Shadow Banking in the Dutch National Accounts

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Abstract

Recently, there has been growing attention for the shadow banking phenomenon. Capital requirements for regulated banks have made it more attractive to provide credit via unregulated shadow banks. Complicated financial products like securities, swaps and other derivatives are part of their business. Risks may increase in the less traditional areas of the banking system, like hedge funds, financial vehicle corporations, and other financial intermediaries. The shadow banking sector is a systemic risk because of the interconnectedness of shadow banks with the regulated part of the financial system.

'Addressing those risks is challenging. Firstly, because shadow banking is an elusive concept that is hard to quantify with available statistics. Secondly, as I have argued, the tools needed to prevent the building-up of excessive risks in that sector are currently not in the set of instruments available to the ECB or to macro-prudential authorities at large – and some need yet to be devised.' said ECB vice-president Constâncio in his speech on 13 February 2015.

This paper uses the System of National Accounts (SNA) to quantify the size and risk of shadow banking in the Netherlands. That is a prerequisite for developing tools to prevent excessive risks in that sector. Firstly, an inventory will be made of the definitions used in literature to delineate shadow banking, trying to select the best definition(s) applicable to the Netherlands. Secondly, it will be investigated how to measure the size and risks of shadow banking. Possible sources of data are the Dutch National Accounts, more specifically the Sector Accounts. They contain the balance sheets of financial sectors, relevant for leverage and other statistical measures of risk, and give insight to the interconnected nature of banking and non-banking sectors.

The sources, quality of the data and their applicability to the Netherlands will be paid attention to. Finally, analyses will be performed based on the collected definitions and available data. This analysis aims to contribute to improved supervision of shadow banking.

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1. Introduction

Recently, there has been growing attention for the shadow banking phenomenon. The reason for this has much to do with unconventional monetary policy. After Lehman Brothers filed for bankruptcy on 15 September 2008, special facilities were created and expanded to provide loans of cash and securities to primary dealers. The collapse of the large investment bank provoked a global financial crisis that required emergency lending programs to shadow banks. The financial crisis has taught that risks may increase in the less traditional areas of the banking system, like hedge funds, securitisation vehicles and other financial intermediaries.

According to European Central Bank (ECB) vice-president Constâncio in his speech on 13 February 2015, shadow banking is "an elusive concept that is hard to quantify with available statistics". This paper uses statistics in the System of National Accounts (SNA) to quantify the size and risk of the Dutch shadow banking system, since shadow banks are predominant in the Netherlands. An inventory is made of the definitions used in literature to describe shadow banking, after which a definition is selected that is best applicable to the Dutch National Accounts (paragraph 2). Shadow banking is explained by the illustration of a chain, which gives an overview of shadow bank entities and credit intermediation activities, and a description of the benefits and risks (paragraph 3). Sources of data are the Dutch National Accounts, more specifically the Sector Accounts. Paragraph 4 delineates the National Accounts subsectors and instrument categories applicable to shadow banking, and describes the data for measuring them. Paragraph 5 presents the results; after the size of shadow banking is quantified, the analysis will focus on the risk of leverage and give insight to the interconnected nature of banking and non-banking sectors, using a Balance Sheet Approach matrix. Finally, paragraph 6 concludes.

2. Definition

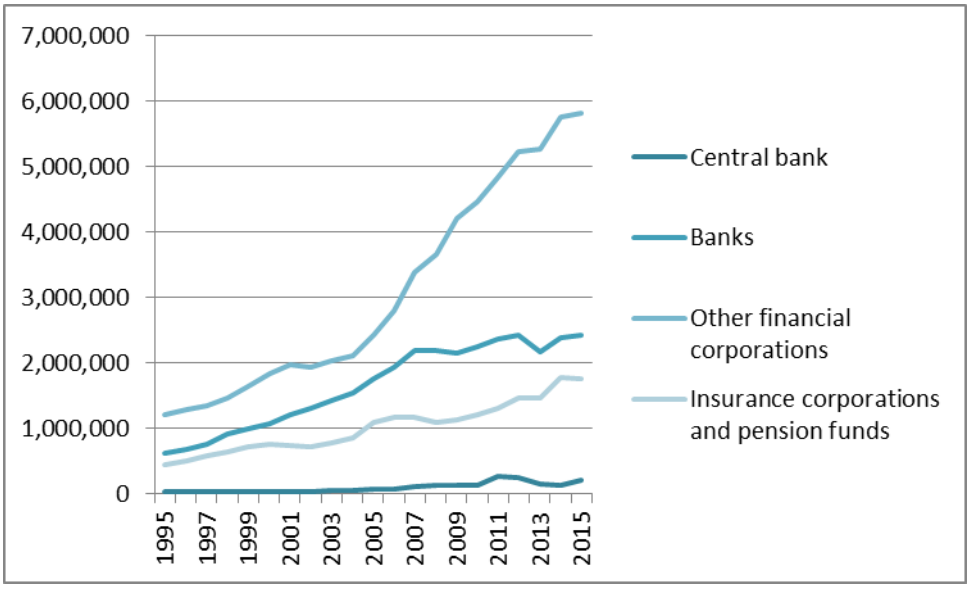
2.1 Broad definition

Shadow banking has been an evolving concept since its introduction by Paul McCully in 2007. He broadly referred to shadow banks as "the whole alphabet soup of levered up non-bank investment conduits, vehicles, and structures". The focus on leverage has been expanded to concrete activities and level of regulation by Acharya and Öncü (2010), who define shadow banks as "financial institutions that mostly look like a bank, borrow short-term in rollover debt markets, leverage themselves significantly, and lend and invest in longer-term and illiquid assets. Unlike banks, however, the shadow banking system is much less regulated". The definition of Pozsar et al. (2010) adds that credit intermediation by shadow banks is not 'enhanced' by access to central bank liquidity or deposit insurance: "Shadow banks are financial intermediaries that conduct maturity, credit, and liquidity transformation without explicit access to central bank liquidity or public sector credit guarantees". Regular banks do have access to central bank liquidity and deposit insurance. In the euro area the instrument of the 'marginal lending facility' is used to obtain overnight liquidity from the national central banks against sufficient underlying assets. In October 2008 the European Commission expanded the Directive (94/19/EC) on Deposit Guarantee Schemes to prevent bank runs and maintain the confidence of depositors in the financial safety net. The minimum level of coverage for deposits has been increased within one year from €20,000 to €100,000. Without access to central bank liquidity nor insured deposits, shadow banks can promise liquidity on demand by issuing collateralized financial credit. This is a short term and cheap funding source (Perotti 2012). Lenders of

collateralised financial credit are provided bankruptcy privileges; they can immediately repossess and resell pledged collateral. It is this so-called 'safe harbour status' that makes shadow banks credible (Perotti 2010). Most important component of shadow banking is securitised debt, which is debt secured by underlying assets. Literature does not always agree on the delineation of shadow banking, but often mentions the following institutions, instruments and markets: finance companies, broker/dealers, securitisation vehicles, (credit) hedge funds[2], investment banks, money market funds (MMFs), asset-backed commercial paper, asset-backed securities (ABSs), collateralised debt obligations, credit derivatives, repurchase agreements (repos), securities lending (Deloitte 2012).

