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The Law and Economics of Shadow Banking

Nabilou, H.; Paccès, A.M.

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1. The law and economics of shadow banking

Hossein Nabilou and Alessio M. Paces

1. INTRODUCTION

This chapter deals with the economic rationale for regulating shadow banking. It discusses whether the regulatory initiatives proposed by academics and policymakers are consistent with this rationale. We posit that the ultimate goal of financial regulation is to promote financial stability. Therefore, we evaluate shadow banking regulation based on its ability to reduce financial instability efficiently.

Regulating shadow banking is challenging because shadow banking is often defined by reference to what it is not, namely, licensed or official banking.¹ However, such an approach does not capture the essence of the shadow banking problem. The official banking system has implicitly or explicitly supported a significant part of what is known today as shadow banking. For instance, the asset backed commercial paper (ABCP) conduits or the structured investment vehicles (SIV), which were exposed to the United States (US) housing market during the global financial crisis (GFC), all enjoyed guarantees by banks – so-called ‘put options’ – by way of contract or reputation.² The remainder of shadow banking was still problematic for financial stability because of the contracts in which shadow banks were counterparty to banks. American International Group (AIG), for instance, was counterparty to a significant part of the banking system relying on credit default swaps (CDS) to insure against the default of mortgage-backed securities (MBS).

We start from the observation that shadow banking is effectively banking, albeit carried out in such a way as to avoid regulatory constraints. In order for regulation to be effective in promoting financial stability, shadow banking is to be defined functionally, based on its contribution to systemic risk. We characterize systemic risk as the likelihood of financial system failure, which will impair the financing of production and consumption, and thus will have consequences on the performance of the real economy. There are different definitions of systemic risk, which are geared towards measuring it.³ Although we agree on the necessity to improve the measurement of systemic risk, we are skeptical

¹ For the definition of licensed banking, *see for example* art 4.1(1) of the Capital Requirements Regulation (CRR) which defines a ‘credit institution’ as ‘an undertaking the business of which is to take deposits or other repayable funds from the public and to grant credits for its own account’. *See* Regulation (EU) of the European Parliament and of the Council 575/2013 of 27 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) 648/2012 [2013] OJ L 176/1.

² Zoltan Pozsar, Tobias Adrian, Adam Ashcraft and Haley Boesky, ‘Shadow Banking’ (2013) 19(2) *FedReserveBankNewYorkEconPolRev* 1.

³ *See* Markus Brunnermeier and Arvind Krishnamurthy (eds), *Risk Topography: Systemic Risk and Macro Modeling* (University of Chicago Press 2014). *See also* Viral Acharya, Robert Engle and Matthew Richardson, ‘Capital Shortfall: A New Approach to Ranking and Regulating Systemic Risks’ (2012) 102(3) *AmEcRev* 59.

that such measurement can ever become so precise as to prevent financial crises. Rather, we prefer to adopt a conceptual approach to systemic risk in order to define shadow banking.

Defining shadow banking in terms of its contribution to systemic crisis implies taking a macro perspective to the economics of banking, and deriving regulatory implications from there. In this respect, our chapter aims at filling an important gap in the law and economics literature, which is the lack of consideration for macroeconomics in the economic analysis of law.⁴ This gap reflects the disintegration of finance and monetary economics in the economics profession. Looking at shadow banking from a macroeconomics perspective implies taking a ‘money view’.⁵ We can identify shadow banking from its ability to fund long-term commitments through short-term liabilities. This maturity mismatch creates systemic risk inasmuch as short-term liabilities are considered as safe as money. The implied liquidity of such liabilities makes them subject to run.

For the purposes of financial stability, regulation of shadow banking should focus on entities and transactions allowing liabilities to be accepted as a substitute for money.⁶ For the banking business to be profitable, such safe, liquid, short-term liabilities must be invested in risky, illiquid, long-term assets. Therefore, we define banking – both official and shadow – in connection with the maturity transformation of debt. We intend maturity transformation broadly. Not only does it include the funding of assets through liabilities having different maturities, but also liquidity transformation (financing illiquid assets with liquid liabilities, possibly with matching maturities) and credit transformation (enhancing the credit quality of assets in order to fund them with safer liabilities, regardless of maturity and liquidity mismatch). Maturity, liquidity and credit transformation currently contribute to defining shadow banking.⁷ We focus on the money-like character

⁴ See Richard A Posner, ‘On the Receipt of the Ronald H. Coase Medal: Uncertainty, the Economic Crisis, and the Future of Law and Economics’ (2010) 12(2) ALER 265. Important exceptions in the law and economics scholarships includes Katharina Pistor, ‘A Legal Theory of Finance’ (2013) 41(2) JCompEcon 315, and Yair Listokin, ‘A Theoretical Framework for Law and Macroeconomics’ (Yale Law & Economics Research Paper No 567, 2016) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2860283> accessed 5 June 2017. Professors Pistor and Listokin focus on different problems than shadow banking though.

⁵ Perry Mehrling, ‘Essential Hybridity: A Money View of FX’ (2013) 41(2) JCompEcon 355; Zoltan Pozsar, ‘Shadow Banking: The Money View’ (2014) Office of Financial Research Working Paper 2014 <https://www.financialresearch.gov/working-papers/files/OFRwp2014-04_Pozsar_ShadowBankingTheMoneyView.pdf> accessed 5 June 2017.

⁶ Minsky had historically one of the broadest views of money in economics. This is the view adopted in this essay. See Hyman P Minsky, *Stabilizing an Unstable Economy* (McGraw-Hill 1986) 225.

