience has shown that the shadow banking system in Europe is more resilient that those that operate in other areas suggesting that the regulations governing shadow banking activities may be more comprehensive here than in other areas of the world. Nevertheless, Europe must remain vigilant to adverse developments. Indeed, the Eurosystem's reply to the Green Paper clearly states the need for a permanent process at EU level to facilitate the collection and exchange of information related to shadow banking entities. At the European level, the most appropriate authority for this task is clearly the ESRB given its macro-prudential mandate and ability to act as a forum for information exchange.

Although increasing financial integration within the Union is an important agenda to pursue, the other significant factor to consider is that current regulatory frameworks are not uniform at the international level. The effect of these non-uniformities in regulatory regimes has the potential to induce regulatory arbitrage. Consequently, this study is motivated by the strong presence of investment funds and other "shadow banking" entities in Luxembourg in addition to the need to have a more informed picture of the linkages between banks and shadow entities. This study represents the first comprehensive analysis of the linkages between banks and the shadow component of the financial system in Luxembourg.

The study is organized as follows. In part 1, we examine the role that money market funds play in the national financial sector in addition to the structure and breakdown of their composition and counterparties. Part 2 of the report extends the assessment with a particular focus on investment funds other than MMFs. In part 3 the interconnections between banks and shadow entities are assessed using a network analysis technique. Lastly, we conclude. Throughout this note we try to emphasize areas where significant policy issues are at stake and the relevance of larger European initiatives and their possible implications for Luxembourg.

PART I: MONEY MARKET FUNDS

II. MONEY MARKET FUND REFORM

This section begins with a broad overview of the current regulatory issues related to MMFs both in Europe and internationally. Money Market Funds (MMFs) are a type of investment fund with the goal of preserving the principle value of the initial investment and, in some cases, are additionally used as a cash management tool[5]. Although individual fund strategies may vary, MMFs primarily invest in short-term government debt and commercial paper. Given these characteristics, MMFs are considered to exhibit strong similarities with bank deposits yet they offer more attractive yields than a bank deposit. Importantly, the one crucial difference between the two is that, even though MMFs are not supported by official deposit guarantees, their deposit-like nature results in the perception that they represent low-risk and low-return investments. However, the absence of an official backstop makes them susceptible to runs in the event of a sudden increase in investor risk aversion. In addition MMF investors are excluded from deposit guarantee schemes (DGS).

Money Market Funds (MMFs) in the U.S. were significantly and negatively affected by contagion after the failure of Lehman Brothers. One fund in particular, Reserve Primary Fund, actually "broke the buck" as

5 The use of MMFs as a cash management tool is briefly discussed in G. Gunnarsdottir and M. Strömqvist, "Money Market Funds and Financial Stability," Economic Review of the Swedish Riksbank, 2/2010 as well as in Z. Pozsar, (2011), "Institutional Cash Pools and the Triffin Dilemma of the U.S. Banking System", IMF Working Paper.

a result of its exposures to Lehman Brothers. Rather disconcertingly, Reserve Primary's exposure to Lehman was actually quite minimal, but the event nevertheless brought attention to the possible risks associated with MMFs. The Lehman episode, in combination with MMFs' importance as a short-term funding source, highlighted the financial stability risks underlying MMFs. These systemic risks are now at the forefront of the current policy reform initiatives both in Europe and the U.S.

In addition to the progress already made on regulating the money market industry to date[6], multiple initiatives directed towards addressing the risks posed by Money Market Funds and proposals for the reform of MMFs regulation are currently ongoing at both the International and European levels. This section of the report provides a concise summary of the ongoing reform initiatives in Europe and internationally.

1.1 International Reform Initiatives

In following with the outcome of the 2010 Seoul Summit, during the November 2011 Cannes Summit, the G-20 Leaders endorsed the Financial Stability Board's initial recommendations concerning regulatory reform of the money market fund (MMF) industry. More recently, at the Los Cabos Summit in June 2012, the G-20 Leaders once again reiterated their support for the FSB's shadow banking work and encouraged the FSB to submit their formal recommendations for reform in time for the G-20 Finance Ministers and Central Bank Governors meeting in November 2012.

The Financial Stability Board has identified five key areas where policy action is needed in order to mitigate the systemic risk arising from the shadow banking sector. In particular, the FSB document[7] stressed the need *"to reduce the susceptibility of money market funds (MMFs) to "runs""*. After this initial assessment, the FSB recommended that the regulatory framework for MMFs be enhanced in order to address sources of potential risk. Subsequently, the FSB mandated the International Organization of Securities Commissions (IOSCO) to explore and identify potential regulatory policies that could help to mitigate the risk posed by uncontrolled runs on MMFs as well as other systemic risks related to MMFs activities.

In following with this request, on October 9 2012, IOSCO issued a public document containing policy recommendations geared towards improving MMFs regulation[8] and a focus on greater harmonization across jurisdictions. The IOSCO document proposed a total of 15 Recommendations to facilitate MMFs reform. Among the more significant proposals were recommendations for CNAV[9] to convert to VNAV[10] funds where workable. Alternatively, IOSCO has proposed that safeguards should be introduced in order to ensure the resilience of CNAV funds in the face of significant redemption pressures.

In the U.S., money market funds are subject to minimum daily and weekly liquidity requirements in order that they can meet investors' redemption requests. Under U.S. regulation, both taxable and tax-exempt money market funds must hold 30 percent of their assets in cash, Treasuries, government securities with remaining maturities of 60 days or less, or securities that will either mature or are subject to be callable within five business days for purposes of weekly liquidity. Such requirements could be

6 Here we refer to the CESR (now ESMA) Guidelines as well as the IOSCO recommendations which will be discussed in more detail later.
7 FSB Consultative document, "Strengthening Oversight and Regulation of Shadow Banking: An Integrated Overview of Policy Recommendations," November 2012.
8 The Board of the International Organization of Securities Commissions, "Policy Recommendations for Money Market Funds: Final Report," October 2012.
9 CNAV is an acronym for Constant Net Asset Value.
10 VNAV is an acronym for Variable Net Asset Value.

considered for adoption in Europe, thereby shortening the current period from 97 days to 60 days and indirectly imposing a type of liquidity control as well as limits on maturity transformation. Therefore alternative policy recommendations to a mandatory VNAV move are available.

1.2 European Reform Initiatives

The structure of the money market fund (MMF) sector in Europe varies across Member States and some jurisdictions provide a definition of classification of what constitutes an MMF according to their domestic laws or regulatory frameworks. In an attempt to harmonize the definition of Money Market Funds in Europe, the Committee of European Securities Regulators (CESR)[11], has created two categories of MMFs including "Short-term Money Market Funds" and "Money Market Funds". In order to use the "MMF" label, each category of fund must comply with an established list of criteria.

The need for reform within Europe was recognized in the responses to the European Commission's Green Paper on Shadow Banking. The Eurosystem's response to the Commission's Green Paper raised the concern that *"...the financial crisis has also shown that runs on VNAV money market funds[12] can also occur."* Consequently, it is the Eurosystem's position that *"...any regulating initiative mandating the move to VNAV should be complemented by additional measures limiting maturity transformation and credit risk. Such measures have already been introduced in the EU and the US. The alternative of imposing bank-like capital and liquidity requirements on MMFs that promise constant NAV, could also be contemplated."*

Regarding a mandatory move from CNAV to VNAV for MMFs, it is not certain that this addresses adequately the risks attributed to CNAV funds. A report prepared by the U.S. Committee on Capital Markets Regulation states that *"...according to the ICI* [Investment Company Institute] *French floating NAV dynamic money funds ... lost about 40 percent of their assets over a three-month time span from July 2007 to September 2007."* Box 1 provides a summary of the ESRB's recommendations that have been addressed to the European Commission.

11 CESR was succeeded by ESMA as a new European authority in charge of securities and markets oversight.
12 This issue is discussed briefly in the report entitled "Interconnectedness and Contagion" prepared by the US Committee on Capital Markets Regulation.

Box 1:

RECOMMENDATIONS ON MMFS PROPOSED BY THE ESRB

Within the ESRB, an Expert Group on Money Market Funds was established to examine the need to issue Warnings or Recommendations in line with the ESRB's macro-prudential monitoring mandate[13]*. The Group has identified a set of four possible Recommendations related to CNAV versus VNAV funds, imposing liquidity requirements, enhancing public disclosure related to the marketing material of MMFs and improving reporting and monitoring standards.*

During the December 2012 meeting of the ESRB General Board, a recommendation to require MMFs to make a mandatory move to VNAV was approved and will be published in February 2013. This recommendation will now be sent to the European Commission who will publish legislative proposals for the UCITS framework and MMFs in early 2013.

The text of the ESRB's Recommendations on Money Market Funds follows:

RECOMMENDATION A – MOVE TO VNAV

The European Commission is recommended:

1. *to require MMFs to have a fluctuating net asset value;*

2. *to require MMFs to make general use of fair valuation and to restrict the use of amortized cost accounting to a limited number of pre-defined circumstances.*

RECOMMENDATION B – LIQUIDITY REQUIREMENTS

The Commission is recommended to ensure that the relevant Union legislation:

1. *complements the existing liquidity requirements for MMFs by imposing explicit minimum amounts of daily and weekly liquid assets that MMFs must hold;*

2. *strengthens the responsibility of the funds' managers regarding the monitoring of liquidity risk;*

3. *ensures that national supervisory authorities and funds' managers have in place effective tools, for example temporary suspensions of redemptions, to deal with liquidity constraints in times of stress resulting from both fund-specific and market-wide developments.*

RECOMMENDATION C – PUBLIC DISCLOSURE

The Commission is recommended to ensure that the relevant Union legislation:

1. *requires specific disclosure by MMFs, also in their marketing material, that draws the attention of investors to the absence of a capital guarantee and the possibility of principal loss;*

13 Separately from the ESRB, Every two years the ECB publishes the Euro Money Market Study which covers the structure and functioning of the euro money market. The published results are based on a survey conducted by the European Central Bank in cooperation with national central banks that are members of the Eurosystem. The Study incorporates data and tables from a regular data survey.

2. *requires that MMFs refer in their public disclosure to possible sponsor support, capacity for support or protection only if such support or protection is a firm commitment by the sponsor, in which case it must be recognised in that sponsor's accounts and prudential requirements;*

3. *requires MMFs to disclose their valuation practices, particularly regarding the use of amortised cost accounting, as well as to provide appropriate information to investors regarding applicable redemption procedures in times of stress.*

RECOMMENDATION D – REPORTING AND INFORMATION SHARING

1. *The Commission is recommended to ensure that the relevant Union legislation:*
   (a) requires that any instances of sponsor support that may have an impact on the price of the MMF are reported by the MMF or its manager, and the sponsor, to the competent national supervisory authority, together with a full description of the nature and size of such support;
   (b) enhances regular reporting by MMFs;
   (c) ensures that competent national supervisory authorities, where relevant, share the information referred to in points (a) and (b) with other national supervisory authorities within the same Member State, or from other Member States, the European Supervisory Authorities, the members of the European System of Central Banks and the ESRB;

2. *The Commission is recommended to promote the development of harmonised reporting and a harmonised data set as mentioned in paragraph 1(b), and the organisation of information sharing mentioned in paragraph 1(c).*

III. FINANCIAL STABILITY AND MONEY MARKET FUNDS

The systemic relevance of money market funds was clearly illustrated during the September 2008 run on MMFs that occurred during the 2007-2008 crisis episode. Even though MMFs were not directly responsible for the outbreak of the financial turmoil at that time, their systemic relevance and potential to amplify or exacerbate the existing turmoil lead to their identification as a driving factor in the broader stability of the financial system.

MMFs play a systemically important role as net liquidity providers to financial institutions as well as the wider financial sector in Europe, including private household investors. Since 2006, the European MMF industry was estimated to have approximately €1 trillion in assets under management[14] (AuM) with France, Ireland and Luxembourg accounting for 90% of the total aggregate market share. According to the ECB, however, as of end-2012 the total amount of AuM of euro area MMFs fell below €1 trillion for the first time since 2006[15]. The results of the ECB Study indicate that the fall in AuM seems to be a result of the continuing low interest rate environment along with a robust demand for bank deposits which benefit from the deposit guarantee schemes in place in a number of Member States.