The Financial Stability Board (FSB) broadly describes the shadow banking system as "credit intermediation that involves entities and activities outside the regular banking system" (FSB 2011). The broad definition of the FSB simply sums up total assets of other financial corporations, which contains MMFs, non-MMF investment funds and other financial intermediaries (OFIs)[3]. The timeline in figure 1 shows the total financial assets of financial corporations in the Netherlands for two decades.

Figure 1. Total financial assets of financial corporations, 1995-2015 (million euro)



Source: Statistics Netherlands

Between 2008 and 2014, the financial assets of Dutch other financial corporations (OFC) have grown on average 8.4 percent per year, to a level of 5.8 trillion euros in 2015. With 8% of global OFC assets,

[2] Bouveret (2011) discusses the inclusion of exchange traded funds (see also Ramaswamy 2011) and hedge funds (see also Alternative Investment Management Association 2012).
[3] Including financial auxiliaries in the Netherlands.

shadow banking is predominant in the Netherlands, after the United States (32%) and the United Kingdom (12%). Shadow banks have become more than twice as large as banks[4].

2.2 Functional delineation

Pozsar et al. (2010) propose to classify by instrument and not by institutional level. Bouveret (2011) measures shadow banking by the instruments used during the securitisation process, i.e. commercial paper, ABS issuers, repos, and money market funds. Securities lending is also part of shadow banking, but is omitted given the uncertainties surrounding the data. Dovicova (2014) extends this delineation by also including hedge funds. Gallin (2013) defines shadow bank funding of the non-financial sector (households, non-financial corporations, government) as debt financing that is dependent on a 'runnable' link in the intermediation chain. A runnable link means that the financial intermediary relies significantly on short-term (pay-on-demand) funding without explicit insurance from the federal government. Examples of runnables are uninsured bank deposits, money market fund shares, commercial paper, repos and securities lending (Bao, David and Han 2015). The focus is on the non-financial sector, because of the direct link to the real economy. Claessens and Ratnovski (2014) also advocate a more functional delineation of intermediation services. In their view, reliance on backstops is what distinguishes shadow banks from other financial intermediaries using capital markets' type tools, such as custodians, hedge funds and leasing companies. Shadow banking includes "all financial activities, except traditional banking, which rely on a private or public backstop to operate". They need a backstop to absorb the rare and systemic risks (for example systemic liquidity risk, bankruptcy risk) that cannot be distributed away via typical activities like securitisation and the use of collateral. A backstop can be obtained privately by operating within banks or publicly by government guarantees such as bankruptcy stay exemptions for repos, or more generally 'too-big-to-fail' guarantees.

The FSB (2011) encourages authorities to narrow the focus on "systemic risk concerns, in particular by maturity/liquidity transformation, leverage and flawed credit risk transfer, and/or regulatory arbitrage concerns". In order to do so, the FSB (2013) groups shadow banking activities into five economic functions, which involve non-bank credit intermediation that poses shadow banking risks to the financial system: (i) management of collective investment vehicles with features that make them susceptible to runs, (ii) loan provision that is dependent on short term funding, (iii) intermediation of market activities that is dependent on short term funding or secured funding of assets, (iv) facilitation of credit creation, (v) securitisation-based credit intermediation and funding of financial entities. The second element of this high-level policy framework consists of overarching principles and a policy 'toolkit'. "The overarching principles aim to ensure non-bank financial entities that are identified as posing shadow banking risks (i.e. other shadow banking entities) are subject to oversight by authorities. The toolkit meanwhile presents a menu of optional policies from which authorities can draw, if necessary to mitigate financial stability risks, as they think best fits the non-bank financial entities concerned, the structure of the markets in which they operate, and the degree of financial stability risks posed by such entities in their jurisdictions" (FSB 2013). The risk-based approach "takes into account home authorities' assessment of potential sources of shadow banking risks in non-bank financial entities in their jurisdiction from a financial stability perspective, by either classifying these entities with reference to five economic functions or excluding the entity based on

[4] Deposit-taking corporations except the central bank.

the assessment that it does not pose shadow bank-like risks" (FSB 2015). The Dutch Central Bank is further improving the narrow measure of shadow banking by undertaking micro data research on leverage. The risk based FSB (2013) functional approach has been implemented by the Dutch Central Bank (Van der Veer, Klaaijsen and Roerink 2015). In contrast to the FSB delineation, the Dutch Central Bank excludes funds on joint account of pension administration organisations. The estimate of shadow banking is much smaller than in earlier studies, mainly because entities that are subject to consolidated prudential bank supervision (the majority of the securitisation vehicles, finance companies and financial SFIs) are not seen as being part of shadow banking.

The National Accounts perspective aims a transparent and standardised measure of shadow banking, that fits within the subsector and instrument delineations in the System of National Accounts (SNA). The definition of shadow banking chosen in this paper is: credit intermediation without explicit access to central bank liquidity or public sector credit guarantees. The shadow banking system is measured by deposits, securities and loans on the balance sheet[5] of the National Accounts subsectors MMFs, non-MMF investment funds, other financial intermediaries and financial auxiliaries. In contrast to the broad definition (FSB 2011), captive financial institutions and money lenders are left out of account. The broad definition exaggerates the size of shadow banking by taking into account the entire balance sheet of all other financial corporations. A functional approach is preferable. Therefore, only credit intermediation assets are selected, which corresponds to the National Accounts instrument categories deposits, securities and loans. The risk based approach (FSB 2013) limits the size of shadow banking too its risks, which can be important for regulation and supervision. However, the National Accounts perspective is useful for macro-mapping the whole shadow banking chain. Moreover, the Sector Accounts are a valuable tool for analysing the risk of interconnectedness between shadow banks and the rest of the economy.

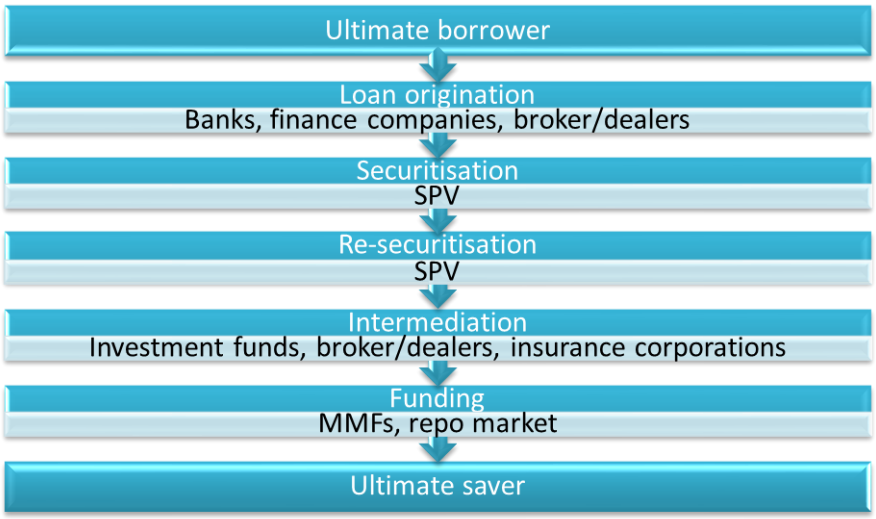
3. What is shadow banking?