⁷ See Tobias Adrian and Adam B Ashcraft, ‘Shadow Banking: A Review of the Literature’ in Garrett Jones (ed), *Banking Crises: Perspectives from The New Palgrave Dictionary* (Palgrave Macmillan 2016) 282. The International Monetary Fund (IMF) defines shadow banking as ‘nontraditional financial intermediation, which is determined by the funding source used by financial intermediaries to finance a portion of their assets’. See Artak Harutyunyan, Alexander Massara, Giovanni Ugazio, Goran Amidzic, and Richard Walton, ‘Shedding Light on Shadow Banking’ (2015) IMF Working Paper No WP/15/1, 7 <www.imf.org/external/pubs/ft/wp/2015/wp1501.pdf> accessed 5 June 2017. Shadow banking can also be measured using a noncore liability approach which attempt to capturing nontraditional funding. See IMF, ‘Global Financial Stability Report: Risk Taking, Liquidity, and Shadow Banking: Curbing Excess While Promoting Growth’

of the liabilities to fund assets that do not have the same feature, regardless of the maturity of both. We adopt such a broad definition because we are skeptical about defining shadow banking based on a list of activities about which we know today. We argue that shadow banking may well evolve into activities that we – and importantly, the policymakers – may not yet know about, while still generating systemic risk. This is, after all, what happened during the GFC. Anchoring the definition of shadow banking to a conceptual framework of systemic risk, instead of to a list of systemically relevant activities, allows identifying shadow banking despite financial innovation and the imperfection of risk models employed by the financial industry and its regulators.

The remainder of the chapter is as follows. Section 2 deals with the problem of shadow banking definition, emphasizing the advantages, but also the limitations, of an instrument-based definition. Section 3 discusses the mapping of shadow banking by the Financial Stability Board (FSB) and the International Monetary Fund (IMF) in light of the challenges in defining and monitoring shadow banking. Section 4 discusses the benefits and the costs of shadow banking for society. Building upon this framework, section 5 argues that the optimal way to regulate shadow banking is to restrict leverage at the assets level, through minimum haircut regulation. Section 6 evaluates the effectiveness and the efficiency of direct and indirect regulation of shadow banking in two major jurisdictions, the US, and the EU. Section 7 concludes.

2. SHADOW BANKING (UN)DEFINED

2.1 History of the Term

The term shadow banking as we use it today was coined by PIMCO's Paul McCulley in 2007 in a speech at the annual economic policy symposium of the Federal Reserve Bank of Kansas City in Jackson Hole, Wyoming.⁸ The origins of the concept, however, can be traced back to an earlier work referring to shadow banking as the 'parallel banking system'.⁹ Following these pristine uses of the term, a whole host of unconventional designations were coined to refer to shadow banking. These include 'securitized finance',¹⁰ 'market-based credit system',¹¹ 'nonbank credit

(October 2014) 91–92 <<http://www.imf.org/external/pubs/ft/gfsr/2014/02/index.htm>> accessed 5 June 2017.

⁸ Paul A McCulley, 'Teton reflections' (PIMCO Global Central Bank Focus No 2, 2007) <www.pimco.com/en-us/insights/economic-and-market-commentary/global-central-bank-focus/teton-reflections> accessed 5 June 2017.

⁹ Jane W D'Arista and Tom Schlesinger, 'The parallel banking system' (Economic Policy Institute Briefing Paper 1993) <www.epi.org/files/page/-/old/briefingpapers/1993_bp_parallel.pdf> accessed 5 June 2017; Pozsar et al, 'Shadow Banking' (n 2) 13.

¹⁰ Gerard Caprio and Lawrence H Summers, 'Finance and its Reform: Beyond Laissez-Faire' in Dimitri B Papadimitriou (ed), *Stability in the Financial System* (Palgrave Macmillan 1996) 418.

¹¹ Perry Mehrling, Zoltan Pozsar, James Sweeney and Daniel H Neilson, 'Bagehot was a Shadow Banker: Shadow Banking, Central Banking, and the Future of Global Finance' (5 November 2013) 2 <http://econ.as.nyu.edu/docs/IO/26329/Mehrling_10012012.pdf> accessed 5 June 2017.

intermediation¹² and ‘network finance’.¹³ These multiple designations and definitions added more confusion to the already complex and convoluted debate on shadow banking. However, despite its elusive name, shadow banking is neither shadowy, nor banking as we know it.¹⁴

Though the term shadow banking entered the common parlance after the GFC, shadow banking has a longer history. According to some commentators, shadow banking has existed at least since the late nineteenth century, when the Bank of England initiated a program to stabilize the private bills markets by bailing out bill brokers.¹⁵ These brokers were not banks. However, they were able to convert the bills into money,¹⁶ an activity that we would call shadow banking today.

What we know as shadow banking is a multitude of activities that contribute to the vulnerability of the financial system. Therefore, they are being studied by academics and policymakers. In this section, we review different approaches to defining shadow banking, with the goal to identify a suitable definition from a law and economics perspective.

2.2 Approaches to Shadow Banking Definition

The variety of financial instruments, institutions, and activities involved in shadow banking do not lend themselves to a classic definition *per genus et differentiam*.¹⁷ Furthermore, searching for an all-encompassing definition would be a futile endeavor. Shadow banking should rather be defined by reference to the purpose for which it is studied. Since the shadow banking system came under the spotlight because of its potential contribution to systemic risk, a useful definition needs to cover the systemic risk implications of shadow banking.¹⁸

Currently, there are three approaches to defining shadow banking. Shadow banking may be defined by the activities constituting shadow banking. These, for instance, include maturity, liquidity and credit transformation as long as they are geared towards

¹² The Group of Thirty: Working Group on Financial Reform, ‘Financial Reform: A Framework for Financial Stability’ (2009) <www.group30.org/images/PDF/Financial_Reform-A_Framework_for_Financial_Stability.pdf> accessed 5 June 2017. *See also* Financial Stability Board, ‘Progress in the Implementation of the G20 Recommendations for Strengthening Financial Stability: Report of the Financial Stability Board to G20 Finance Ministers and Central Bank Governors’ (2011) <www.fsb.org/wp-content/uploads/r_110415a.pdf?page_moved=1> accessed 5 June 2017.

¹³ Robert Guttman, *Finance-Led Capitalism: Shadow Banking, Re-Regulation, and the Future of Global Markets* (Palgrave Macmillan 2016) 125.