14 J. Ansidei, E. Bengtsson, D. Frison and G. Ward, "Money Market Funds in Europe and Financial Stability," ESRB Occasional Paper Series, No. 1/June 2012.
15 Source: ECB Euro Money Market Study, December 2012.

Box 2:

FINANCIAL STABILITY RISKS OF MMFS IN EUROPE

According to the ESRB's Occasional Paper on Money Market Funds in Europe and Financial Stability, there are four main risks underlying MMFs and their activities:

A. MATURITY TRANSFORMATION

Money Market Funds in Europe may hold risky assets on their balance sheets that have a maturity date of one year or longer. However, the same funds also issue shares to investors that, in addition to being perceived as "safe," must be redeemable on demand. Under certain conditions, such a maturity mismatch may lead to the inability of the MMF to absorb losses in the event of a sudden investor withdrawal of funds. In the absence of an official liquidity backstop and a "bank-like" set of prudential regulation, MMFs are considered to be at risk of runs.

B. DEPOSIT-LIKE FEATURES

MMFs are "deposit-like" though they are not supported by any form of official guarantee as is the case for bank deposits. The perception that MMF shares are relatively "risk-free", combined with the widespread presence of CNAV funds, may result in the perception by investors that investing in an MMF provides a similar level of security as a bank deposit, but with a higher yield. However, there are clearly risks involved in MMF investment.

C. CASH-LIKE TREATMENT

Given that MMFs are also used as cash management tools, they may be perceived as cash-equivalent. Under International Accounting Standard (IAS) rules[16], "...cash and cash equivalents comprise cash on hand and demand deposits, together with short-term, highly liquid investments that are readily convertible to a known amount of cash and that are subject to an insignificant risk of changes in value."

D. INVESTORS AND RUN RISK

The failure of Reserve Primary illustrated the effects that a sudden investor run can have on an MMF as a result of redemption pressures. At least in the U.S. case, redemptions come primarily from institutional investors[17] which tend to be more risk averse than private investors. Additionally, institutional investors may possess greater resources for - and have access to - better MMF monitoring facilities which can lead them to redeem shares pre-emptively in comparison to private investors according to the "first-mover" advantage.

16 This corresponds to IAS rule 7.7 regarding cash and cash equivalents. Note that the IASB is considering eliminating the concept of cash equivalents which may help to mitigate some of the risks associated with MMFs.
17 Please see the Financial Stability Oversight Council's (FSOC) 2011 Annual Report.

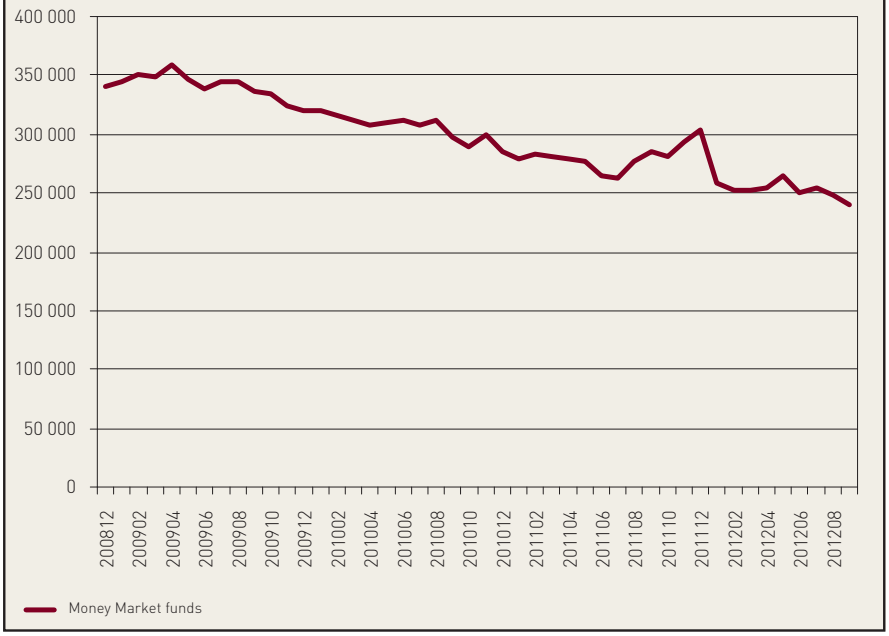
IV. THE IMPORTANCE OF MONEY MARKET FUNDS IN LUXEMBOURG

1.1 Overview of the Luxembourg MMFs Activity

According to IOSCO, the global MMF industry has a significant amount of assets under management and it is estimated to represent around US$ 4.7 trillion as of the first quarter of 2012[18]. By comparison, Luxembourg hosts a money market fund (MMF) activity with total assets under management (AuM) approaching €240 billion as of August 2012 as indicated in the accompanying figure 1. From the period displayed, it can be seen that MMF balance sheets have been in general decline since April 2009 albeit with a small but short-lived resurgence in the latter half of 2011 and early 2012.

For the total assets of MMFs in the euro area, a similar trend has been observed. Since approximately the end of 2008, euro area MMF total assets have been in near constant decline and, in 2012, dipped below €1 trillion for the first time since 2006. It is likely that the prevailing low interest rate environment is the primary factor driving this reduction in total MMF assets. The trend, therefore, seems to be occurring in a larger context and does not appear to be specific to Luxembourg.

Figure 1
Evolution of aggregate MMF balance sheet in Luxembourg, Dec. 2008 - Aug. 2012.
(millions €)



Source: BCL calculations

Recommendations for the reform of the money market fund sector can be expected to lead to structural changes in the functioning and composition of these markets. However, the precise effects of increased regulation are difficult to predict. Given the significant presence of MMFs in Luxembourg, it is important to analyse and assess the structure of this financial system component in order to achieve a better understanding of the possible impact of changes in the regulatory environment.

In Luxembourg, MMFs may be registered as a regulated Specialized Investment Funds (SIF)[19]. The legal form of a SIF can either be classified as a common fund (FCP – *fonds commun de placement*) or as an

18 Size estimate is based on statistics collected by the Investment Company Institute (ICI) and is considered to be approximate only.

19 SIFs have greater flexibility with regard to investment policy and reduced regulatory oversight in comparison to funds created under Part II of the Law of 20 December 2002 regarding undertakings for collective investment. SIF investment is also reserved for "well-informed" investors including "institutional" and "professional" investors.

investment company (SICAV – *Société d'investissement à capital variable* or SICAF – *Société d'investissement à capital fixe*). The regulation of MMFs in Luxembourg is in line with EU directives and ESMA standards.

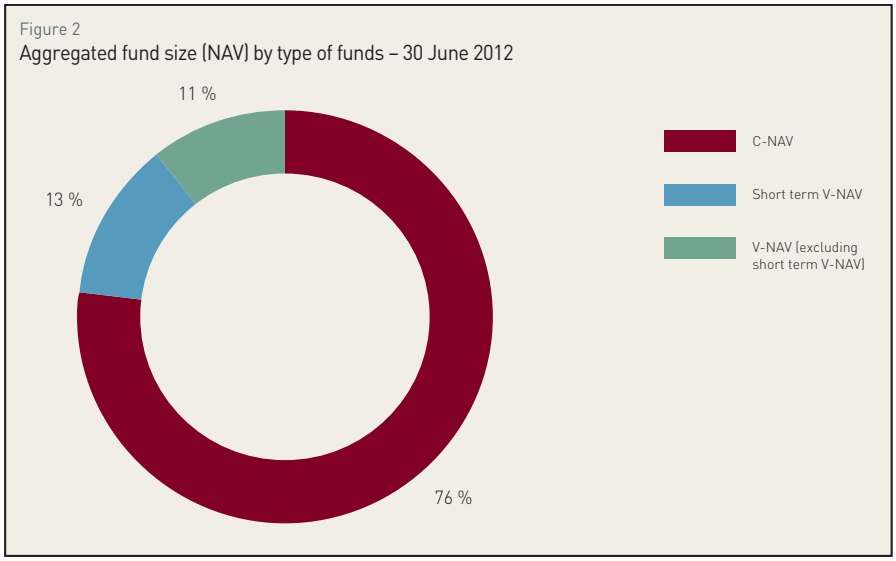
Money market funds play a key role for short-term bank funding but they also represent a source of funding for companies and governments. MMFs' prominent role as funding vehicles can, in part, be attributed to their reputation as a safe alternative to bank deposits and their use as a cash management tool by both corporations and private investors.

Despite the perception that MMFs are a low-risk investment, they do hold risky and some less liquid assets[20] in their portfolios, yet at the same time issue shares that are redeemable on demand (oftentimes on a daily basis). The resulting maturity mismatch between less liquid assets and daily redemption requests can leave MMFs with reduced ability to absorb losses and the lack of an official liquidity backstop further complicates the situation. Nevertheless, a negative shock to a significant MMF can quickly lead to broader spill-overs and negative systemic consequences for the beneficiaries of their short-term funding markets as well as banks.

1.2 CNAV and VNAV Funds in Luxembourg

In Luxembourg, two main categories of MMFs can be distinguished; constant net asset value (CNAV) funds which use amortised cost accounting to value their assets enabling a stable face value (e.g. of €1 or US$1 per share) to be maintained, and variable net asset value (VNAV) funds which principally use mark-to-market accounting. However, as of May 2010, CESR (now known as ESMA) published new criteria establishing two types of MMFs: "short-term money market funds" (STMMFs, which include both VNAV and CNAV funds) and "money market funds" (which are all VNAV funds).

Figure 2
Aggregated fund size (NAV) by type of funds – 30 June 2012



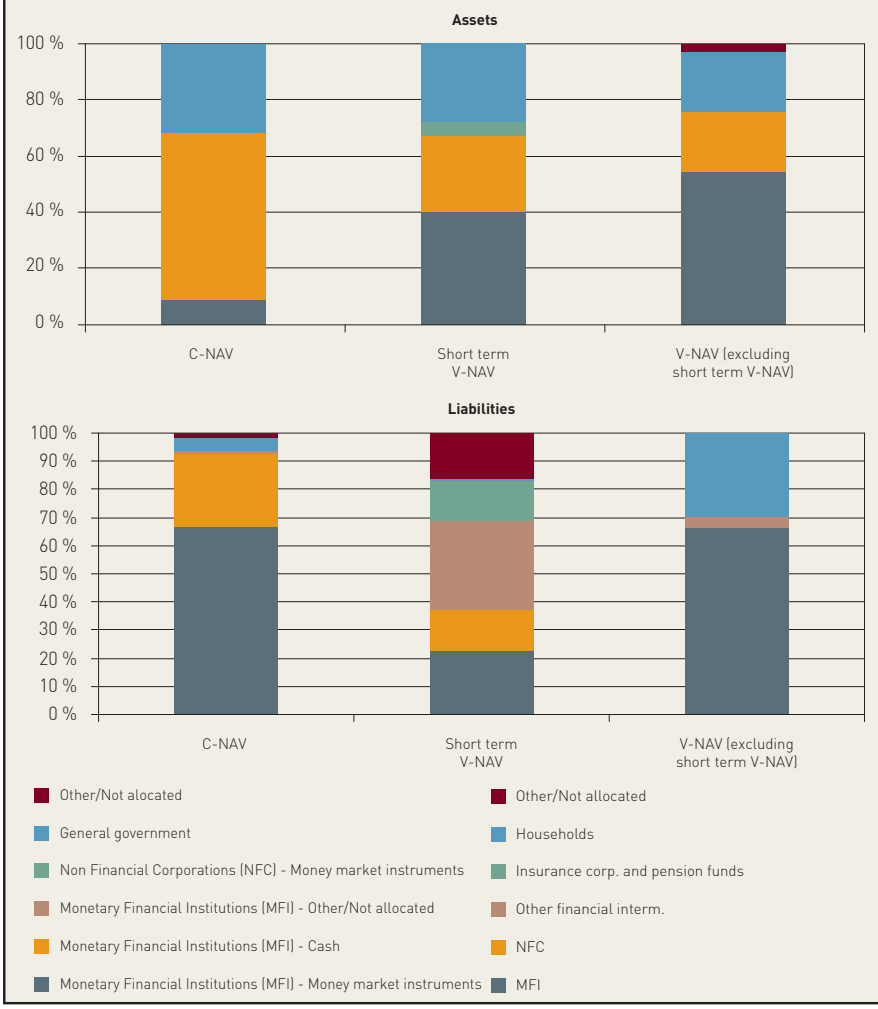
Data sources: CSSF (survey on 24 Luxembourg Money Market Funds and covering 75% of the total aggregated Luxembourg money market funds size); Calculation: BCL

Based on a survey[21] conducted by the Commission de Surveillance du Secteur Financière (CSSF) on 30 June 2012, for MMFs in Luxembourg C-NAV funds represent 76% of the aggregated size of the funds in the survey while short-term V-NAV and V-NAV amount to 13% and 11% respectively as illustrated in figure 2.