3.1 Shadow banking chain

Whereas traditional banking intermediation between savers and borrowers occurs in a single entity (under one roof), shadow banking can be described as a long chain of credit intermediation: "The distinguishing feature of shadow banking is that it decomposes the process of credit intermediation into a sequence of discrete operations. A shadow banking system can be composed of a single entity that intermediates between end-suppliers and end-borrowers of funds, or it could involve multiple entities forming a chain" (Ghosh et al. 2012). The shadow credit intermediation chain consists of multiple steps, performed by a specific type of shadow bank and through a specific funding technique (Poszar 2008, Poszar et al. 2010).

Figure 2. Shadow credit intermediation chain

[5] Corrado, Hood and Reinsdorf (2014) measure the size of the shadow banking sector by its production of credit intermediation services, using a reference rate approach. This method is comparable with the treatment of Financial Intermediation Services Indirectly Measured (FISIM), as described in the European System of Accounts (ESA) 2010 (European Union 2013) and applied to the Dutch National Accounts (den Boer 2012). Here the more usual approach is followed, measuring shadow banking based on balance sheet data.



Credit intermediation starts with a loan, originated by deposit-taking banks, finance companies and broker/dealers. Characteristic for shadow banking is securitisation[6], which transforms pools of loans into tradable debt securities with different risk profiles from the underlying collateral. Loans are structured by broker/dealers and sold to the securitisation vehicle, typically a special purpose vehicle (SPV). The SPV issues asset-backed securities (ABS) and sells them to investors. The cash received from the sale of ABS is used to purchase the loans from the originator. The ABS is sliced into 'tranches' with different risk profiles: 'senior', 'mezzanine' and 'equity', which catch the cash flow of the loans. Interest and principal payments are first paid to the least risky senior tranches, then the mezzanine tranches and finally to the equity tranches. Default losses on loans are allocated in reversed order; equity tranches suffer first, then the mezzanine and only then the senior tranches. Of course, the most risky equity tranches are compensated by the highest yields. The purpose of creating different tranches is to transform and redistribute credit risk associated with the collateral. Securitisation has evolved into the creation of complex products, including the re-securitisation of asset-backed securities into a collateralised debt obligation (CDO). A CDO is a structured financial product that pools together cash flow-generating assets and repackages this asset pool into different tranches that are sold to investors. The pooled assets (mortgages, loans, bonds, asset-backed securities, or even other CDOs) are debt obligations that serve as collateral for the collateralised debt obligation.

Investors are broker/dealers, commercial banks and cash rich parties like pension funds (via investment funds) and insurance corporations. Sources of funding are MMFs and the repo market. The markets for a 'sale and repurchase agreement' (or simply 'repurchase agreement' or 'repo') and securities lending are based on collateralised lending and have a crucial role in the functioning and efficiency of the financial system (Adrian et al. 2011). A repurchase agreement is the sale of securities coupled with an agreement to repurchase the securities at a later date, at a specific price (a higher repurchase price reflects interest). The motivation of a repurchase agreement is to borrow cash, backed by general securities as collateral. In securities lending the purpose of the cash lender is to borrow specific securities. Securities lending occurs primarily by hedge funds to facilitate 'short-

[6] Cetorelli and Peristiani (2012) analyse in detail the system of asset securitisation.

selling' of equity securities, that is the sale of securities that one does not own, to speculate on a price fall of these securities against other securities. In repurchase agreements and securities lending a 'haircut'[7] can be applied; the value of the collateral is higher than the cash borrowed. The haircut serves as protection against potential value loss of the collateral, reflecting the safety of the collateral but also the creditworthiness of the debtor (Adrian et al. 2013). Cash collateral acquired in securities lending may be invested in repurchase agreements (liquidity transformation), forming an interconnection between the security lending market and the repo market. The repo market plays an important role in the shadow banking system (providing highly liquid financing) and its collapse was central to the recent financial crisis (Acharya and Öncü 2010).

3.2 Benefits

The rise in shadow banking is driven by increased demand for alternatives to traditional bank deposits, which are insured only to a certain amount (Poszar 2011). Investors value the liquidity and safety of government securities like U.S. Treasuries (Krishnamurthy and Vissing-Jorgensen 2012), but their supply is insufficient. So, investors seek new forms of 'private money': safe liquid assets, protected by over-collateralisation, mark-to-market accounting and variation margin (Turner 2012). Private financial intermediaries compete with the government in the provision of money-like claims (Greenwood, Hanson and Stein 2012). On the supply side borrowers (particularly small and medium-sized enterprises) can obtain alternative funding, in response to tight controls over regulated bank lending. The Economist (February 25th 2012) quoted a senior American regulator: "Securitisation is a good thing. If everything was on banks' balance sheets there wouldn't be enough credit". Risk transfer and risk diversification are considerable benefits from securitisation. Pooling and tranching cash flows from loans creates safe assets for investors. It overcomes adverse selection problems; trading losses associated with information asymmetries can be mitigated by securities designed to split the cash flows of underlying assets (Gorton and Pennacchi 1990).[8] The efficient functioning of financial markets can be improved through economies of scale in the origination, structuring, trading and funding of loans (Poszar et al. 2010), and due to increased specialization (European Commission 2012).

3.3 Risks

The *raison d'être* of shadow banking lies in its benefits, although the recent financial crisis has particularly reminded us of the risks. The most fundamental credit risk is the risk that the lender won't get his money back. Rating agencies (Moody's, Standard & Poor's, Fitch, DRBS and others) range the credit risk of securities from most secure (AAA) to junk status (BBB to D). Shadow banks usually fund themselves short-term and invest in longer-term and illiquid assets. Consequently, maturity and liquidity transformation make the banking system vulnerable to sudden large-scale withdrawals of funds. The house price bubble burst in 2007 provoked a shadow bank run by increasing haircuts and creditors who refused to extend repo financing (Gorton and Metrick 2010).