¹⁴ Eddy Wymeersch, ‘Shadow Banking and Systemic Risk’ (European Banking Institute Working Paper Series 2, No 1, 2017). Although shadow banks do not engage in deposit taking, which is key for the legal definition of a bank or credit institution, as we will show, their activity is very similar to the core function of banking.

¹⁵ Mehrling et al (n 11). Mehrling draws interesting parallels between the bills market of late nineteenth-century England and the current functioning of the shadow banking system.

¹⁶ Walter Bagehot, *Lombard Street: A Description of the Money Market* (HS King 1873).

¹⁷ This is an Aristotelian pattern of definitions in which definitions are provided by determining their genus to which that term belongs and then providing the difference which gives the species and locates the term within that genus. The most famous example is humans are rational animals.

¹⁸ IMF, ‘Global Financial Stability Report’ (n 7) 68.

performing credit intermediation – namely, taking savings from lenders and channeling them towards borrowers. Activity-based definitions may or may not exclude credit intermediation performed by banks. Alternatively, shadow banking may be defined by the entities carrying out credit intermediation, as long as these entities differ from banks. One prominent example of such entities is money market mutual funds (MMMFs), but there are several others (finance companies, peer-to-peer lenders, hedge funds and private equity funds, among others). Finally, shadow banking may be defined by the instruments through which it is carried out. The repurchase agreement (repo),¹⁹ namely, functionally a contract to borrow on financial collateral, is a case in point. Depending on the quality of collateral, its credit enhancement, and the term of the repo, it can generate money-like liabilities. There are several other examples of such instruments. Importantly, the list is not finite, but it includes every credit instrument that can generate safe and liquid liabilities, which are subject to runs.

An instrument-based definition is a functional definition anchored to a financial instrument that may or may not yet exist. The activity- and entity-based definitions are functional too, because they reflect the systemic risk concerns stemming from shadow banking.²⁰ However, these definitions are static owing to their reliance on a list of entities and/or activities. Activity- and entity-based definitions are useful to identify the object of regulation, whereas an instrument-based approach is more promising for the purpose of adapting regulation to unknown challenges to financial stability.

2.3 Activity-based Definitions

Under the realm of activity-based definitions, shadow banking can be defined broadly as ‘all financial activities, except traditional banking, which require a private or public backstop to operate’.²¹ A backstop is a last-resort risk-absorption commitment that operates when all other forms of insurance have failed. It is usually in the form of an (explicit or implicit) put option, which can be private or public. An example of private backstop is a credit risk guarantee by a bank, of the kind activated by ABCP conduits during the GFC. An example of public backstop is the liquidity put by central banks, which ranges from traditional lender-of-last-resort facilities to the more recent programs of distressed assets purchase. A backstop is instrumental in conferring on shadow banking liabilities the money-like features (that is, safety and liquidity) that, along with a mismatch with the assets, make shadow banking prone to systemic risk.

A definition of shadow banking based on backstops is entirely a functional one. The

¹⁹ A repo or repurchase agreement is the sale of securities coupled with a commitment to repurchase them at a specified price and at a future date or on demand. See Adrian Tobias, Adam Copeland, Begalle Brian and Martin Antoine, ‘Repo and Securities Lending’ (2012) NBER Working Paper Series No 18549, 2 <www.nber.org/papers/w18549.pdf> accessed 5 June 2017. In the recent financial crisis, the run on repo markets which led to forced deleveraging played a significant role in the GFC. See Gary Gorton and Andrew Metrick, ‘Securitized Banking and the Run on Repo’ (2012) 104(3) *JFinanceEcon* 425; Gary Gorton, *Slapped by the Invisible Hand: The Panic of 2007* (OUP 2010).

²⁰ IMF, ‘Global Financial Stability Report’ (n 7) 68, 91–92.

²¹ Stijn Claessens and Lev Ratnovski, ‘What is Shadow Banking?’ (2014) IMF Working Paper WP 14/25, 4 <www.imf.org/external/pubs/ft/wp/2014/wp1425.pdf> accessed 5 June 2017.

focus is on the activities that require a backstop to be undertaken irrespective of what type of financial institutions are engaging in such activities. The purpose of this definition is to capture any form of shadow banking, present and future. However, it is doubtful that it may achieve this purpose in practice. Backstops, particularly if implicit, are difficult to identify, whereas systemic risk may build up in their shadow. Shadow banking can be performed formally in the absence of backstops; save that it will indeed require a backstop when the systemic risk materializes.

Moving away from strictly functional definitions, shadow banking activities can also be defined in the negative, particularly as ‘bank-like financial activities that are conducted outside the traditional commercial banking system, many of which are unregulated or lightly regulated’.²² Similarly, the Office of Financial Research (OFR) in the US defines shadow banking as ‘credit intermediation outside the insured depository system, involving leverage, maturity transformation, and the creation of money-like liabilities’.²³ These definitions are easier to operationalize as they focus on the absence of regulation or relatively light-touch regulation in financial intermediation, rather than on activities being in need of backstop. The disadvantage of a negative definition is that it results in either too narrow or too vague lists of activities. The concrete identification of shadow banking will thus depend on the discretion of the financial supervisors. This is not ideal, if only for reasons of legitimacy and legal certainty. This limitation reveals the challenges stemming from the dynamic character of shadow banking.

To cope with the trade-off between vagueness and under-inclusiveness of activity-based definitions, we could look at the root of shadow banking. What has historically differentiated shadow banking from financial intermediation is the reliance on financial markets. In this perspective, shadow banking has been defined as ‘money market funding of capital market lending’²⁴ either on the banks’ balance sheets or off their balance sheet. This definition captures two crucial features of shadow banking: one is the reliance on capital markets (for example, mortgage securitizations, derivatives) for risk-taking; the other is reliance on money markets (for example, repos and commercial paper) for liquidity. It is a small step from markets to the instruments that are traded therein. In a similar vein, the IMF defines shadow banking as ‘non-traditional financial intermediation, which is determined by the funding source used by financial intermediaries to finance a portion of their assets’.²⁵ To capture (and measure) non-traditional funding, the IMF relies on the notion of noncore liabilities, which is an instrument-based approach to defining shadow banking.