20 MMFs invest in an array of money market instruments with very short maturities that are perceived by some to pose little investment risk. Such instruments include repos, as well as deposits. MMFs also invest in long-term assets, typically those close to their original maturity date, such as asset-backed commercial paper or floating rate notes.
21 Based on a sample of 24 Luxembourg money market funds covering 75% of the total Luxembourg money market funds size.

Additionally, as illustrated in figure 3, the data for national[22] counterparts of Luxembourg money market funds shows that the asset side of C-NAV money market funds is mainly composed of monetary financial institutions (MFI) in cash and general government whereas the share of money market instruments (MFI) is more important on the asset side of V-NAV and short-term V-NAV funds. Nevertheless, general government still represents an important share (more than 20%) of the asset side of all three types of money market funds. On the liabilities side, C-NAV and V-NAV (excluding short-term V-NAV funds) funds are characterized by an important share of MFI (around 65%) while liabilities of short-term V-NAV funds are more balanced between MFIs, NFCs, other financial intermediaries and insurance corporations/pension funds.

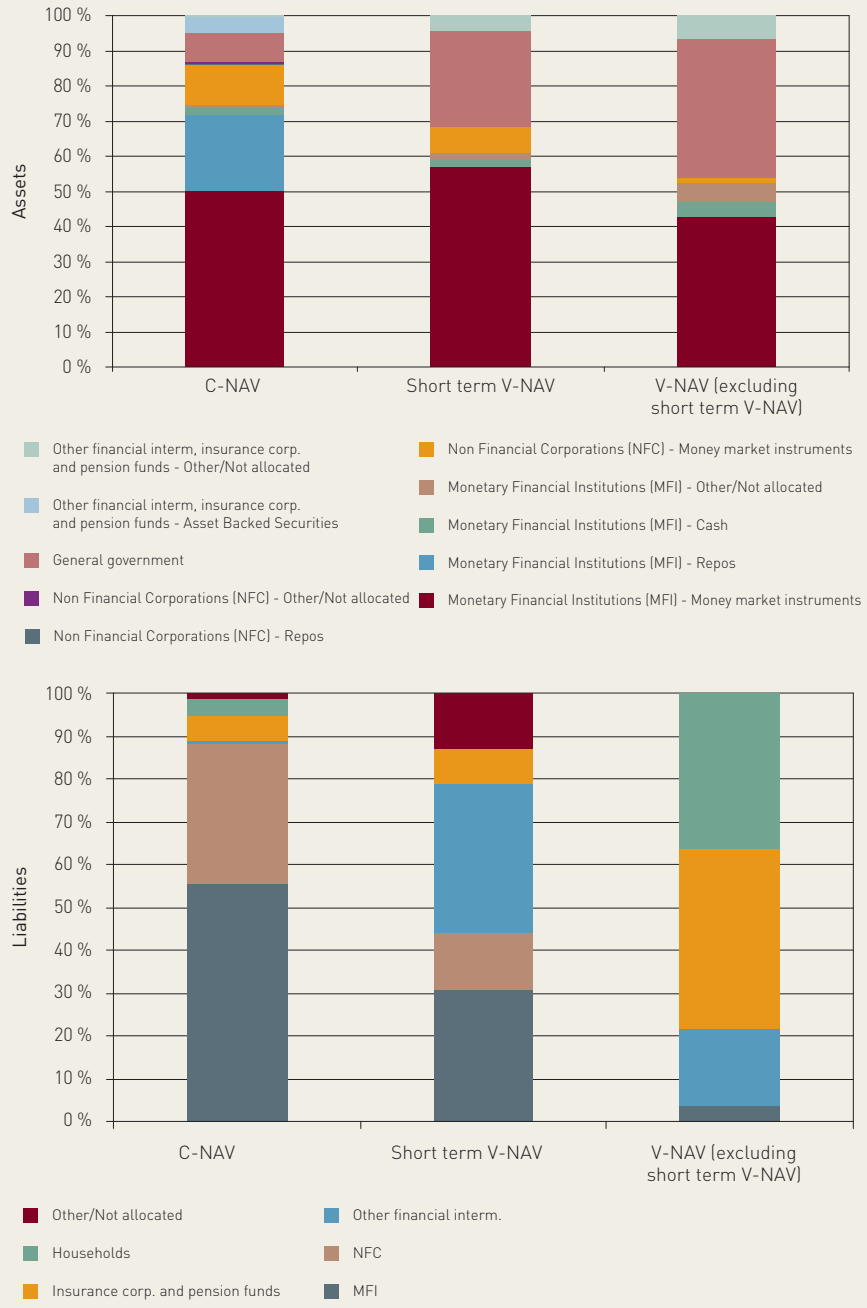
Figure 3
Breakdown of assets/liabilities of Money market fund by type of funds – 30 June 2012



Sources: CSSF (survey on 24 Luxembourg Money Market Funds and covering 75% of Luxembourg total aggregated funds size); Calculation: BCL

22 By national here we mean those counterparties originating in Luxembourg and who account for approximately 5% of total MMF assets.

Figure 4
Counterparts - Other Member States

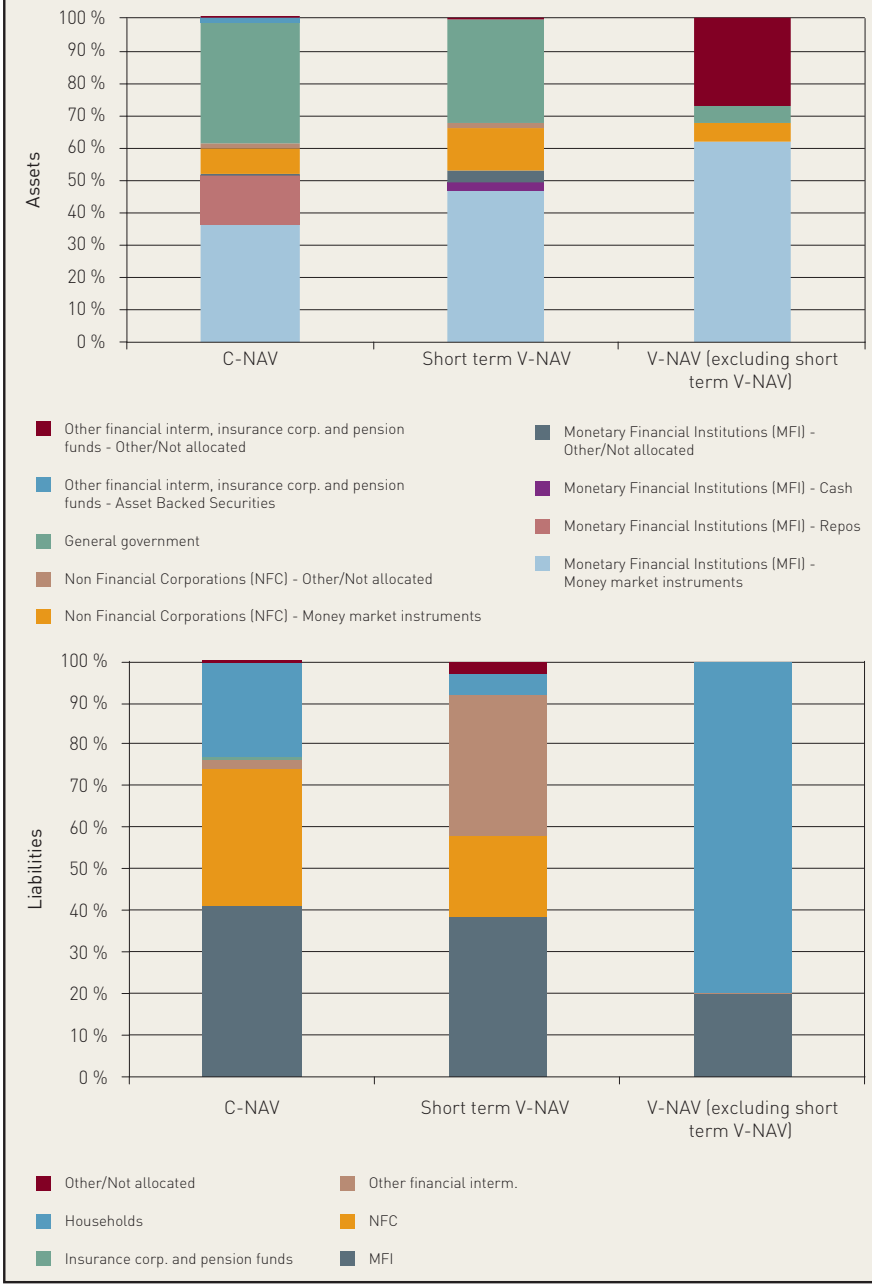


Sources: CSSF (survey on 24 Luxembourg Money Market Funds and covering 75% of Luxembourg total aggregated funds size); Calculation: BCL

With respect to assets and liabilities from other Member States, the asset side of C-NAV and V-NAV money market funds is essentially composed of money market instruments (MFI) as can be seen from figure 4. Moreover, general government debt still represents an important part of the asset side for both short-term V-NAV and V-NAV excluding short-term VNAVs funds. On the liabilities side, C-NAV funds are characterized by an important share of MFI (around 55%), the rest being non-financial corporations. However, the liability side of V-NAV funds (excluding short term V-NAV) is essentially composed of households and insurance corporation/ pension funds while the liabilities of short-term V-NAV funds is mostly characterized by MFIs and other financial intermediaries.

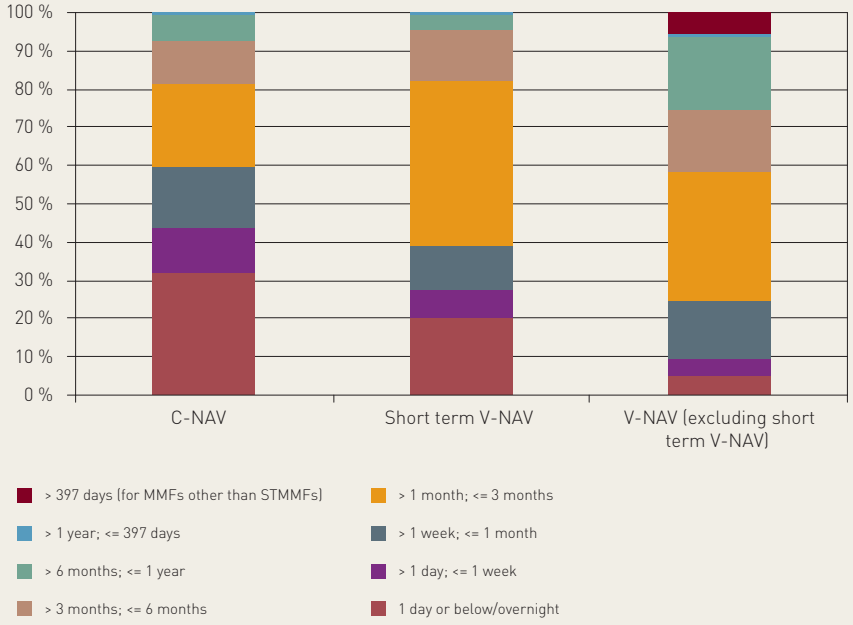
Looking now at figure 5 which provides a breakdown of aggregate data for the Rest of the World, the asset side of C-NAV money market funds is essentially composed of money market instruments (MFI), around 35%, and general government, less than 40%. From figure 5, the same pattern can be observed on the asset side of short-term V-NAV funds (money market instruments (MFI) representing more than 45% and general government more than 30%). V-NAV funds (excluding short-term V-NAV funds) are mainly composed of money market instruments (MFI) (more than 60%) and "not allocated" other financial intermediaries, insurance corporations and pension funds (more than 25%). On the liabilities side, V-NAV funds (excluding short-term V-NAV) are characterized by an important share of households (around 80%), the rest being MFIs. However, the liabilities side of C-NAV funds is composed of money market instruments, MFI, (around 40%), NFC (more than 30%) and households. Finally, liabilities of short-term V-NAV funds are split between MFI, NFC and other financial intermediaries.