Financial leverage describes the use of borrowed money to magnify profit potential, and can be measured as the ratio of total assets to equity. Collateral underlying securities financing transactions

[7] For a comprehensive numerical example of haircuts, see Gridseth 2014 (adapted from Adrian and Shin 2009).
[8] Greenbaum and Thakor (1987) explain a bank's choice of the funding modes securitization versus deposits: "With asymmetric information about borrowers' payoff distributions, and without governmental intervention, banks will prefer securitization for their best assets and deposit funding for their worst".

can be ‘re-hypothecated’ to raise funds, which can be used to buy assets, that serve as collateral to raise more funds, etcetera. This may result in excessive leverage, which increases the exposure to risk, because of potential liquidity problems; the return on investments should always be high enough to cover interest and principal payments. Valuation changes in collateral assets can cause procyclical leverage (high during economic booms and low during busts), reinforcing interactions between the financial and real economy. Rising prices of assets may lead to stronger balance sheets and encourage an active response to adjust the leverage by buying assets; a greater demand to buy assets puts further upward pressure on their prices, which in turn leads to stronger balance sheets and encourages active balance sheet management, etcetera. Procyclical leverage also works the other way round. Asset price decreases may lead to weaker balance sheets and a response of adjusting leverage by selling assets, which puts downward pressure on the price of these assets, leading to even weaker balance sheets, requiring further deleveraging and potentially asset fire sales, etcetera.

The financial system is characterised by high interconnectedness. The regulated banking system is closely linked to the shadow banking system via securitisation or investments in financial products of shadow banks. Systemic risk is defined as “the disruption to the flow of financial services that is caused by an impairment of all or parts of the financial system and has the potential to have serious negative consequences for the real economy” (IMF et al. 2009). The liquidity risk that secured repo financing may become unavailable is a systemic risk, especially when assets held by the financial sector become more illiquid. The shadow banking system itself potentially is a systemic risk. Risks can be transmitted to regular banks directly through borrowing from banks, or indirectly via price decreases of assets and derivatives held by both regular and shadow banks. A fall in asset prices weakens the balance sheet of financial institutions and may reduce the amount of credit provided to the real economy. This interconnectedness causes consumers, non-financial corporations and banks to become exposed to asset bubbles and other systemic risks of the shadow banking system.

Shadow banking is a form of regulatory arbitrage. Tighter regulations imposed on banks provoke the circumvention of regulation by transferring banking activities from regulated banks towards unregulated shadow banks. Shadow banks have no incentive to internalise the costs of risk. Given the interconnected nature of the financial system, shadow banking has grown to a systemic risk. The effectiveness of regulation is undermined by the shadow banking system, leaving the goal of financial stability further away.

4. Shadow banking in the Dutch National Accounts

4.1 Entities

Shadow banks in the National Accounts refer to the subsectors MMFs, non-MMF investment funds, other financial intermediaries, and financial auxiliaries. According to the European System of Accounts handbook ‘ESA 2010’ (European Union 2013) par. 2.95 definition: “the financial auxiliaries subsector (S.126) 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 FSB (2011) considers activities that constitute the credit intermediation chain also as the core business of shadow banks, so financial auxiliaries are considered part of shadow banking.

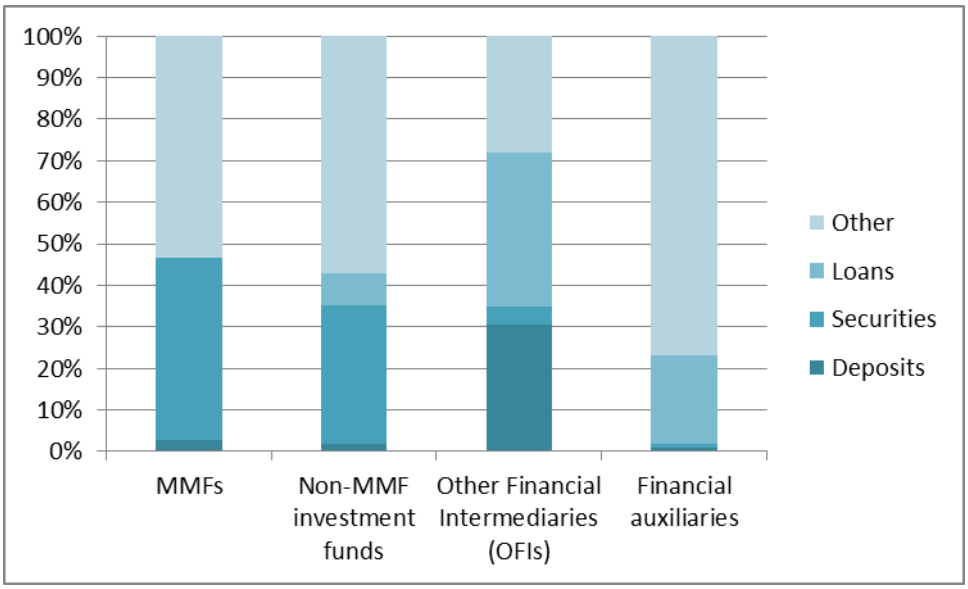
The size of the other financial corporations sector, used in the broad definition of the FSB, is biased by captive financial institutions and money lenders. This subsector holds two-third of other financial corporations' financial assets. Captive financial institutions and money lenders have a large amount of loans (assets 1,268,761 million euros in 2015) on their balance sheet. However, most of these loans (98 percent) are intra-concern loans, typically with the rest of the world. It is questionable if entities designed for intra-concern loans are financial intermediaries. ESA 2010 gives a definition of financial intermediation and delineates the subsectors: "Financial intermediation is the activity in which an institutional unit acquires financial assets and incurs liabilities on its own account by engaging in financial transactions on the market. The assets and liabilities of financial intermediaries are transformed or repackaged in relation to, for example, maturity, scale, risk, etc. in the financial intermediation process (ESA 2010 par. 2.56)". The captive financial institutions and money lenders subsector is delineated to 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 (ESA 2010 par. 2.98)". Captive financial institutions and money lenders are not part of the shadow banking system, because they are not engaged in financial intermediation on open markets.

Many countries have Pension Benefit Guarantee Schemes (see Stewart 2007) and Insurance Guarantee Schemes (see Oxera 2007), which protect the consumers and policyholders against insolvency and bankruptcy. In the Netherlands, pension funds and insurance companies are not protected by explicit guarantee schemes. However, Dutch pension funds face strong funding rules, by which the Dutch Central Bank ensures that they have enough reserves (5%) and are not underfunded. Special arrangements do exist for life insurance (Early Intervention Arrangement for Life Insurers) and health insurance (unsettled claims are compensated by the government agency Health Care Insurance Board). Because of the implicit access to public guarantees, pension funds and insurance corporations are not considered as shadow banks.

4.2 Activities

Most definitions described in paragraph 2 limit shadow banking to credit intermediation. Therefore, only credit intermediation assets are seen as shadow banking assets. Securities and loans are important instruments used in the securitisation process. Deposits of shadow banks are stalled at deposit-taking corporations, which have access to central bank liquidity and deposit insurance. It is questionable if these deposits are part of shadow credit intermediation, which occurs outside the regular banking system. However, cash can be used as collateral in securities lending. Moreover, securitisation 'not derecognised', where the securitised assets stay on the balance sheet of the originator, is recorded in the SNA as deposits on the balance sheet of the SPV. Therefore, it is necessary that deposits in the National Accounts are considered as being part of shadow banking. Derivatives are potential shadow banking instruments. Statistics of the Dutch Central Bank show that over-the-counter derivatives contracts at Dutch banks are dominated by interest rate and foreign exchange derivatives. Credit Default Swaps (CDSs) play a negligible role in the Dutch derivatives market. Further, the quality of the data on derivatives makes netting necessary (ESA 2010 par. 5.31 and 5.229). These issues on the size and quality are the reason that derivatives are excluded from shadow banking activities. Figure 3 shows the portfolio choice of shadow banking entities.