Before moving on to discussing the instrument-based definitions, it is useful to discuss the entity-based definitions for they have a unique advantage over all other approaches. Whereas the legal basis for regulating the activities of shadow banking and the instruments they rely upon is not obvious, particularly if these activities are identified at the discretion of supervisory agencies, dealing with entities is much easier from a legal point

²² Financial Crisis Inquiry Commission, ‘Shadow Banking and the Financial Crisis’ (2010) 7 <http://fcic-static.law.stanford.edu/cdn_media/fcic-reports/2010-0505-Shadow-Banking.pdf> accessed 5 June 2017.

²³ Office of Financial Research, ‘Financial Stability Report’ (2015) 124 <www.financialresearch.gov/financial-stability-reports/> accessed 5 June 2017.

²⁴ Mehrling et al (n 11) 2.

²⁵ Harutyunyan et al (n 7) 7.

of view.²⁶ Whether certain institutions are subject to regulation is a policy issue and depends on whether, according to the legislator's assessment, these institutions are in a position to jeopardize financial stability.

2.4 Entity-based Definitions

The earlier definitions of shadow banking were entity based. McCulley defined the shadow banking system as 'the whole alphabet soup of levered up non-bank investment conduits, vehicles, and structures' whose liabilities are similar to bank deposits.²⁷ According to Morgan Ricks's view, repo-financed dealer firms, securities lenders, SIVs, ABCP conduits, credit hedge funds and MMMFs can all be considered as shadow banks.²⁸ Acharya Khandwala, and Öncü define shadow banking based on their similarity to financial institutions that behave like banks.²⁹ Although, like banks, these institutions borrow short-term and use leverage to lend and invest in illiquid assets, they are only lightly regulated.³⁰

If we focus on the perception of shadow banking by investors, a shadow bank is rather 'an institution or bank- sponsored special-purpose vehicle that has persuaded its customers that its liabilities can be redeemed *de facto* at par without delay (or can be traded *as if* they will be executed at par without fail at maturity) even though they are not *formally* protected by government guarantees'.³¹ Within the entity-based definitions of the shadow banking sector, shadow banks might even be given the label of 'non-banks performing bank-like functions'.³²

Because they all implicitly rely on a functional approach, entity-based definitions are unhelpful to identify shadow banking. Virtually any entity of the financial industry could perform shadow banking in one way or another. In the European context, a study by the European Systemic Risk Board (ESRB) reveals that most of the 'other financial institutions' (OFI) have currently little engagement in shadow banking activities.³³ However, a focus on the entities is the ultimate reason why policymakers know anything at all about the shadow banking system.

²⁶ Willa E Gibson, 'Are swap Agreements Securities or Futures? The Inadequacies of Applying the Traditional Regulatory Approach to OTC Derivatives Transactions' (1999) 24(2) JCorpLaw 416.

²⁷ McCulley (n 8) 2.

²⁸ Morgan Ricks, 'Shadow Banking and Financial Regulation' (2010) Columbia Law and Economics Working Paper, No 370, 3–4 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1571290> accessed 5 June 2017.

²⁹ Viral V Acharya and Sabri, Öncü T, 'A Proposal for the Resolution of Systemically Important Assets and Liabilities: The Case of the Repo Market' (2013) 9(S1), International Journal of Central Banking, 291–349 <<http://www.ijcb.org/journal/ijcb13q0a14.pdf>> accessed 24 December 2017.

³⁰ IMF, 'Global Financial Stability Report' (n 7) 91.

³¹ Edward J Kane, 'Shadowy Banking: Theft by Safety Net' (2014) 31 YaleJonReg 776.

³² The 'non-banks credit intermediation' is another term for shadow banking used by the FSB. See The Group of Thirty: Working Group on Financial Reform (n 12); FSB (n 12).

³³ Laurent Grillet-Aubert et al, 'Assessing Shadow Banking – Non-bank Financial Intermediation in Europe' (2016) 40 <www.esrb.europa.eu/pub/pdf/occasional/20160727_occasional_paper_10.en.pdf> accessed 5 June 2017.

One big challenge for shadow banking regulation is the lack of granular data. The problem mainly stems from the lack of reporting obligations by the OFIs. This gap makes good economic sense as long as the activities OFIs engage in do not give rise to systemic risk. However, the lack of information creates negative externalities.³⁴ As we are going to argue, an instrument-based definition of shadow banking could help identify the entities producing externalities in the form of systemic risk. Having said this, legal obligations, including disclosure obligations, are more effectively imposed on entities than on the instruments they use.

2.5 Towards a Workable Instrument-based Definition

Instrument-based definitions of shadow banking are not popular in the policy debate. On the contrary, the prominent FSB definition is based on a mixture of activities and entities. According to the FSB, shadow banking is to be understood as ‘credit intermediation involving entities *and* activities outside the regular banking system’.³⁵ Academic commentators have dwelled more on the *instruments* connecting entities to the activities of shadow banking. On the legal side, Steven Schwarcz considers shadow banking as ‘the provision of *any* financial products and services by shadow banks’, because ‘the essential point of shadow banking is that non-banks provide financial products and services’.³⁶ Professor Schwarcz’s definition is intentionally broad, ‘to encompass the inevitable evolution of financial products and services over time’. On the economists’ side, Gorton and Metrick likewise define shadow banking placing more emphasis on the instruments, such as, ‘old contracts (repo)’ or ‘more esoteric instruments’ (similar to ABCP, asset-backed securities – ABS – and collateralized debt obligation – CDO).³⁷ However, the purpose of these instruments should always be to replicate functions of traditional banking.

The above definitions are too vague. They suffer from the lack of a precise connection with systemic risk. Instruments such as repos may not be conducive to systemic risk, for instance, when large liquidity reserves are held against them.³⁸ Conversely, on-balance-sheet securitizations by banks, such as covered bonds, may well lead to systemic risk despite them being excluded from the list of instruments of shadow banking.³⁹

³⁴ For an overview of information gaps in shadow banking and their implications for shadow banking regulation, see Kathryn Judge, ‘Information Gaps and Shadow Banking’ (2017) 103(3) *VaLRev* 411.