Figure 5
Counterparts - Rest of the world



Sources: CSSF (survey covering 24 Luxembourg Money Market Funds and covering 75% of Luxembourg total aggregated funds size); Calculation: BCL

Figure 6
Breakdown of investments by residual maturity by types of money market funds – 30 June 2012
(% of investments which mature within the designated periods)



Sources: CSSF (survey covering 24 Luxembourg Money Market Funds and covering 75% of Luxembourg total aggregated funds size); Calculation: BCL

Figure 6 shows the breakdown of residual maturity by types of money market funds in June 2012. C-NAV funds tend to have almost 60% of their investments in instruments that mature within less than 1 month (compared to 40% and 25% for short-term V-NAV and V-NAV excluding short term V-NAV funds respectively).

Under the ESMA guidelines, the maximum residual maturity for short-term money market funds is 397 days while it is 2 years for money market funds. It has to be noted that, in the European context, ESMA only allows the use of a constant net asset value (C-NAV) for short-term money market funds arguing that the risk of mispricing is greater when the average residual maturity of assets held by money market funds gets longer.

The weighted average maturity (WAM) is a measure of the average length of time to maturity of all of the underlying securities in a fund. The calculation is weighted to reflect the relative holdings in each instrument, assuming that the maturity of a floating rate instrument is the time remaining until the next interest rate reset to the money market rate. From a practical standpoint, the WAM is used to measure the sensitivity of a money market fund to interest rate changes. In Europe, under the ESMA guidelines, the weighted average maturity (WAM) for short-term money market funds is 60 days whereas it is 6 months for other money market funds.

Another measure in use, the weighted average life (WAL) is the weighted average of the remaining life (maturity) of each security held, meaning the time until the principal is repaid in full (disregarding interest and not discounting). Contrary to the WAM, the calculation of the WAL for floating rate securities and structured financial instruments does not permit the use of interest rate reset dates and instead only uses a security's stated final maturity. In practice, the WAL is used to measure the credit risk, as the longer the reimbursement of principal is postponed, the higher is the credit risk. It is also used to limit the liquidity risk. According to ESMA guidelines, the weighted average life (WAL), maximum is set at 120 days for short-term money market funds and 1 year for other money market funds.

Box 3:

SUMMARY OF CESR GUIDELINES FOR A HARMONIZED MMF DEFINITION

In May 2010 CESR (succeeded by ESMA as a European authority) established a set of criteria with the intention to create a harmonized definition of MMFs in Europe. The CESR guidelines established a dual classification for MMFs consisting of "Money Market Funds" (MMFs) and "short-term money market funds" (ST-MMFs). The ESMA Guidelines impose strict standards on MMFs in terms of their sensitivity to interest rate risk, their liquidity requirements, the maturity of assets held by MMFs and credit risk exposures. From a prudential perspective, ST-MMFs operate with very short WAM and WAL while MMFs operate with longer WAM and WAL giving rise to important and characteristic policy considerations for each category of fund (i.e. maturity transformation, etc...)

The CESR standards also impose requirements on the specific information disclosures with particular emphasis being placed on MMF shares differences with actual bank deposits. Under the guidelines it is required that MMF documentation is clear in delineating that the objective of the fund is to preserve the initial capital investment and not for the fund to be construed as a capital guarantee. Additionally, MMFs are also required to provide disclosures on the impact of their long average duration on the risk profile of the particular fund.

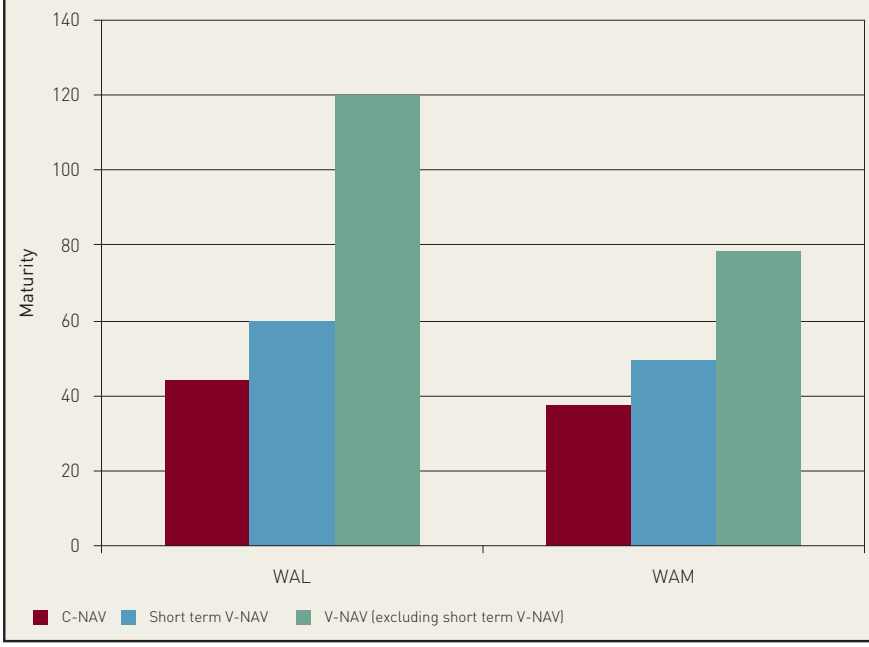
The CESR guidelines entered into effect in July 2011.

For the Luxembourg data, one can see from figure 7 that on 30 June 2012, the WAL amounted to 44 days for C-NAV funds, 60 days for V-NAV funds (excluding short-term V-NAV) and slightly less than 120 days for short-term V-NAV funds. The WAM was 37 days for C-NAV funds, 49 days for V-NAV funds (excluding short-term V-NAV) and less than 78 days for short-term V-NAV funds.

As regards the breakdown of securities held by Luxembourg money market funds by countries on 30 June 2012, figure 8 below shows that the US represents 32% while France 13%, the UK 11%, Germany 9% and the Netherlands 9%.

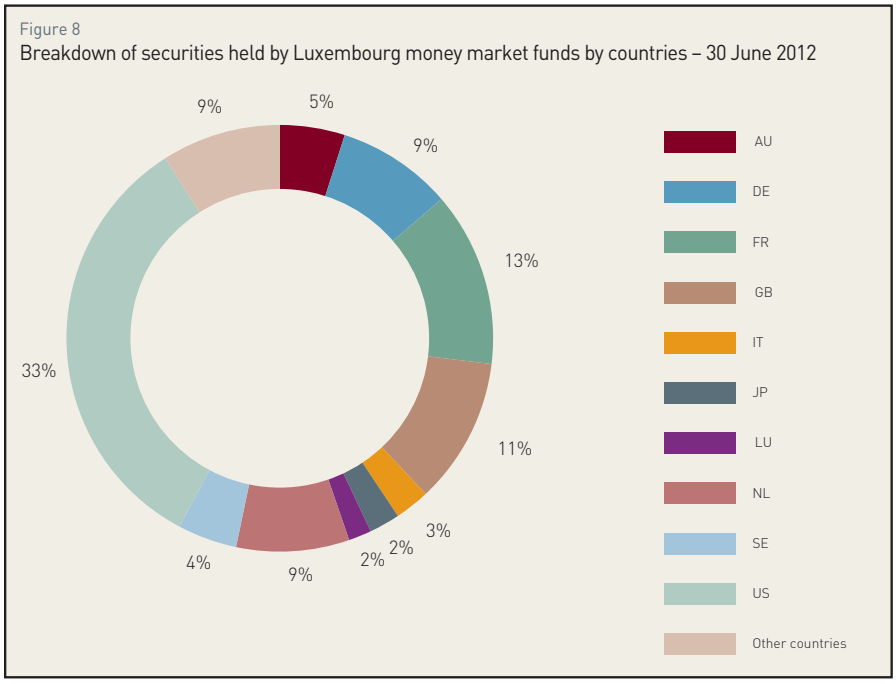
As regards the breakdown of securities held by Luxembourg money market funds by currencies on 30 June 2012, according to figure 9 it appears that the share of the USD

Figure 7
Weighted average life (WAL) and Weighted average maturity (WAM) by types of money market fund – 30 June 2012



Sources: CSSF (survey covering 24 Luxembourg Money Market Funds and covering 75% of Luxembourg total aggregated assets size); Calculation: BCL

Figure 8
Breakdown of securities held by Luxembourg money market funds by countries – 30 June 2012



Source: BCL (covering only the 13 main money market funds)

represents 52%, while the Euro only 32% and the GBP 10%.

The predominance of USD funding may raise certain financial stability issues for Luxembourg, particularly given the issues related to the budget deficit and public debt in the U.S. that could fuel asset price declines and impact the value of securities held by MMFs in Luxembourg; particularly those funds with a large percentage of USD securities holdings.

V. BANK FUNDING IN LUXEMBOURG

Banks rely on MMFs as a key source of short-term funding[23] and exhibit strong interconnections not only with companies and governments but also banks and other components of the financial system. Due to their perceived status as a safe alternative to bank deposits, MMFs are also employed by companies and households as a cash management tool. For these reasons, MMFs are considered systemically important from a financial stability perspective. Subsequently, changes to the European regulatory framework for MMFs may have unexpected effects on MMFs and, by consequence, banks' short-term funding models. Amongst the possible adverse side-effects could be increased risks for investors and an increase the funding costs of banks, illustrating some of the financial stability concerns of the new regulatory initiatives.

In this section, we analyze the use of MMFs in their capacity as a funding tool for Luxembourg credit institutions and find that foreign counterparties play a large role in bank funding in comparison to Luxembourg domestic counterparties.

1.1 MMFs as Sources of Bank Funding

MMFs are significant providers of short-term funding to the banking. Under the current EU regulatory framework, MMFs are subject to the UCITS[24],[25] rules on eligible assets, leverage, diversification and counterparty risk. These aspects of MMFs contribute to their use as short-term funding vehicles.

Based on the aggregated balance sheets of Luxembourg credit institutions, the following graphs illustrate the strong international dimension of the Luxembourg financial sector and show the importance of foreign counterparts in the sources of funding of banks, i.e. 58% in December 2008 and 60% in June 2012,

23 It is important to mention that the analyses provided in this paper do not take into account off-balance sheet data.
24 UCITS is an acronym for Undertakings for Collective Investment in Transferable Securities.
25 However, prior to the ESMA guidelines published in May 2010, there was no regulatory framework for MMFs at the European level.

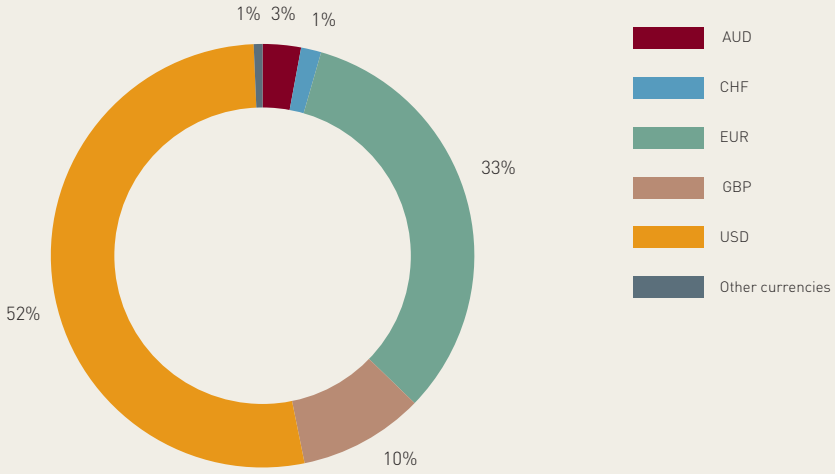
compared to Luxembourg domestic counterparts. In June 2012, sources of funding of Luxembourg banks coming from the latter amounted to €266 137 million, while funding originating from *foreign counterparts* totals approximately €396 334 million. In 2008, these sources of funding represented €343 976 million and €467 453 million in December 2008, respectively.