Figure 3. Asset portfolio of shadow banks, 2015



Source: Statistics Netherlands

The assets of MMFs consist almost entirely of debt securities and MMF shares. In the year 2000, deposits were 90 percent of the financial assets, but over the years deposits have gradually been replaced by securities in the portfolio choice of MMFs. Non-MMF investment funds invest a large part of their portfolio in equity and investment fund shares or units (56 percent of financial assets in 2015). These other assets are not part of shadow banking activities. In the financial auxiliaries subsector the other assets are (mostly unlisted) shares on the balance sheet of head offices. Only 23 percent of the financial assets of financial auxiliaries constitutes the chain of credit intermediation.

For other financial intermediaries (OFIs) the major part of their financial assets (72 percent in 2015) is related to shadow banking activities. Shadow banking particularly occurs in the OFI subsector, where SPVs typically have large amounts of securitised assets on their balance sheet. Statistics of the Dutch Central Bank show that SPVs with a Dutch originator are engaged in the securitisation of mortgages for 215,917 million euros. Part of these securitized mortgages are not derecognised (63,153 million euros). The other mortgages (152,764 million euros) and some other securitized loans/assets (11,430 million euros) are transferred from the originator to the balance sheet of SPVs. In addition, SPVs with a foreign originator accounted for 32,290 million euros of securitized loans, primarily corporate loans.

4.3 Data

The National Accounts are a valuable source for measuring the size and risk of shadow banking. More specifically, the Sector Accounts provide the balance sheets of different sectors in the economy: non-financial corporations (S.11), financial corporations (S.12), general government (S.13), households (S.14), non-profit institutions serving households (S.15), rest of the world (S.2). The financial corporations sector is divided into subsectors: central bank (S.121), deposit-taking corporations except the central bank (S.122), money market funds (S.123), non-MMF investment funds (S.124),

other financial intermediaries, except insurance corporations and pension funds (S.125), financial auxiliaries (S.126), captive financial institutions and money lenders (S.127), insurance corporations (S.128), pension funds (S.129). Per subsector, the balance sheet gives an overview of different categories of financial instruments: monetary gold and special drawing rights (F.1), currency and deposits (F.2), debt securities (F.3), loans (F.4), equity and investment fund shares or units (F.5), insurance, pension and standardised guarantee schemes (F.6), financial derivatives and employee stock options (F.7), other accounts receivable/payable (F.8). The definition chosen in this paper delineates shadow banking to the subsectors S.123, S.124, S.125, S.126 and the instruments F.2, F.3, F.4.

Many financial corporations report to the Dutch Central Bank. MMFs and non-MMF investment funds under supervision reported until 2008Q3. Since 2008Q4 balance sheet data of MMFs have been extrapolated and non-MMF investment funds have reported via the 'Directe RApportage' (DRA), which is a survey covering all investment funds (also funds not under supervision). The OFI subsector consists of SPVs, finance companies, broker/dealers, treasury centres and other OFIs. Data on SPVs are based on public sources like annual reports. Since 2009Q4 statistics on SPVs are reported by Monetary Financial Institutions (MFIs) as originators. Data on SPVs with a foreign originator are derived from reports for the compilation of the balance of payments, available since 2009Q4. Non-MFI daughters of MFIs, which include finance companies and broker/dealers, are reported by the MFIs. The DRA source also has information on treasury centres, who particularly leverage themselves with derivatives and are primarily hedging risks for pension funds. Data of other OFIs and financial auxiliaries (including head offices) are derived from annual reports.

Data gaps arise for the repo and securities lending markets. Adrian et al. (2011) argue that, for a better understanding of firm-level and systemic risk in the repo and securities lending market, the minimum requirements are micro data on: principal amount, interest rate, collateral type, haircut, tenor (maturity), and counterparty. Statistics Netherlands has no such data on the Dutch repo and securities lending markets. The lack of micro data on repos make it almost impossible to measure the liquidity risks in the shadow banking system. Recently, the Organisation for Economic Co-operation and Development (OECD) proposed a further breakdown of OFI subsectors and transactions (repos) for the purpose of better monitoring shadow banking.

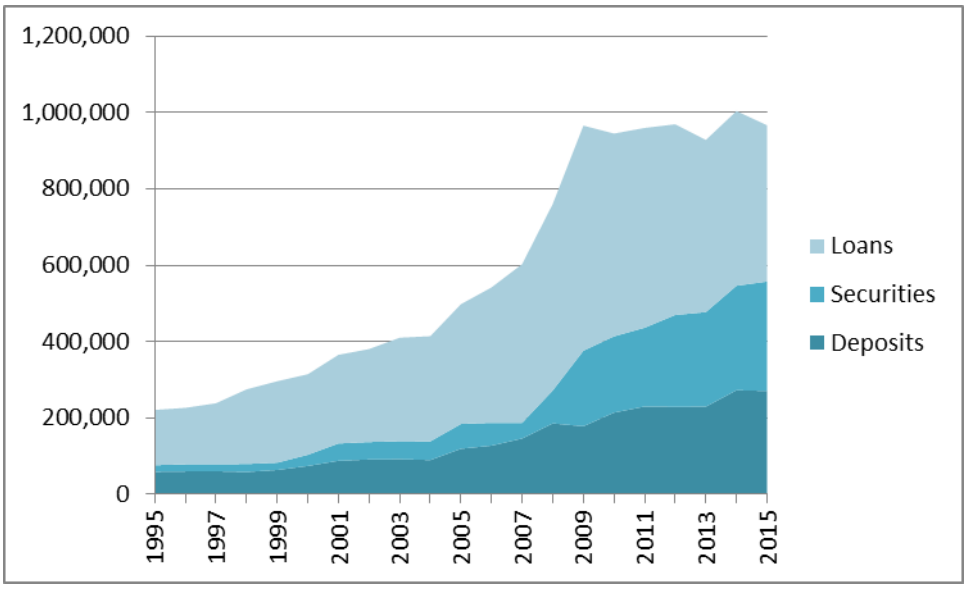
5. Results

The second part of this paper quantifies the size and risk of the Dutch shadow banking sector. After the results are presented, the analysis will focus on the risks of leverage and interconnectedness.

5.1 Size of shadow banking

Shadow banking is measured by the credit intermediation assets, which are deposits, securities and loans, on the balance sheet of the National Accounts subsectors MMFs, non-MMF investment funds, other financial intermediaries and financial auxiliaries. Figure 4 presents the size of shadow banking in historical perspective.