³⁵ FSB, ‘Shadow Banking: Strengthening Oversight and Regulation – Recommendations of the Financial Stability Board’ (2011) 1 (emphasis added) <www.fsb.org/wp-content/uploads/r_111027a.pdf?page_moved=1> accessed 5 June 2017.

³⁶ Steven L Schwarcz, ‘Regulating Shadow Banking’ (2012) 31 *RevBanking&FinL* 620, 621–22 (original emphasis).

³⁷ Gorton and Metrick, ‘Securitized Banking and the Run on Repo’ (n 19).

³⁸ Ana Fostel and John Geanakoplos, ‘Endogenous Collateral Constraints and the Leverage Cycle’ (2014) 6(1) *AnnuRevEcon* 17.

³⁹ Since covered bonds subordinate other non-adjusting secured and unsecured creditors, those unsecured creditors would find it in their best interest to run on the issuing bank at the first signs of trouble. By concentrating risk on unsecured debt, the asset encumbrance stemming from covered bonds may deteriorate the liquidity profile of the issuing institution and facilitate a run on financial firms. Moreover, a high level of asset encumbrance would limit the level of unsecured funding to begin with. Therefore, in addition to increasing the likelihood of runs on banks, covered bonds

If the purpose of regulating shadow banking is to cope with systemic risk, the definition of shadow banking instruments should be linked to maturity transformation broadly conceived. All and only the instruments allowing the funding of risky long-term assets (such as a house or exposure to the housing market) with supposedly safe short-term liabilities (such as a repo or a marked-to-market derivative) should define shadow banking. Although an instrument-based definition of this kind is not reflected by the policy debate, the IMF approach to identifying shadow banking comes relatively close to it.

According to the IMF, shadow banking is to be identified based on noncore liabilities. Noncore liabilities are defined in contrast to the liabilities of traditional banking, namely, demand deposits of ultimate creditors (whether individual or institutional). This definition is obviously over-inclusive, as virtually any institution, also non-financial, could issue noncore liabilities. The IMF narrowed it down to exclude entities such as pension funds and funds other than MMMFs, which do not engage in any form of maturity transformation. The IMF approach has the important advantage to include the forms of shadow banking that are carried out within the banking system. The narrow IMF definition of noncore liabilities includes money-like promises by banks and non-banks to ultimate investors. The broad IMF definition includes also noncore liabilities issued between financial counterparties, whose net impact outside the financial sector is zero. Particularly because this measure includes banks, it gives an important indication of the systemic risk within the financial sector, as matched-book obligations typically fail to net out in a financial crisis.

Conversely, the FSB's definition excludes regular banks. This approach has been criticized because, by focusing on the non-bank financial sector, the FSB overlooks the possibility that the systemic risk of shadow banking originates from within regular banking.⁴⁰ Moreover, the FSB definition covers all entities that, like banks, intermediate credit although they may not give rise to any systemic risk concerns.⁴¹

Choosing one approach to defining shadow banking is not easy, for they all have shortcomings. Activity-based definitions are under-inclusive or too vague to operationalize in a democratic regulatory system. Entity-based definitions may be sufficiently precise to operationalize, but they are ultimately uninformative about the source of systemic risk. Moreover, both activity-based and entity-based definitions are static and may fail to capture new forms of shadow banking that generate systemic risk. Instruments-based definitions may fare better in connection with systemic risk and, if carefully crafted, can adapt to financial innovation. However – as the IMF approach reveals – they tend to be over-inclusive, which brings us back to the operationalization problem. The best way to

may also reduce market discipline. See Toni Ahnert et al, 'Asset Encumbrance, Bank Funding and Financial Fragility' (2016) Deutsche Bundesbank Discussion Paper No 17/2016 <www.econstor.eu/bitstream/10419/142170/1/861479394.pdf> accessed 5 June 2017; Reimo Juks, 'Asset Encumbrance and its Relevance for Financial Stability' (2012) 3 Sveriges Riksbank Economic Review 67 <http://www.riksbank.se/Documents/Rapporter/POV/2012/rap_pov_artikel_4_121017_eng.pdf> accessed 30 May 2017.

⁴⁰ Yingmao Tang, 'Shadow Banking or "Bank's Shadow": Reconceptualising Global Shadow Banking Regulation' in Ross P Buckley, Emiliós Avgouleas and Douglas W Arner (eds), *Reconceptualising Global Finance and Its Regulation* (CUP 2016) 333.

⁴¹ Claessens and Ratnovski (n 21).

define shadow banking is, therefore, a combination of the three approaches, with a special focus on the instruments.

As mentioned, systemic risk stems from the promise of cash immediacy against long-term, risky investments (maturity transformation broadly intended). There are not many instruments making such promises credible. These instruments can be characterized as collateral, namely, assets that may be liquidated to make good on the promise if the borrower defaults. Immediacy promises require the collateral to be liquid. Liquidity implies that the collateral can be turned into cash without losing much of its value.

Banking adds another dimension to the liquidity of collateral, which is leverage.⁴² Because banks profit from transforming debts (long into short, risky into safe), they tend to have as much debt, or leverage, as possible.⁴³ Banks can leverage more than any other economic actor because they rely on various liquidity puts – from other banks and, ultimately, from the central bank.⁴⁴ However, leverage is a multiplier of losses as well as of gains, as a result of which banks are more fragile than other economic actors. In the absence of regulation, the market liquidity of assets increases the leverage possibilities of banks (funding liquidity), until the asset price bubble bursts and both market and funding liquidity turns in the other direction.⁴⁵ Liquidity and leverage are, therefore, the defining features of banking, both official and shadow.⁴⁶

We can then define banking as the business of leveraging on collateral to support liquidity promises. This becomes shadow banking when it avoids the regulation of liquidity and leverage imposed on banks for the purpose of financial stability. To clarify by way of examples, demand deposits are banking, but not shadow banking, because they are subject to both liquidity (reserve requirements) and leverage (capital adequacy) regulation of banks. By the same token, MMMFs are shadow banking as long as they are not subject to regulatory constraints comparable with those faced by banks. Repos used to be shadow banking, but are increasingly less so because banks are a key player in the repo market and their operation therein has been curbed by the liquidity and leverage restrictions of the Basel III standards.⁴⁷ Derivatives were, and still are, a form of shadow banking because they support leveraged liquidity promises, although these are not obvious. A marked-to-market derivative, which is used extensively in shadow banking operations, is effectively an overnight promise to pay the margin call. Because

⁴² Leverage is the amount of debt as a multiple of the equity, which is the proportion of collateral that the borrower owns. The reciprocal of the leverage is the margin, or haircut, namely, how much collateral the borrower owns relative to the outstanding amount of debt. See John Geanakoplos, 'Leverage, Default, and Forgiveness: Lessons from the American and European Crises' (2014) 39(Part B) *JMacroecon* 313.