With respect to *domestic counterparts*, Luxembourg credit institutions represent 37% of the domestic sources of funding and only 15% of the total sources of funding of banks as of June 2012 (respectively 22% and 9% as of December 2008). The share of Luxembourg non-monetary investment funds in banks' funding amounts to 23% of the domestic sources of funding and 9% of the total sources of funding as of June 2012 (respectively 18% and 7% in December 2008) while Luxembourg money market funds account for 4% of the domestic sources of funding and only 2% of the total sources of funding as of June 2012 (respectively 9% and 3% as of December 2008).

As regards foreign counterparts, foreign credit institutions represent 42% of the total sources of funding of Luxembourg banks (40% in December 2008). The share of foreign non-monetary investment funds in Luxembourg credit institutions' funding amounts to 2% of the total sources of funding in June 2012 and in December 2008. The decline of 2% in foreign counterpart shares of funding seems likely to be induced by small changes in funding sources perhaps due to the low interest rate environment or other more mundane causes. Nevertheless, it warrants continued monitoring.

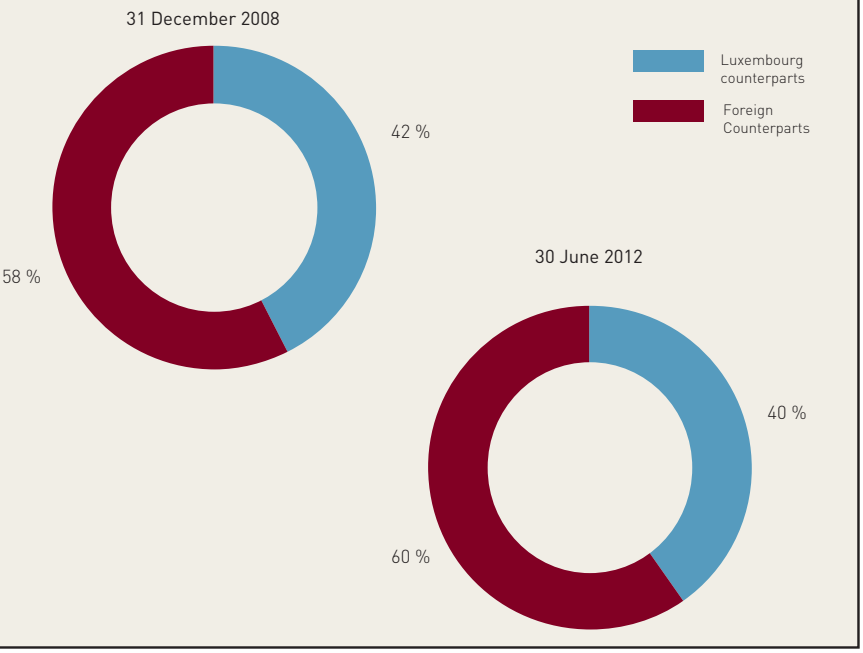
Figure 11 provides a bar chart with the breakdown of funding sources of Luxembourg credit institutions

Figure 9
Breakdown of securities held by Luxembourg money market funds by currencies – 30 June 2012



Source: BCL (covering only the 13 main money market funds)

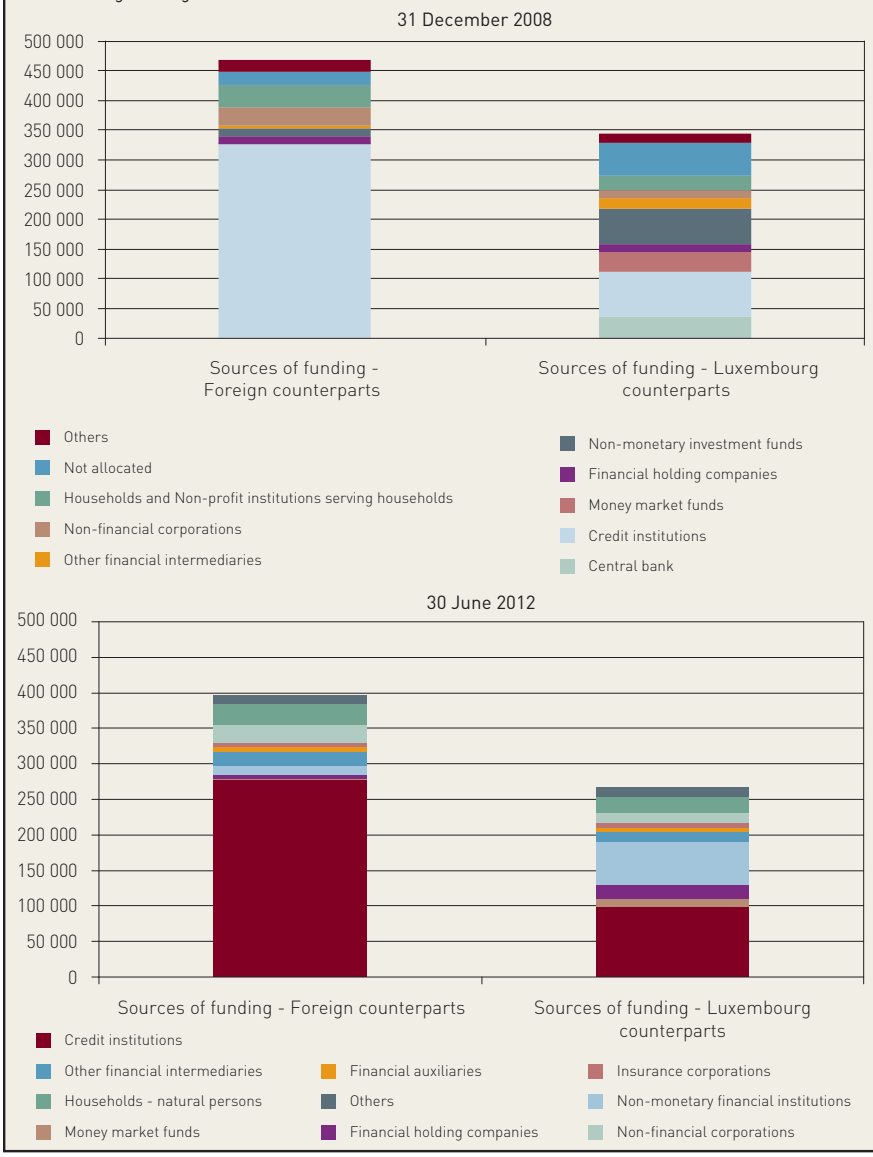
Figure 10
Sources of funding of Luxembourg credit institutions – Luxembourg and foreign counterparts



Source: BCL - Sources of funding cover loans and debt securities issued by Luxembourg credit institutions

by counterparty. In December 2008, foreign credit institutions were the largest foreign providers of funding to Luxembourg credit institutions and were followed by households and non-financial corporations. As of June 2012, the composition of funding sources has not changed appreciably and foreign credit institutions remain the dominant funding provider, followed by households and non-financial corporations. The breakdown mirrors the situation in 2008. Overall, funding to Luxembourg credit institutions has declined since 2008, perhaps reflecting a preference among private investors for higher yielding investments or alternative funding choices and/or shifting preferences.

Figure 11
Breakdown of the sources of funding of Luxembourg credit institutions by counterparts
(Luxembourg / Foreign countries) million Euros



Source: BCL - Sources of funding cover loans and debt securities issued by Luxembourg credit institutions

The composition of domestic sources of funding (i.e. funding from Luxembourg counterparties to Luxembourg credit institutions) differs in comparison to the composition of foreign funding sources. In 2008, the top three funding sources were credit institutions, non-monetary investment funds and households. Central banks were also observed to play a role as funding providers in 2008 as illustrated in the associated bar chart of figure 11, although as of 2012, their importance as a funding source has declined against the background of an overall decline in total funding amounts to credit institutions between 2008 and 2012. Nevertheless, domestic non-monetary financial institutions also remain a key funding provider to credit institutions in Luxembourg.

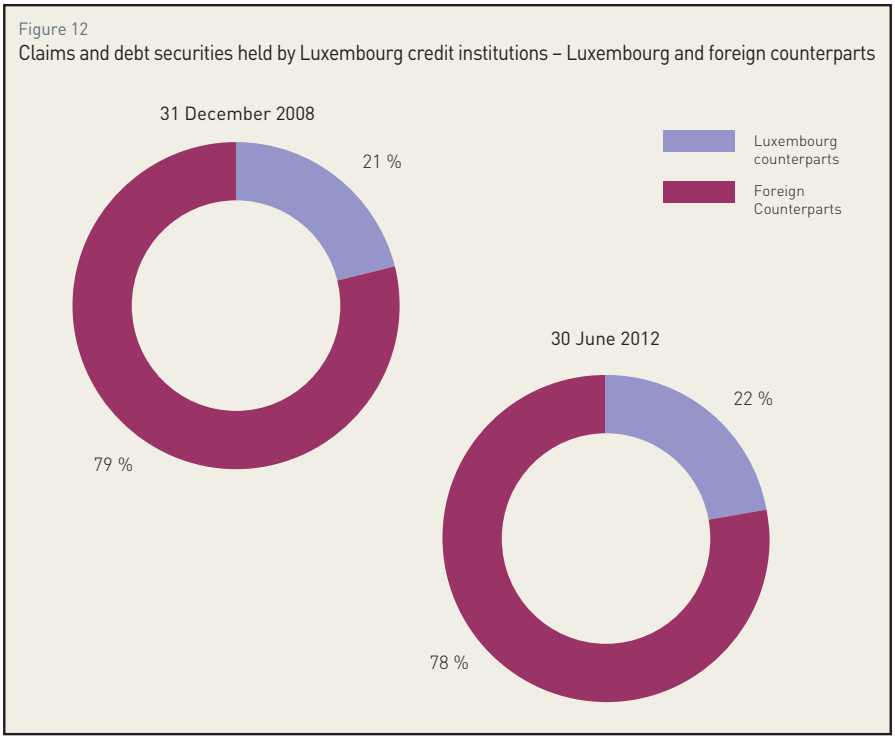
1.2 Credits

The international dimension of the Luxembourg banking sector is also reflected in the breakdown of the claims and debt securities held by Luxembourg credit institutions as Luxembourg counterparts only represent 22% of the total claims and debt securities held by domestic banks as of June 2012 (the value was 21% in December 2008). In June 2012, claims and debt securities from domestic counterparts held by Luxembourg banks amounted to €165 586 million while claims and debt securities from

foreign counterparts represented €577 599 million (respectively €185 686 million and €692 713 million in December 2008). Figure 12 consists of two pie charts illustrating the partition between domestic and foreign debt securities held by Luxembourg credit institutions. There are no substantial differences in the percentages for 2012 compared to 2008.

As regards domestic counterparts, Luxembourg credit institutions represent 22% of the domestic claims and debt securities and only 5% of the total claims and debt securities held by Luxembourg banks as of June 2012 (respectively 40% and 8% as of December 2008). The share of Luxembourg non-financial corporations amounts to 8% of the domestic claims and debt securities and 2% of the total claims and debt securities held by Luxembourg credit institutions as of June 2012 (respectively 10% and 2% as of December 2008) while Luxembourg "other" financial intermediaries represent 9% of the domestic part and 2% of the total portion as of June 2012 (respectively 4% and 1% as of December 2008).