Figure 4. Shadow banking assets, 1995-2015 (million euro)



Source: Statistics Netherlands

The size of shadow banking in the Netherlands is 966,488 million euros in 2015[9], which corresponds to 143 percent of Gross Domestic Product (GDP). This amount is contributed by the subsectors MMFs (4,190 million euros), non-MMF investment funds (313,751 million euros), other financial intermediaries (604,988 million euros) and financial auxiliaries (43,559 million euros).

Shadow banking has grown strongly up to 2009. The portfolio of credit intermediation assets was remarkably constant over time. Shadow credit intermediation consists for about two-third of loans and for one-quarter of deposits, the share of securities being 10 percent on average. However, the financial crisis has led to another portfolio decision. In 2015, the share of loans has decreased to 42 percent, while the share of securities has raised to 30 percent of shadow banking assets.

Pre-crisis shadow banking increased almost entirely by the growth of the OFI subsector. Between 1995 and 2008, the amount of deposits on the balance sheet of OFIs raised from 41,407 million euros to 172,505 million euros, due to a boost in securitisation not derecognised. The size of loans increased from 122,794 million euros to 427,764 million euros; this amount contains a large part of securitized loans on the balance sheet of SPVs. After 2009, loans on the balance sheet of OFIs decreased on average 7 percent per year between 2009 and 2015. The collapse of the U.S. securitisation market was a catalyst for the global liquidity crisis. The European securitisation markets experienced a loss of confidence amongst investors. The Basel III capital and liquidity requirements for banks (Basel Committee on Banking Supervision 2009) and the Solvency II capital requirements for insurance companies (European Union 2009) may have caused a reallocation of

[9] For comparison, implementation of the risk based FSB (2013) framework by the Dutch Central Bank (Van der Veer, Klaaijsen and Roerink 2015) resulted in a Dutch shadow banking sector of only 207 billion euros in 2014. Earlier, the Dutch Central Bank (Broos, Carlier, Kakes and Klaaijsen 2012) estimated OFIs substantially engaged in shadow banking (MMFs, hedgefunds, SPVs, finance companies, financial SPEs) to be 978 billion euros in 2011. Economic research agency SEO (Kerste, Baarsma, Weda, Rosenboom, Rougoor and Risseeuw 2013) also included other investment funds and measured the size of shadow banking in the Netherlands as 1,452 billion euros in 2011.

funds from securitisation to alternative investment categories. “Despite its long-term social value, securitisation today suffers from stigma, reflecting both its adverse reputation among investors and conservatism among regulators and standard-setters… Nevertheless, further improved and standardised data availability may be needed to enable investors to assess the credit risk inherent in securitised assets and to help restore investor confidence in the securitisation market” (European Central Bank and Bank of England 2014).

A second factor of growth is contributed by investment funds. Since the financial crisis, investment funds have shown a large increase (on average 39 percent per year) in shadow banking assets, primarily securities. The story behind this growth is a huge portfolio transfer from pension funds to investment funds. Securities on the balance sheet of non-MMF investment funds raised from 64,338 million euros in 2008 to 153,355 million euros in 2009, and eventually to 244,951 million euros in 2015. The delineation of shadow banking excludes pension funds, so this portfolio transfer has led to a growth in shadow banking.

5.2 Risk of excessive and procyclical leverage

Leverage is evaluated using the balance sheet components[10]. The balance sheet identity is given by

$$A = D + E \tag{1}$$

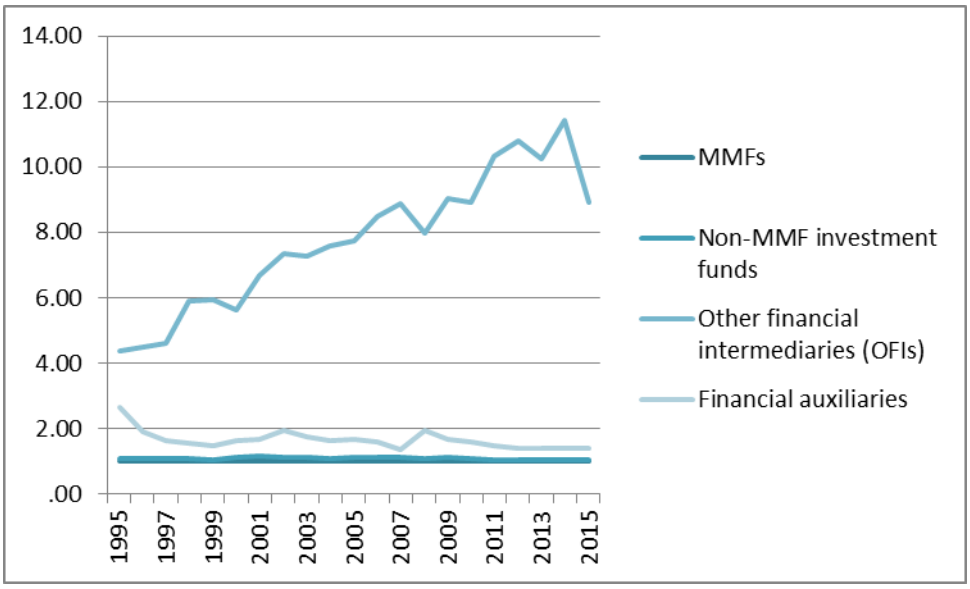
Assets *A* consist of financial and non-financial assets. Debt *D* covers all liabilities excluding shares and other equity. Equity *E* reflects the residual value of a corporation, after all other claims have been met, so the net wealth of a sector is determined by total assets minus debts. Leverage *L* is defined as the ratio of total assets to equity.

$$L = \frac{A}{E} \tag{2}$$

Other financial intermediaries, especially SPVs, are characterised by relatively high leverage, which means that they have large debts. For the total OFI subsector leverage has grown over time, from 4.4 in 1995 to 8.9 in 2015. The last year is characterised by deleveraging (figure 5).

Figure 5. Leverage, per subsector, 1995-2015

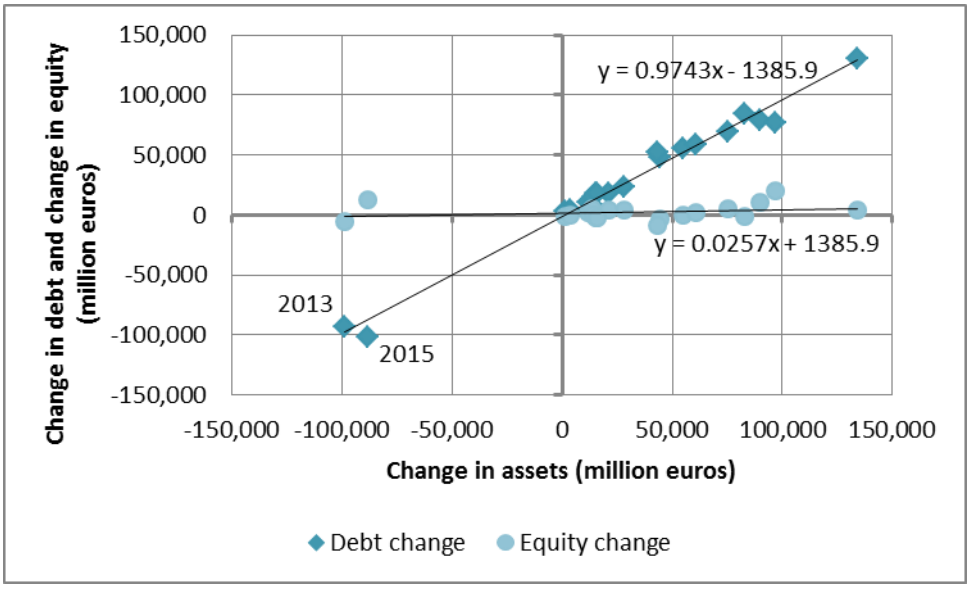
[10] Accounting leverage ignores off-balance sheet instruments like derivatives.