⁴³ Another way to put it is that banks profit from owning as little collateral as possible.

⁴⁴ Anat R Admati and Martin Hellwig, *The Bankers' New Clothes: What's Wrong with Banking and What to Do about It* (Princeton University Press 2013).

⁴⁵ See Markus Brunnermeier and Lasse Heje Pedersen, 'Market Liquidity and Funding Liquidity' (2009) 22(6) *Rev FinancStud*.

⁴⁶ Tobias Adrian and Hyun Song Shin, 'Liquidity and Leverage' (2010) 19(3) *JFI* 418.

⁴⁷ Basel Committee on Banking Supervision, 'Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems' (Bank for International Settlements 2010, Revised in June 2011) <www.bis.org/publ/bcbs189.htm> accessed 5 June 2017. This is a form of indirect regulation about which see *infra* text accompanying notes 129–144.

the liquidity (reserve requirement) and the leverage (minimum haircut) of derivatives are not regulated as such, but only indirectly when derivatives are entered into by banks or other systemically important institutions, derivatives markets are still the realm of shadow banking.⁴⁸

This instrument-based approach has several advantages. First, the definition includes all – past, present and future – activities giving rise to systemic risk, because it does not rely on particular markets. Rather, this definition relies on the core instruments of banking at all times: liquidity and leverage. Second, this definition is functional, but not as vague as a functional activity-based definition. Because financial regulation can embed *ex ante* the instruments of liquidity and leverage, it can also confer upon a regulatory agency the mandate to regulate them across the board, without creating legitimacy concerns. Third, the definition is not linked to any particular entity, although this is the practical limitation of this approach. Economists have suggested a number of smart ways to monitor liquidity and leverage,⁴⁹ but all these overlook that reporting obligations can only be established effectively on specific entities. You cannot regulate something you cannot measure;⁵⁰ but likewise, you cannot measure something you do not know of. For this reason, policymakers should rely on entity-based approaches, albeit guided by instrument-based criteria to identify the right entities and adapt this identification with time.

3. MAPPING SHADOW BANKING THROUGH SYSTEMIC RISK

The key to identifying shadow banking is the maturity transformation function. Maturity transformation involves issuing short-term liabilities to finance long-term assets.⁵¹ As such, maturity transformation is beneficial because it ultimately encourages long-term capital investments.⁵² Despite providing this benefit, shadow banking endangers the

⁴⁸ In the US, liquidity and leverage of derivatives are not regulated directly, but only in the framework of the capital requirements of banking institutions. See 12 CFR 615.5212. In the EU, the EMIR (Regulation (EU) No 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories (OJ L 201, 27.7.2012) establishes margin requirements for all non-centrally cleared derivatives, whether or not they are entered into by banks. However, the EMIR does not set a minimum level for these margins. Although margin requirements are mandatory, the EMIR leaves it to the Central Counterparty Clearing House (CCP) to determine their level.

The EMIR regulation assumes that, because the CCP is subject to prudential regulation, it will have incentives to set the margins at the optimal level. However, the CCP does not internalize the systemic risk. Moreover, being too big to fail, the CCP's incentives are not aligned with society's interest in financial stability. Therefore, this form of incentive regulation is most likely insufficient to curb shadow banking to the optimal level.

⁴⁹ See Brunnermeier and Krishnamurthy (n 3).

⁵⁰ This is paraphrased from Pozsar (n 5) 65: 'We cannot monitor what we do not measure.'

⁵¹ Dirk Heremans, 'Regulation of Banking and Financial Markets' in Roger J. Van den Bergh and Alessio M. Paces (eds), *Encyclopedia of Law and Economics*, vol 9 *Regulation and Economics* (2nd edn, Edward Elgar Publishing 2011).

⁵² Financial Services Authority, 'The Turner Review: A Regulatory Response to the Global Banking Crisis' (2009) 21; see also Gary Gorton, *Misunderstanding Financial Crises: Why We Don't See Them Coming* (OUP 2012).

financial system both directly via the credit, market and liquidity risks taken by shadow banking participants, and indirectly through their interconnectedness with the official banking sector.⁵³ Shadow banking increases systemic risk by undertaking maturity transformation with excessive leverage.⁵⁴

Maturity transformation is inherently fragile.⁵⁵ Traditionally, banks had a monopoly on maturity transformation because they were the only institutions licensed to issue demand deposits.⁵⁶ With the advent of SIVs, other entities such as investment banks and MMMFs could create deposit-like investment opportunities to compete with commercial banks. This is possible by promising on-demand redemption at par.⁵⁷ Such a promise is credible as long as it is backed by collateral widely accepted in liquid markets. However, if a liquidity crisis hits, the issuing financial institution must immediately sell long-term assets to meet redemption requests by investors. Massive redemption requests undermine market pricing because of fire sales of the assets backing the liquidity promise.⁵⁸ Because shadow banking is highly leveraged and depends on market liquidity to sustain debt, market illiquidity can make the whole shadow banking system quickly insolvent.