Figure 12
Claims and debt securities held by Luxembourg credit institutions – Luxembourg and foreign counterparts



Source: BCL – Credits cover claims and debt securities held by Luxembourg credit institutions (data for December 2008 includes shares of money market funds held by credit institutions).

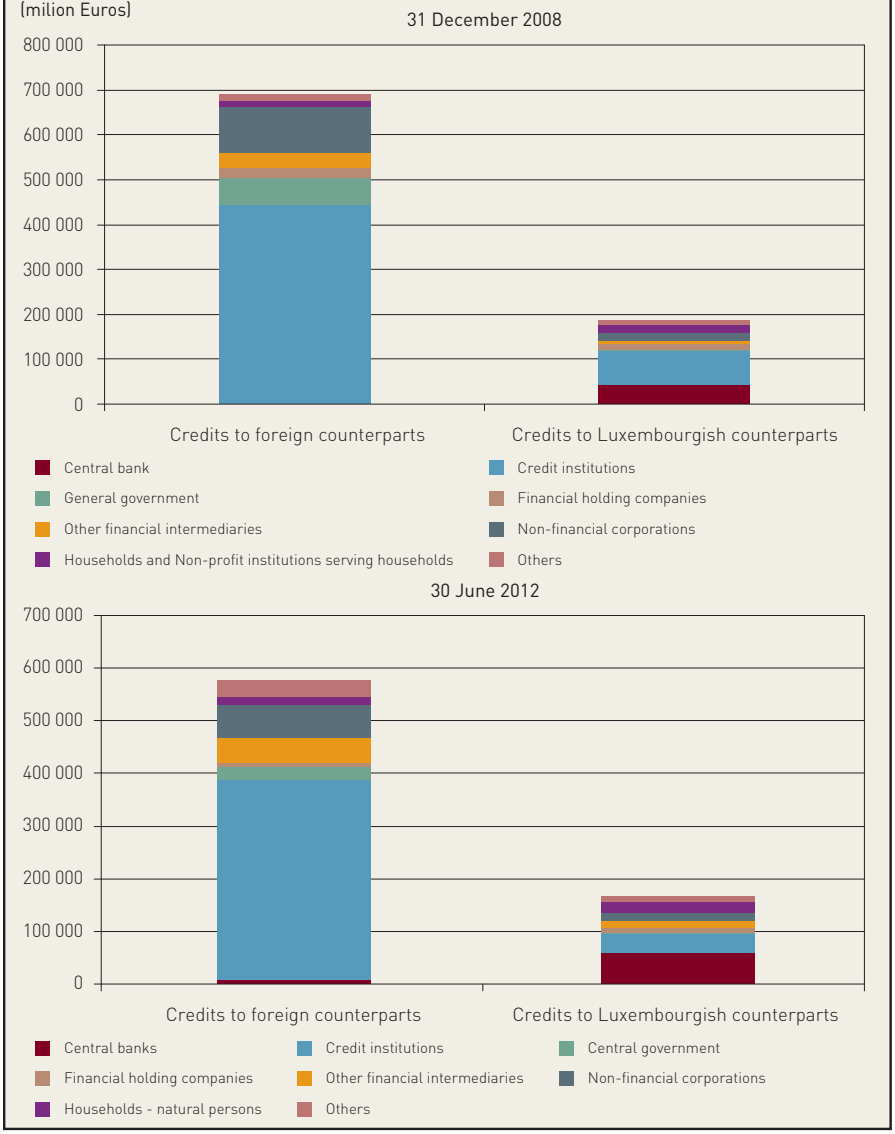
As regards foreign counterparts, foreign credit institutions represent 51% of the total claims and debt securities held by Luxembourg credit institutions as of June 2012 and December 2008. The share of Luxembourg non-financial corporations amounts to 8.5% of the total claims and debt securities held by Luxembourg credit institutions as of June 2012 (respectively 12% as of December 2008) while Luxembourg other financial intermediaries represent 6% as of June 2012 (respectively 4% as of December 2008).

Figure 13 provides a breakdown of the credits granted by credit institutions in Luxembourg to both foreign and domestic counterparties (in € millions).

The breakdown by credits granted to foreign counterparties presents a consistent picture between the situation in December 2008 and that in June 2012. Although the overall amount of credits declined during the four year period from €700,000 million to just under €600,000 million, foreign credit institutions remained the largest borrowers followed by non-financial corporations. Credits to foreign other financial intermediaries increased while for central governments it declined which can likely be attributed to increased sovereign risk and its feedback with the financial sector.

For credits extended to Luxembourg counterparts, the situation is similar albeit with some minor changes between the two periods under consideration. The period from 2008 until 2012 can be

Figure 13
Breakdown of the credits granted by Luxembourg credit institutions – Luxembourg and foreign counterparts
(milion Euros)



Source: BCL Credits cover claims, debt securities and shares of investment funds held by Luxembourg credit institutions

characterized by an overall decline in the amount of credits granted to domestic credit institutions but with an increase in deposits and reserves within central banks.

PART 2: INVESTMENT FUNDS

Investment funds are a key component of the shadow banking sector given their involvement in the credit intermediation activity that takes place outside of the regular banking system. Such financial intermediation activities can help to provide a valuable alternative to bank-based funding in addition to facilitating the supply and flow of credit to the real economy, thereby contributing to sustainable economic growth. However, such activities are not without an element of risk especially in view of the fact that these funds do not benefit from access to official liquidity facilities from central banks.

Investment funds engage in maturity transformation by granting long-term credit financed through short-term funding and leverage. The mismatch in the maturities results in the transformation of short-term liabilities into long-term assets leading to possible instabilities in the event of investor requests for withdrawals[26]. In the case of investment funds, large banks may have significant dealings with the funds thereby creating a network of interconnectedness between banks and investment funds, or "shadow" entities. However, especially in the case of sponsors, banks lack adequate capital to support the total amount of off-balance-sheet liabilities that may be associated with interlinked shadow banks. Consequently, it is important for regulators and

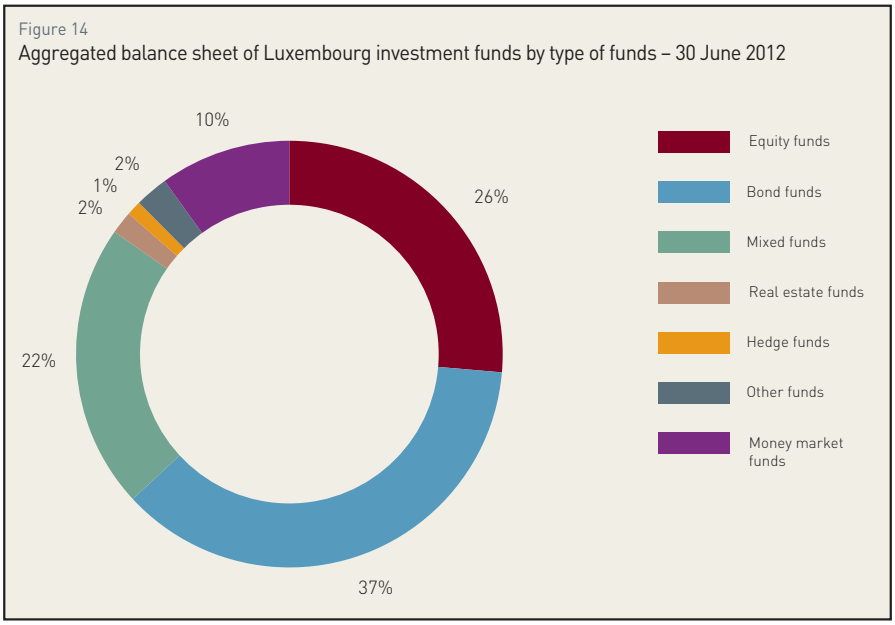
26 Whereas under current liquidity coverage ratio (LCR) regulations, banks are required to hold an amount of liquidity for periods up to 1 month in order to meet the demand for investor withdrawals, investment funds are not currently subject to such LCR requirements, giving rise to the risk of investor runs.

authorities to collect the necessary information in order to monitor and assess the magnitude and characteristics of these interlinkages since they can lead to the formation of systemic risk and contagion channels with resultant adverse feedback to the regulated banking sector.

In this section, we examine the characteristics of investment funds in Luxembourg by considering the composition of their aggregate balance sheets, sources of funding, and the amount of claims and debt securities they hold. Based on aggregated data of Luxembourg investment funds in June 2012, figure 14 shows that money market funds only represent 10% of the aggregated balance sheet of Luxembourg investment funds while bonds funds and equity funds amount to 36% and 26% respectively.

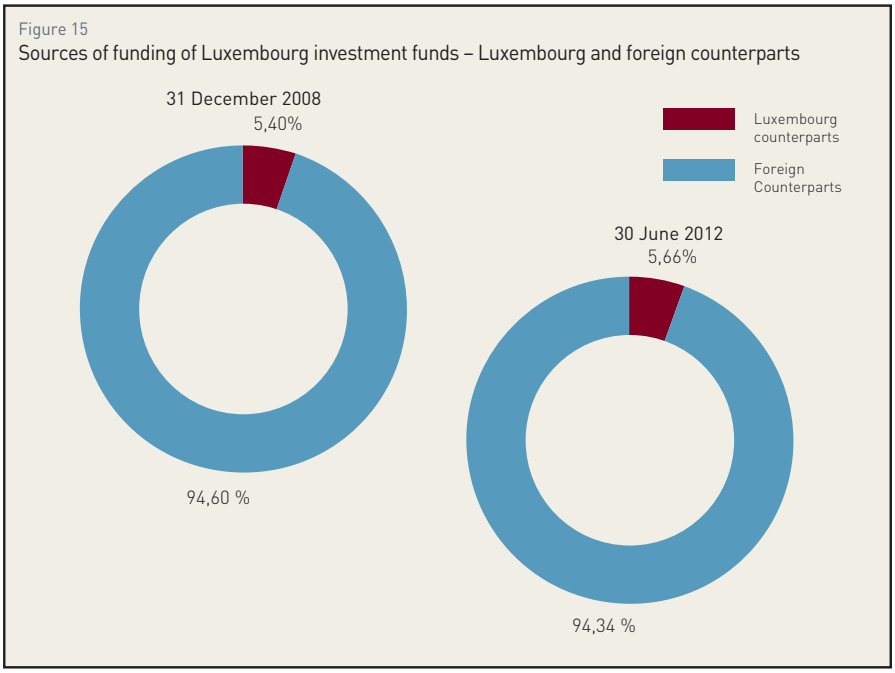
Although not indicated in the figure, the collected data show that between December 2008 and September 2012, the aggregated balance sheet of money market funds slowly declined from €340 billion to €240 billion while the opposite trend was observed for mixed funds, bonds funds and equity funds. Figure 15 shows that for the aggregate balance sheet of Luxembourg investment funds, the three primary components by type of fund are bond funds, equity funds and mixed funds. Money market funds account for approximately 10% of the total balance sheet while hedge funds, real estate funds and other funds make up the remainder but are not significant in terms of the total. Given the aggregated nature of the data, it is not possible to determine if there are fund-specific factors underlying the breakdown.

Figure 14
Aggregated balance sheet of Luxembourg investment funds by type of funds – 30 June 2012



Source: BCL

Figure 15
Sources of funding of Luxembourg investment funds – Luxembourg and foreign counterparts



Source: BCL - Sources of funding cover debt and shares issued by Luxembourg investment funds. Investment funds cover money market funds, equity funds, bonds funds, mixed funds, real-estate funds, hedge funds and other funds. Not allocated amounts of investment funds' sources of funding have been split between Luxembourg and foreign counterparts as 5% and 95% respectively, approximated according to several indicators from different BCL databases.