Source: Statistics Netherlands

Leverage can change through three different modes, depending on the component in formula 1 - assets, debt, equity - that remains fixed (Adrian and Shin 2008). MMFs and non-MMF investment funds finance the acquisition of new assets through the issue of investment fund shares. Financial auxiliaries are funded by the issue of equity securities (listed and unlisted shares). The debt component of these subsectors remains more or less fixed. Figure 6 is a scatter plot of the yearly changes in balance sheet components of the OFI subsector, which is the most interesting subsector in terms of leverage. It plots the changes in assets against debt $\left(\Delta A_y, \Delta D_y\right)$ and the changes in assets against equity $\left(\Delta A_y, \Delta E_y\right)$ in year *y*.

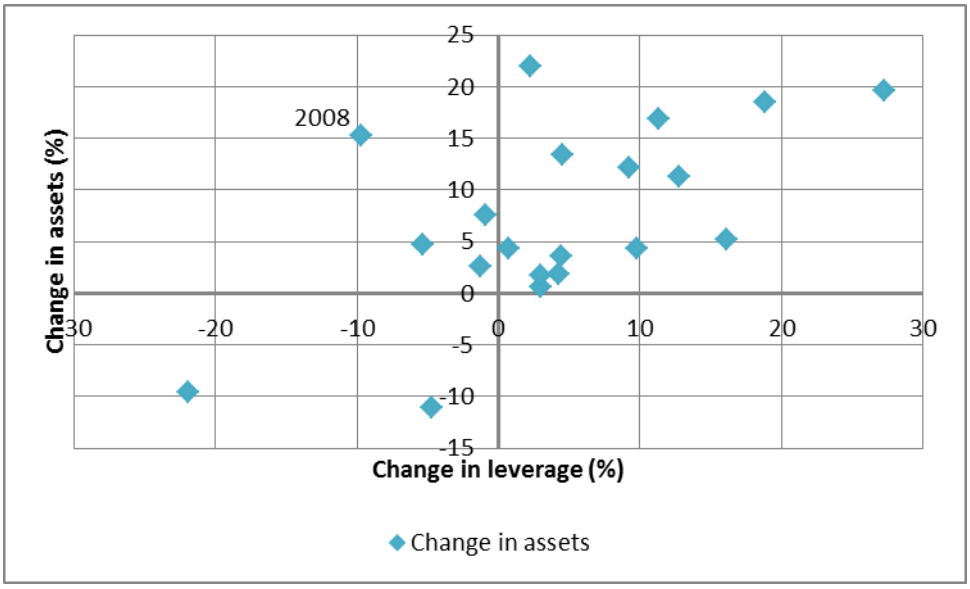
Figure 6. Balance sheet change scatter chart, other financial intermediaries, 1995-2015



Source: Statistics Netherlands

The fitted line through $(\Delta A_y, \Delta D_y)$ has a slope of 0.9743, which means that 97.43 percent of the change in assets is financed by debt. The slope of the fitted line through $(\Delta A_y, \Delta E_y)$ is close to zero, indicating that other financial intermediaries in the Netherlands have a balance sheet management that keeps equity relatively constant over time; new assets are funded by borrowing[11]. As a consequence of active balance sheet management, leverage can be procyclical (Adrian and Shin 2010). The scatter plot in figure 7 shows a positive relationship between the yearly change in assets and the yearly change in leverage of the Dutch OFI subsector.

Figure 7. Change in assets and leverage of other financial intermediaries, 1996-2015



Source: Statistics Netherlands

Most points are situated in quadrant I (x>0,y>0) and quadrant III (x<0,y<0). The year 2008 is an outlier; equity increased as result of a capital injection at the start of the financial crisis. In general, the scatter plot indicates that leverage is procyclical in the Netherlands, which is an important risk.

5.3 Risk of interconnectedness

The risk of interconnectedness is analysed using the 'Balance Sheet Approach' (BSA), developed by the International Monetary Fund (Allen, Rosenberg, Keller, Setser and Roubini 2002). The BSA aggregates all the balance sheets in an economy by sector. The core of this approach is the BSA matrix with asset and liability positions in and between sectors. This network analysis enables a better understanding of inter-linkages across institutional sectors, identifying financial vulnerabilities

[11] Regression statistics: change in assets against change in debt R square=0.986.

and contagion risk of each link in the chain of non-bank credit intermediation (Turner 2012, IMF 2015). The balance sheet matrix shows each sector's position vis-à-vis that of other domestic sectors and the rest of the world (table 1). Although the BSA matrix tells many stories, the analysis here will focus on the monetary policy operations, and of course on the exposure of shadow banks.