Systemic risk stemming from illiquidity is difficult to be reconciled with finance theory. Illiquidity is by definition a temporary problem, although it may last for some time. Therefore, it should be both privately profitable and socially efficient for arbitrageurs to overcome illiquidity. In reality, however, long-term assets are risky and risk can only imperfectly be predicted by statistical models. Whenever these models fail, the liquidity of the affected assets is impaired because arbitrageurs can no longer strip risk from the assets to turn them into cash equivalents. Investors fly to quality, which is to say that cash becomes the only safe asset.⁵⁹ In this situation, shadow banks can still avoid insolvency by activating the liquidity puts of the official banking system. However, if the shock to the shadow banking is large enough, the banks' funding liquidity will also dry up quickly in the absence of central bank support.

The fragility of maturity transformation is the reason why banks are protected by a public safety net. Since the introduction of deposit insurance, there has been almost no serious runs by depositors on the banks of the developed world.⁶⁰ Formally, shadow banking cannot rely on the banks' safety net. Shadow banking liabilities are not insured.

⁵³ Swati Ghosh, Gonzalez del Mazo Ines and Ötke-Robe İnci, 'Chasing the Shadows: How Significant is Shadow Banking in Emerging Markets?' (2012) The World Bank – Economic Premise No 88 <<http://siteresources.worldbank.org/EXTPREMNET/Resources/EP88.pdf>> accessed 5 June 2017.

⁵⁴ Roland Meeks, Nelson Benjamin D and Alessandri Piergiorgio, 'Shadow Banks and Macroeconomic Instability' (2014) Bank of England Working Paper No 487 <www.bankofengland.co.uk/research/Pages/workingpapers/2014/wp487.aspx> accessed 5 June 2017.

⁵⁵ Tobias Adrian and Adam B Ashcraft, 'Shadow Banking Regulation' (Federal Reserve Bank of New York Staff Report No 559, 2012) 1 <www.newyorkfed.org/research/staff_reports/sr559.html> accessed 5 June 2017.

⁵⁶ Gorton, *Slapped by the Invisible Hand* (n 19).

⁵⁷ This is also called 'breaking the buck'.

⁵⁸ Financial Services Authority, 'The Turner Review' (n 52) 21.

⁵⁹ Ricardo J Caballero and Arvind Krishnamurthy, 'Collective Risk Management in a Flight to Quality Episode' (2008) 63(5) *JFinance* 2195.

⁶⁰ See Gorton, *Slapped by the Invisible Hand* (n 19) 5. However, even in the recent global financial crisis, there were instances of runs on banks such as the run on the Northern Rock.

Therefore, they are susceptible to runs. However, even runs on shadow banks can be avoided – as runs on banks were avoided prior to the introduction of deposit insurance – if the central bank acts as lender of last resort (LOLR).⁶¹ Lending of last resort is supposed to support illiquid banks, which are not (yet) insolvent.⁶² Because illiquidity is tied to (expectations of) insolvency and vice versa, this maxim is conceptually impossible to operationalize. Central banks end up intervening as LOLR in practically every systemic crisis.⁶³

Therefore, the FSB has mapped shadow banking based on the systemic risk that would warrant *ex post* intervention. According to the FSB, shadow banks are the entities engaging in one of the following activities:

1. The management of collective investment vehicles which are prone to runs;
2. Loan provision funded by short-term liabilities;
3. Intermediation of market activities by short-term funding or secured funding of clients' assets;
4. Facilitation of credit creation;
5. Securitization-based credit intermediation and funding of financial entities.

From the assets of the non-bank financial entities involved in any of these activities, the FSB has derived a measure of shadow banking.⁶⁴ According to the FSB, at the end of 2014, the size of shadow banking in 26 jurisdictions (representing 90 percent of the global financial assets) was about \$36 trillion in the narrow measure (excluding entities that do not provide credit intermediation directly). More than 75 percent of these assets were located in the US, the UK, or the eurozone.

The FSB relies on a list of activities potentially conducive to systemic risk to identify

⁶¹ For more information on the lender-of-last-resort (LOLR) function of central banks, see Xavier Freixas, Curzio Giannini, Glenn Hoggarth and Farouk Soussa, 'Lender of Last Resort: What Have We Learned Since Bagehot?' (2000) 18(1) *JFinancServRes* 63; see also Xavier Freixas and Bruno M Parigi, 'The Lender of Last Resort of The 21st Century' in Andrew Felton and Carmen M Reinhart (eds), *The First Global Financial Crisis of the 21st Century: Part II June–December 2008* (VoxEU.org Publication 2009) 163–67. Historically, the LOLR function in the market was played by private financial institutions. A bold example of taking up of such a role in the crisis of 1907 was JP Morgan's provision of liquidity to markets and institutions in the banking panic of that year. See Robert F Bruner and Sean D Carr, *The Panic of 1907: Lessons Learned from the Market's Perfect Storm* (John Wiley & Sons 2007). However, after the 1913, the year in which the Federal Reserve came into being, it took up such a function.

⁶² Bagehot (n 16).

⁶³ J Bradford DeLong, 'This Time, It Is Not Different: The Persistent Concerns of Financial Macroeconomics' in Alan S Blinder, Andrew W Lo and Robert W Solow (eds), *Rethinking the Financial Crisis* (Russell Sage Foundation and the Century Foundation 2012).

⁶⁴ According to the FSB, 'This category includes mainly residual OFIs in some jurisdictions that were not classified into a particular economic function, but were assessed to at least partly contain shadow banking activities as described by the five economic functions or for which it was not possible to provide sufficient evidence to warrant their exclusion from the narrow measure of shadow banking'. See FSB, 'Global Shadow Banking Monitoring Report 2015' (2015) 14 <www.fsb.org/wp-content/uploads/global-shadow-banking-monitoring-report-2015.pdf> accessed 5 June 2017.

shadow banking. Crucially, however, the FSB bases the quantitative analyses on the information reported by the entities involved in such activities. As mentioned, the problem with this approach is that it is static, thus it may fail to capture new forms of shadow banking. Moreover, the FSB approach deliberately excludes banks regardless of the activities they engage in, which may overlook regulatory arbitrage within official banking. The IMF tries to cope with this limitation by focusing on the noncore liabilities issued by any entity, which perform maturity transformation.