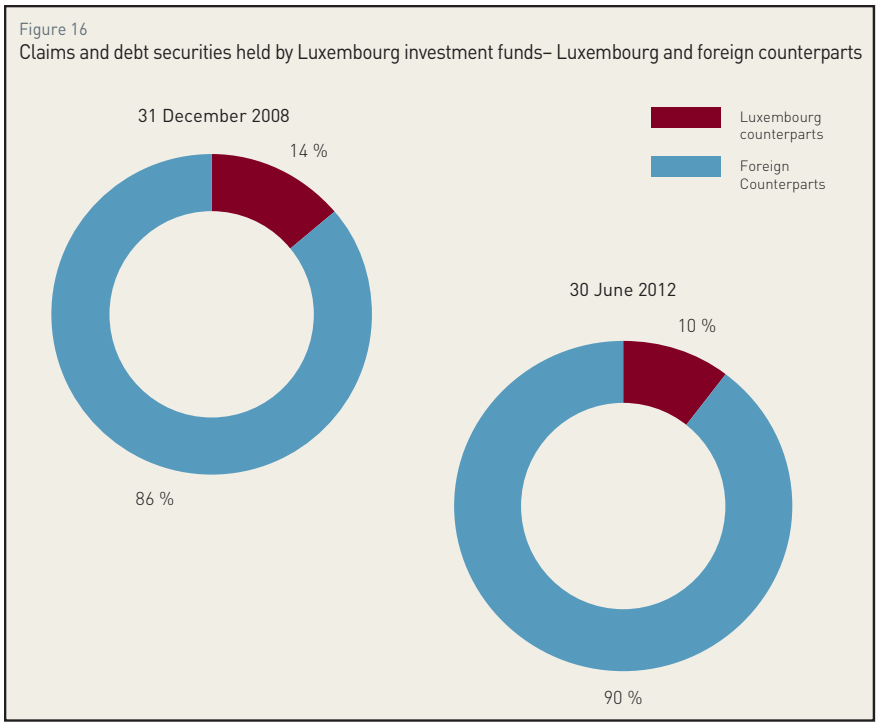
1.1 Credits and Sources of funding

Luxembourg investment funds are characterized by a strong international dimension as most of the sources of funding originates with foreign counterparts. The allocated part of the funding sources of investment funds; €31 084 million in June 2012 and €45 927 million in December 2008 is almost entirely coming from other domestic and foreign credit institutions. Nevertheless, it has to be noted that the issued shares of Luxembourg investment funds, representing €2 230 306 million in June 2012 while their level was €1 561 048 million in December 2008, are reported as "not allocated". Given their important amounts, the shares of investment funds have been taken into account in the sources of funding of investment funds so as to reflect the real links between investment funds and the other sectors, domestic and foreign. This is particularly evident in figure 15 showing the overwhelming sources of funding coming from foreign counterparts. Furthermore, the allocation in 2012 has changed little since December 2008.

1.2 Credits

The international dimension of Luxembourg banking sector is also reflected in the breakdown of the claims and debt securities held by Luxembourg investment funds as illustrated in figure 16. Luxembourg counterparts only represent 10% of all the claims and debt securities held by domestic banks as of June 2012 (14% in December 2008). In June 2012, claims and debt securities held by Luxembourg investment funds towards domestic counterparts amounted to €132 716 million while foreign counterparts represent €1 173 529 million (respectively €134 926 million and €832 493 million in December 2008).

Figure 16
Claims and debt securities held by Luxembourg investment funds– Luxembourg and foreign counterparts



Source: BCL

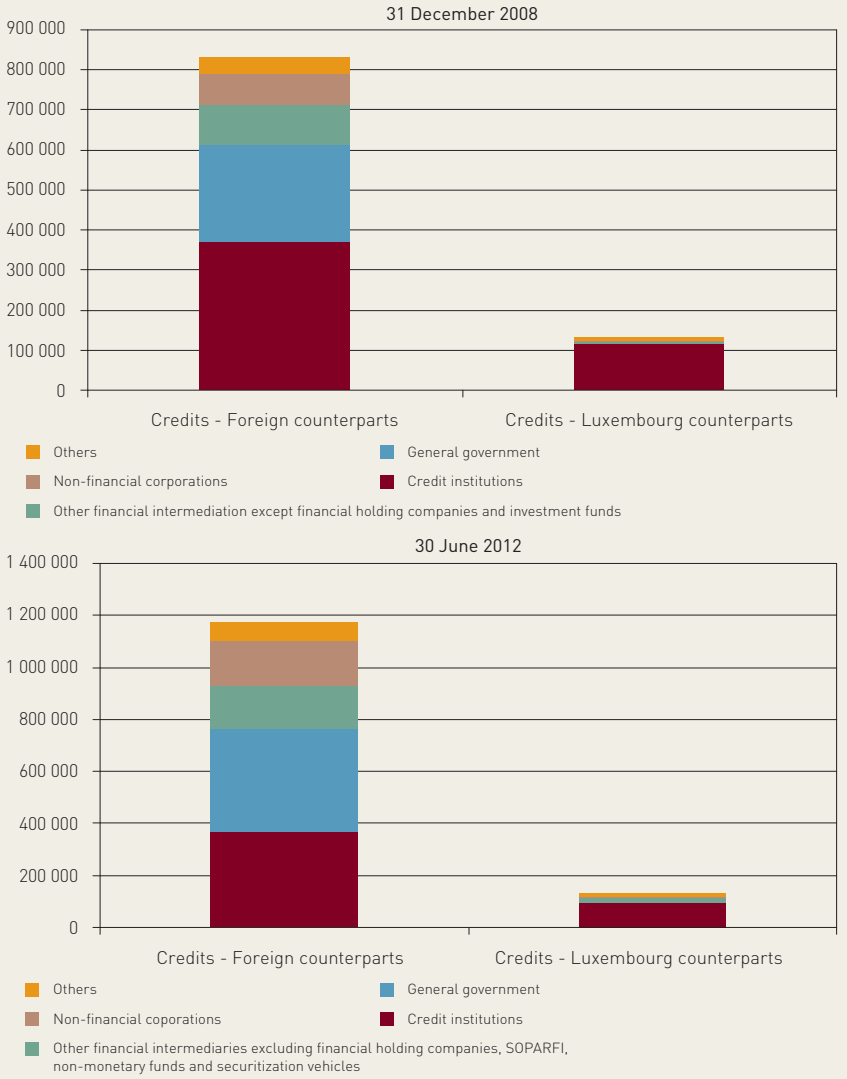
As regards domestic counterparts, Luxembourg credit institutions represent 72% of the domestic claims and debt securities held by Luxembourg investment funds and only 7% of the total claims and debt securities held as of June 2012 (respectively 86% and 12% as of December 2008).

Figure 17 provides a breakdown of claims and debt securities held by Luxembourg investment funds. Regarding foreign counterparts, banks represent 28% of the total claims and debt securities held by Luxembourg investment funds as of June 2012 (respectively 38% in December 2008). General government amounts to 30% of the total claims and debt securities held by Luxembourg investment funds as of June 2012 (respectively 25% as of December 2008). Non-financial corporations represent 13% of the total claims and debt securities held by Luxembourg investment funds as of June 2012 (respectively 8% as of December 2008). Foreign counterparts clearly account for

the majority of claims and debt securities held by Luxembourg investment funds and vastly outweigh Luxembourg domestic counterparts.

In a similar manner to banks, run risks are also present for investment funds and MMFs since they may take on leverage and engage in maturity-transformation as part of their shadow banking activities. Such risk, if not appropriately monitored, can lead to procyclicality thereby increasing the credit supply as well as asset prices. Consequently, "boom" periods can be followed by severe downturns whereby asset prices decline sharply and credit channels become restricted leading to a generalized loss of confidence and increased uncertainty. Similar effects were observed following the collapse of Lehman brothers. The multiple failures of the originate-to-distribute model negatively impacted not only the asset-backed commercial paper (ABCP) markets, but spilled over into structured investment vehicles (SIVs) and lead to a run on the Reserve Primary Fund in the U.S. The latter required the intervention of the U.S. Government in order to limit the impact on financial stability and the spill-overs to the MMF industry. Along with the European Commission's Green Paper on Shadow Banking[27] the episode with Reserve Primary provided some of the impetus in Europe to initiate new reforms for MMFs.

Figure 17
Breakdown of claims and debt securities held by Luxembourg investment funds – Luxembourg and foreign counterparts
(milion Euros)



Source: BCL – Credits cover claims and debt securities held by Luxembourg investment funds

Given the potential severe risks associated with these systemic effects, it would seem appropriate to apply effective prudential regulation and oversight arrangements to the shadow banking system, including MMFs. In the next section, we study the interconnectedness of the shadow banking industry in Luxembourg in order to determine the importance and structure of the industry domestically. Such information could be used as input into designing suitable supervisory frameworks and policies.

27 The Green Paper concludes that "...money market funds (MMFs) and other types of investment funds or products with deposit-like characteristics [...] make them vulnerable to massive redemptions ("runs")".

PART 3: BANKS' INTERCONNECTEDNESS WITH THE SHADOW BANKING SECTOR

1.1 Brief Overview of Interconnectedness Analysis

The lessons learned following the financial crisis underscored the importance of the linkages and interconnections between institutions. Such analyses can provide authorities with an indication of not only how resilient the financial system is to the spread of contagion, but also offer insight into what the potential triggers of contagion may be. Conducting such an assessment is important since although an interconnected system may appear robust, it could be in fact, quite fragile. By improving supervisors' assessments of financial interlinkages, this type of analysis facilitates the macro-prudential assessment of systemic risk arising from interconnectedness.

In the analysis that follows, the interconnectedness network consists of a series of nodes that represent banks or financial institutions along with their linkages which are indicated by the lines joining the different nodes. The thickness of the connecting line can be used to indicate strength of the connection in terms of the level of exposure, for example. In this context, the lines can be thought of as balance sheet links between institutions. The network defined by these nodes and links, along with any clustering or node size[28], provides an indication as to the structure of the system at the aggregate level and the possible network dynamics. This is considered to be important information as even the failure of small but highly interconnected institutions can have negative consequences for the rest of the financial system if they are amplified through the spread of contagious effects.

1.2 Measures of Centrality

In the context of network analysis, centrality provides a measure of the relative importance of a node within the network structure. Although there are numerous measures of centrality, a core group of measures are generally used in the analysis of financial system interconnectedness and contagion channels. In no specific order, the four commonly used measures are:

(i) degree centrality,
(ii) pagerank centrality,
(iii) betweenness centrality and;
(iv) closeness centrality.

Degree centrality is a fairly straightforward measure of the "connectedness" of a node in the network. The degree centrality of a given node is calculated as the sum of both the in-going and out-going connections to that node. Consequently, this measure provides an indication of how connected the node is within the network, irrespective of the type of linkage.

The following formula by Feeman gives the degree centrality of a node:

$$C_D = \frac{\sum_{i=1}^{G}\left(C_D(n^*) - C_D(i)\right)}{(n-1)(n-2)}$$

28 One important network characteristic is the concept of "centrality" which gives an indication of the position of a given node within the network. Centrality provides an indication as to which nodes in the network can be considered as systemically important.

Where $C_D(n^*) = \deg(n^*)$ and n^* and i are the node under consideration and nodes connected to n^*, respectively. G is the total number of nodes in the network.

Betweenness centrality is determined based on a node's position as "intermediary" between other connected nodes in a network. Specifically betweenness is equal to the total number of "shortest paths" between other nodes that pass through the given node. Therefore, a node's betweenness measure will be considered high not because it has a high degree centrality, but rather because it plays a significant role as intermediary in the available possible network paths. The betweenness centrality measure is defined as:

$$btw_i = \frac{\sum_{j,l} \frac{a_{jl,i}}{a_{jl}}}{(n-1)(n-2)}$$

Where $a_{jl,i}$ is the number of paths running between j and l through i, a_{jl} is the total number of the shortest paths between j and l,k and n is the total number of nodes in the network.

Closeness centrality is calculated as the inverse of the "farness" measure of a node. The farness of a node in a network is defined as the sum of the length of the shortest paths between the given node and all other nodes in the network. The closeness is simply the inverse of the farness. It is possible to normalize this measure by dividing farness by the total number of nodes excluding the node under consideration.

The Pagerank centrality measure is also popular as a quantitative method for ranking website pages and is the method employed by the Google search engine. Pagerank centrality is a tool with its origins in directed graph theory and can be considered as a generalization of eigenvector centrality[29].