Table 1. BSA matrix, 2015

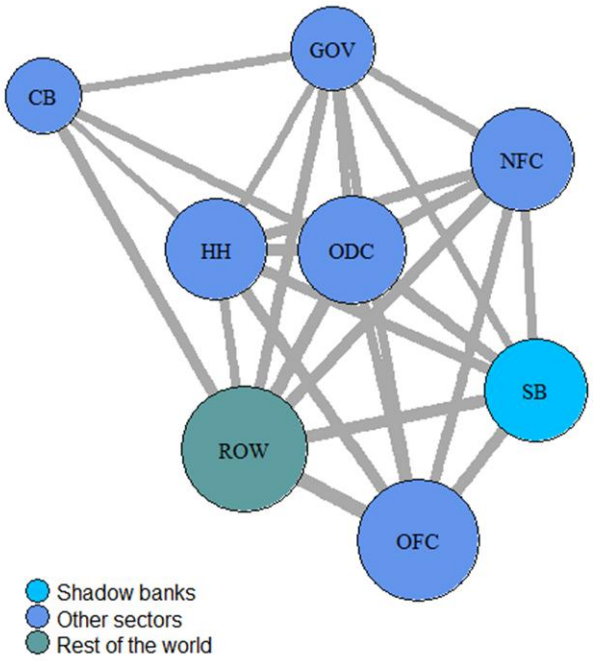
Balance sheet 2015 (million euros)		Holder of the liability (creditor sector)															
		NFC		CB		ODC		SB		OFC		GOV		HH		ROW	
		A	L	A	L	A	L	A	L	A	L	A	L	A	L	A	L
Issuer of the liability (debtor sector)	Non-financial corporations (NFC)			28	4,647	306,211	234,705	52,853	14,335	222,174	45,009	77,151	20,025	166,080	55,113	1,002,631	949,071
	Central bank (CB)	4,647	28			120,470	23,531	920	362	320	0	26,322	24,024	10,025	0	52,995	149,368
	Other deposit-taking corporations (ODC)	234,705	306,211	23,531	120,470			331,720	401,445	74,225	4,651	28,404	119,172	396,506	460,128	1,313,156	975,162
	Shadow banks (SB)	14,335	52,853	362	920	401,445	331,720			768,264	133,438	1,776	14,783	36,476	198,020	348,591	892,143
	Other financial corporations (OFC)	45,009	222,174	0	320	4,651	74,225	133,438	768,264			17,304	102,985	1,482,601	67,941	4,147,938	4,520,414
	Government (GOV)	20,025	77,151	24,024	26,322	119,172	28,404	14,783	1,776	102,985	17,304			8,864	42,686	237,691	44,443
	Households (HH)	55,113	166,080	0	10,025	460,128	396,506	198,020	36,476	67,941	1,482,601	42,686	8,864			3,089	83,506
	Rest of the world (ROW)	949,071	1,002,631	149,368	52,995	975,162	1,313,156	892,143	348,591	4,520,414	4,147,938	44,443	237,691	83,506	3,089		
	Total	1,322,905	1,827,128	197,313	215,699	2,387,239	2,402,247	1,623,877	1,571,249	5,756,323	5,830,941	238,086	527,544	2,184,058	826,977	7,106,091	7,614,107

Source: Statistics Netherlands

The assets side of the central bank shows the marginal lending facility to deposit-taking corporations. In the fourth quarter of 2007, the ECB provided 34,900 million euros extra liquidity to banks because of the turbulence on the money market. In 2008, monetary policy further raised credit to banks up to 70,571 million euros. It diminished to 46,468 million euros in 2009 and to 23,531 million euros in 2014. Regular banks and shadow banks have become more and more interconnected over time. Years before the financial crisis, the interconnectedness between regular banks and households stabilized and shadow banking took over. Securitisation gave a boost to shadow banking between 2006 and 2007. Since then, banks have become highly exposed to shadow banking, even more than to non-financial corporations. Gross exposure is measured as sector's total assets plus total liabilities. While the BSA matrix analyses the assets and liabilities positions of each sector to other parties, a network graph visualises the gross exposure of sectors within the Dutch economy and with the rest of the world (figure 8).

Figure 8. Network graph[12] of gross exposure between sectors in the Dutch economy, 2015

[12] The size of the nodes (sectors) and links (gross exposure) are drawn on a logarithmic scale. No connection between nodes means that the value of gross exposure is zero or smaller than 10,000 million euros.



Source: Statistics Netherlands

The Netherlands are an open economy with strong links to the rest of the world (ROW), potentially leading to increased external risk. In a globalized world, everything depends on everything else. Foreign MMFs show a high proportion of non-domestic portfolio holdings and are primarily funded by non-resident investors. This, amongst others, causes substantial cross-border interconnections and strong contagion links between countries (Gridseth 2014). The Dutch shadow banking system (SB) is highly interconnected with other deposit-taking corporations (ODC) – through the securitisation of loans at regular banks – and other financial corporations (OFC), which include insurance corporations and pension funds (the funding parties) and captive financial institutions. The network graph shows no connection between the central bank (CB) and shadow banks, because there is no safety net for shadow banking. The real economy is exposed to shadow banking risks, primarily via households (HH) and also non-financial corporations (NFC). The gross exposure of shadow banks to households sharply increased from 208,156 million euros in 2006 to 323,527 million euros at the height of the financial crisis in 2009. Afterward, it gradually declined to a level of 234,496 million euros in 2015, while traditional banks became more exposed to households again. Since 2009, regular banks' gross exposure to shadow banks has remained more or less stable (besides a dip in 2013) with a level of 733,165 million euros in 2015.

6. Conclusion

The definition of shadow banking has been an evolving concept in the literature. Most definitions refer to credit intermediation outside the regular banking system, without access to central bank liquidity or public sector credit guarantees. The National Accounts perspective aims a transparent and standardised measure that neither exaggerates the size of shadow banking by taking the entire balance sheet into account, nor limits the size of shadow banking to its risks. Shadow banking is measured by the credit intermediation instruments deposits, securities and loans on the balance sheet of the National Accounts subsectors MMFs, non-MMF investment funds, other financial intermediaries and financial auxiliaries.

Whereas a traditional bank intermediates between savers and borrowers under one roof, shadow banking is a chain of credit intermediation with multiple steps: from loan origination via securitisation (and re-securitisation) to intermediation and funding. Typical for shadow banking is securitised debt, which is debt secured by collateral assets. Shadow banking answers the demand for safe, short-term, liquid investments, and provides alternative credit channels. Innovative products improve the functioning of financial markets, for example via risk diversification. The *raison d'être* of shadow banking lies in the benefits, although the recent financial crisis has particularly reminded us of the risks. Credit risk transfers, maturity and liquidity transformation, and excessive leverage are important sources of risk. In times of economic stress the shadow banking system itself can become a systemic risk, because the financial markets are characterised by high interconnectedness between the regular and shadow banking system. Shadow banking has no incentive to internalise the costs of risk, undermining banking regulation.

The case study of the Netherlands shows that data collection on shadow banking activities (particularly the repo market) can be strengthened to enable investors and regulators the monitoring of credit flows and risks. A valuable source of data is the National Accounts, more specifically the Sector Accounts. They contain the balance sheets of financial corporations, relevant for measuring the size and risk of shadow banking. Tighter regulations and restrictions imposed on traditional banking has encouraged growth in shadow banking up to 2009. Securitisation gave shadow banking a boost, but with the financial crisis investors lost their confidence, and the securitisation market collapsed. This is compensated by a large portfolio transfer from pension funds to non-MMF investment funds, which is a second factor of growth in shadow banking. Ultimately, the level of shadow banking has remained relatively constant since 2009.

The analysis has focussed on the risks of leverage and interconnectedness. The other financial intermediaries (OFIs) subsector is characterised by high leverage, which means that most of the assets are financed by debt. Over the last two decades, leverage has doubled. There is evidence that leverage in the OFI subsector is procyclical, which is a systemic risk, given the interconnected nature of shadow banks. The Balance Sheet Approach (BSA) matrix is a useful instrument that can give insight to the interconnectedness of different sectors in the economy. Regular banks have become more exposed to shadow banks over time, but since 2009, regular banks' gross exposure to shadow banks has remained more or less stable. Concluding, shadow banking, which is characterised by securitisation, has the important benefit of risk diversification, but is also a systemic risk that may leave the goal of monetary and financial stability further away.

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