It is important to mention that network analysis as applied to financial systems is still at a relatively early stage of development and is not yet considered suitable as a stand-alone input into policymaking decisions. Nevertheless, in the presence of other information, and indicators it can help to build an aggregate picture providing a view on the overall stability of a financial system[30]. It therefore warrants further research in order to adopt the analysis into the supervisory toolbox.

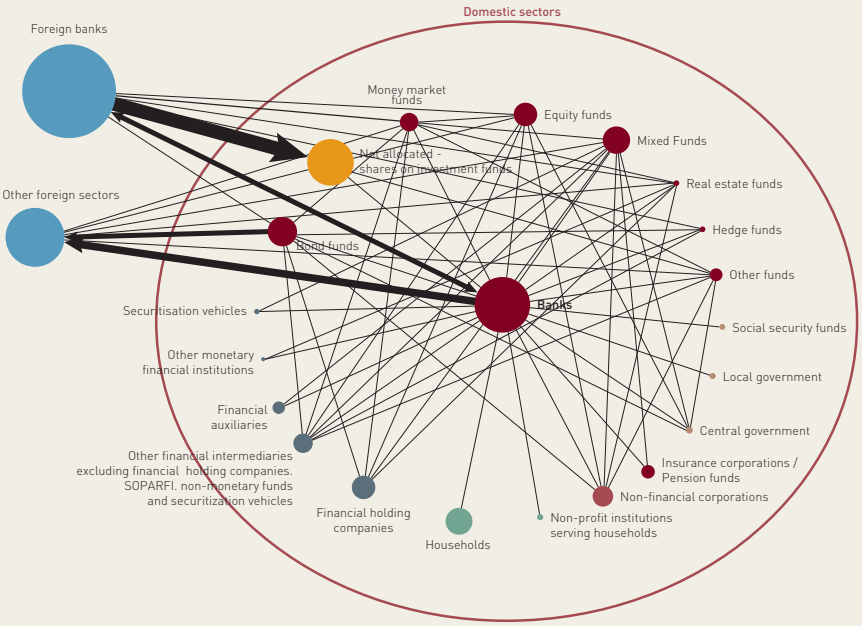
1.3 All sectors

A network has been constructed so as to be able to assess the interlinkages between the Luxembourg banking sector and the other sectors of the economy, and in particular the importance of investment funds for the funding of the Luxembourg banking system. The network is based on data from the aggregated balance sheets of Luxembourg banks and investment funds. The links between the sectors represent the gross amounts i) for credits: claims and debt securities held by a sector and ii) for debts: loans and debt securities issued by a sector. The size of each node represents the share of this particular sector in the sources of funding of Luxembourg banks (central bank being excluded). Not allocated amounts of investment funds' sources of funding have been split between Luxembourg and foreign

29 Eigenvector centrality provides a measure of the influence of a node within the network by assigning relative scores to all nodes in a network. Connections to high scoring nodes increase the eigenvector centrality of the node being considered.

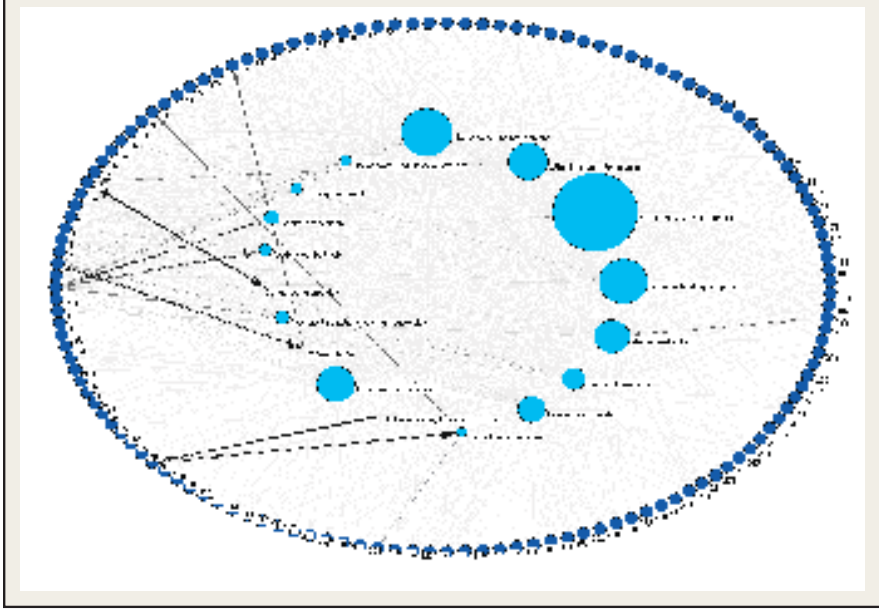
30 Indeed, Borio and Drehmann (2009) "Towards an Operational Framework for Financial Stability: "Fuzzy" Measurement and its Consequences", BIS Working Papers 284, suggest that the interconnected components of the financial system deserve to be monitored and understood along with common exposures.

Figure 18
Network of credits and debts between Luxembourg sectors and foreign counterparts – 30 June 2012



Source: BCL (based on data from the aggregated balance sheets of Luxembourg banks and investment funds).

Figure 19
Domestic network of credits and debts between individual Luxembourg credit institutions and other Luxembourg sectors – 30 June 2012



Source: BCL (based on data from the individual balance sheets of Luxembourg credit institutions towards Luxembourg counterparts).

counterparts as 5% and 95% respectively, approximated according to several indicators observed. Consequently the size of the node "Not allocated" has been chosen more or less arbitrarily as it does not correspond to a source of funding of Luxembourg banks.

Figure 18 below confirms the strong links between Luxembourg banks and investment funds with foreign banks and other foreign sectors. Therefore, based on the available data, from a systemic risk perspective it seems that the source of potential contagion originates from outside Luxembourg rather than domestically.

1.4 Individual banks

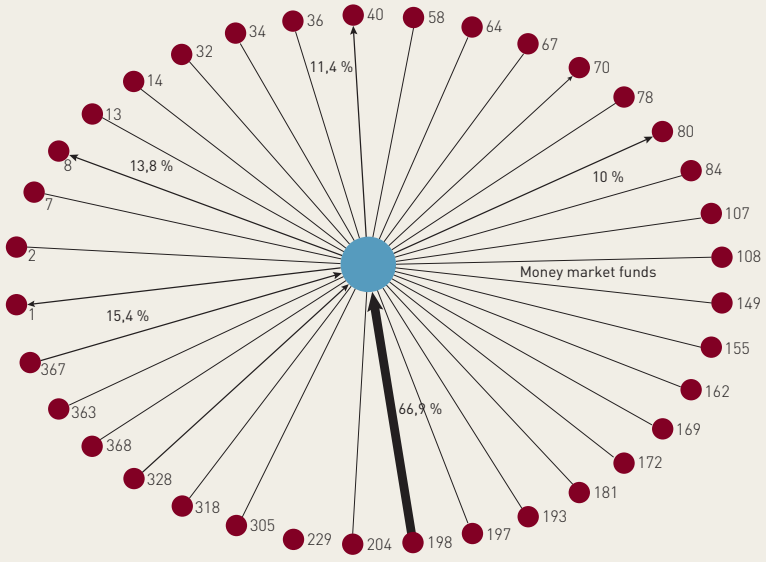
Based on the individual balance sheets of Luxembourg credit institutions, a domestic network has been constructed to represent the links between Luxembourg banks and other domestic sectors. Individual banks are represented on the external circle. The links between the individual bank and the sectors cover i) for credits: claims and debt securities held by an individual bank towards a sector and ii) for debts: loans and debt securities issued by an individual bank that are held by a specific sector. The size of the node of the sectors represents the share of this sector in the total domestic sources of funding of Luxembourg credit institutions or central banks. The links are weighted as a percentage of the total credits / debts of each sector towards the domestic banking sector.

The corresponding figure 19 below shows which sectors are the most

important in the domestic funding of Luxembourg banks, according to the size of the nodes (in line with figure 18) as well as the most active individual banks for each sector, according to the width of the line coming from / going to the bank. It appears that only a limited number of banks have strong links with other components of the financial sector and the real economy. Consequently, they warrant to be closely monitored.

To have a better assessment of the interlinkages between the banks and some specific sectors, figure 20 represents a sub-network of figure 19, illustrating the links between individual Luxembourg banks and the domestic money market funds sector. As the links between the banks and the money market fund sector are weighted as a percentage of the total credits / debts of the Luxembourg money market funds sector towards the domestic banking sector, we can observe that only few Luxembourg banks are playing an important role for the money market funds sector. As an example, the credits granted by one bank to Luxembourg MMFs represent almost 67% of all the credits from Luxembourg banks to Luxembourg MMFs, while another bank represents 15.4%. In the same way, the debts of one Luxembourg bank amount to 13.8% of the total debt of Luxembourg banks towards domestic money market funds, while debts from two other banks represent 11.4% and 10%. Consequently, only three Luxembourg banks play an important role for the funding of Luxembourg MMFs (banks that are granting more than 5% of the total credits granted by Luxembourg banks to domestic money market funds) and nine Luxembourg banks play an important role in the credits granted by money market funds to domestic banks (banks whose debt is representing more than 5% of the total debt of Luxembourg banks towards domestic money market funds).

Figure 20
Domestic network of credits and debts between individual Luxembourg credit institutions and the Luxembourg money market funds sector – 30 June 2012



Source: BCL (based on data from the individual balance sheets of Luxembourg credit institutions towards Luxembourg counterparts). Individual banks are represented on the external circle. The links between the individual bank and the money market fund sector cover i) for credits: claims and debt securities held by an individual bank towards Luxembourg money market funds and ii) for debts: loans and debt securities issued by an individual bank that are held by Luxembourg money market funds.

Having described the importance of a sample of Luxembourg banks for the domestic money market funds industry, it is also interesting to assess the importance that money market funds represent for domestic banks. Considering the claims towards domestic money market funds and debt securities issued by domestic money market funds that are held by an individual bank (respectively the debts of Luxembourg banks towards money market funds) out of the total of claims and debt securities issued by all counterparts held by the bank (respectively total of debts of the bank to all counterparts) we find that only one bank is above the threshold of 5%, whereas on the liabilities side, eleven banks are above the 5% threshold; including two that reach 39% and 68%. With respect to the share of the claims towards domestic money market funds and debt securities issued by domestic money market funds that are held by an individual bank (respectively the debts of Luxembourg banks

towards money market funds) out of the total assets of the bank we see that only one bank remains above the threshold of 5%, whereas on the liabilities side, nine banks are above the 5% threshold (including two that reach 39% and 54%). Looking more closely at the banks that are above the threshold of 5%, it would appear that these banks can be characterized by having a rather small balance sheet. More precisely, for the bank that is above the 5% threshold, on the asset side is a branch with total assets below 250 million euros. Correspondingly, on the liabilities side, one of the two banks has a total amount of assets below 200 million euros whereas the other one is below 1 000 million euros.

VI. CONCLUSION

The ongoing reform initiatives both in Europe and on the international landscape provide strong incentives for national macro-prudential authorities to understand the structure and functioning of the shadow banking sector and its interlinkages with their domestic banking sectors. Given the ongoing development of future regulatory frameworks, it is expected that changes to the regulatory environment may lead to structural changes in the operation and linkages between banks and shadow banks in certain jurisdictions. Small, open economies in countries such as Luxembourg and Ireland are likely to be strongly affected by the forthcoming changes. For this reason, we have undertaken an analysis of the interconnections between banks, investment funds and MMFs using a new and detailed dataset collected for Luxembourg in order to "survey the landscape" and assess the linkages between various sectors.

The data underscore the strong presence of foreign counterparties in the Luxembourg banking sector in comparison to the relatively small domestic component. In this context a withdrawal or retrenchment of foreign funding sources could result in strong and negative consequences for the domestic financial services industry. Furthermore, given the contribution of the financial sector to Luxembourg's total GDP, such an outcome could also feedback onto the real economy resulting in economic repercussions in almost all domestic sectors. However, the negative downside may be mitigated to the extent that only a few domestic banks have strong linkages to the MMF industry. Nevertheless, it is important to continue to monitor and assess the shadow banking sector in Luxembourg in order to be aware of the potential financial stability implications.

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