Compared with the FSB, the IMF measure includes some part of official banking, but it excludes investment funds such as non-MMMFs. As a result, the two estimates are barely comparable even if we look at the broad measures intended to capture every possible systemic risk implication. For example, in a recent comparison of 2013 data,⁶⁵ the IMF broad measure of shadow banking in the US was some \$5 trillion lower than the FSB broad measure (about \$25 trillion), owing to the role of investment funds and to the circumstance that US banks issue very few noncore liabilities. The difference for the eurozone, where banks contribute more significantly to noncore liabilities, was larger (some \$15 trillion in the IMF estimate as opposed to about \$25 trillion in the FSB estimate). The eurozone case is difficult to interpret, however, because the effect of investment funds and banks on the size of shadow banking go in opposite directions. For the UK, the IMF broad measure (about \$14 trillion) was some \$5 trillion larger than the FSB equivalent to reflect the significant involvement of UK banks in shadow banking activities.

Both the FSB and the IMF acknowledge that their measures of shadow banking may well be over-inclusive. Both institutions seek to stay on the safe side and rather include too much, than too little, in terms of systemic risk. Both measurement exercises suffer from lack of data granularity, which, in turn, stems from the limited information available. While the IMF relies on monetary aggregates provided by central banks, the FSB relies on the reporting obligations imposed on financial institutions by the national authorities. Particularly the latter vary considerably across jurisdictions. These limitations could be overcome by combining entity-based mapping (and reporting obligations) with a more instrument-based approach. As we show in section 5, an efficient regulation of shadow banking should be based on the instruments of leverage to support liquidity promises.

4. THE SIMPLE ECONOMICS OF SHADOW BANKING

Because we are concerned about the systemic risk aspects of shadow banking, why not ban those activities that give rise to such risk? In this section, we argue that this would not be a good idea. First, a prohibition will probably not be effective. Because shadow banking caters to a structural demand for safe assets, a ban would not likely be sufficient to deter the private creation of money-like liabilities; it would only marginally increase the cost of accepting them.⁶⁶ Second, even if we could prohibit shadow banking, this would

⁶⁵ Harutyunyan et al (n 7) 23.

⁶⁶ As Minsky (n 6) 225, argued, it is not difficult to create money: 'everyone can create money; the problem is to get it accepted'.

not be efficient. Arguably, a limited amount of shadow banking is welfare increasing, which turns the policy question into how regulation can induce the optimal amount of shadow banking.⁶⁷

In recent decades, financial intermediation has become more and more integrated with capital markets.⁶⁸ As an adaptive response to the developments of financial intermediation, banks transformed too. Banks increasingly became closer to a model based on bank holding companies controlling several subsidiaries.⁶⁹ In this new framework, traditional commercial banking only represents a fraction of the financial institutions. Banks themselves have expanded their shadow banking activities.⁷⁰ The only difference with independent shadow banking is the explicit access to government guarantees, such as the liquidity put by the central bank and the credit guarantees by the public sector.⁷¹

Shadow banking plays an important role in contemporary finance. As traditional banking, it channels credit to the real economy.⁷² The comparison of the assets held by shadow banks with those of the official banking sector reveals that, after a short dip in the aftermath of the GFC, the shadow banking system has been growing at the expense of traditional credit intermediation.⁷³ Eventually, shadow banking could even overtake traditional banking.⁷⁴

The growth of shadow banking is driven by supply-side as well as demand-side factors. As far as the supply side is concerned, shadow banking relies on financial markets for productive efficiency. Shadow banking has managed to replicate the banking functions at a lower cost, for instance by engaging in securitization and providing diversification services, ample choice among risk levels, and third-party validation of credit risk. In this model, liquidity puts and other explicit or implicit guarantees by the banks sponsoring shadow banking replaced the government safety net, at least as long as the private backstops remained credible.⁷⁵

⁶⁷ A related question is how much shadow banking is optimal for the society. This is a very difficult question to answer, for the answer depends on several circumstances and varies with time (particularly with the economic cycle). The question is akin to how much banking is optimal for a society, which is equally difficult to answer for the very same reasons. This chapter, rather, focuses on how regulators can curb shadow banking to the efficient level, after having figured out what this level is at a given point in time.

⁶⁸ Tobias Adrian and Hyun Song Shin, 'The Changing Nature of Financial Intermediation and the Financial Crisis of 2007–2009' (2010) 2 *AnnuRevEconom*.

⁶⁹ Nicola Cetorelli, Benjamin H. Mandel and Lindsay Mollineaux, 'The Evolution of Banks and Financial Intermediation: Framing the Analysis' (2012) 18(2) *FedReserveBankNewYorkEconPolRev* 1; see also Dafna Avraham, Patricia Selvaggi and James Vickery, 'A Structural View of US Bank Holding Companies' (2012), 18(2) *FedReserveBankNewYorkEconPolRev* 65.

⁷⁰ Nicola Cetorelli, 'Hybrid Intermediaries' (Federal Reserve Bank of New York Staff Reports No 705, 2014) 1 <www.newyorkfed.org/medialibrary/media/research/staff_reports/sr705.pdf> accessed 5 June 2017.

⁷¹ Pozsar et al, 'Shadow Banking' (n 2).

⁷² Mehrling et al (n 11) 2.

⁷³ Gary Gorton and Andrew Metrick, 'Regulating the Shadow Banking System' (2010) *Brookings Papers on Economic Activity* 264–65.

⁷⁴ *ibid*; IMF, 'Global Financial Stability Report' (n 7).

⁷⁵ Jeffrey N Gordon and Christopher M Gandia, 'Money Market Funds Run Risk: Will Floating Net Asset Value Fix the Problem?' (2014) 2014(2) *ColumBusLRev* 313.

One major contributor to the rise of shadow banking has been regulatory arbitrage. Capital arbitrage played a major role given the adverse impact of the Basel standards on the profitability of banking.⁷⁶ The banking industry used off-balance-sheet structures to mitigate this impact. These off-balance-sheet structures involved many activities, instruments, and entities of the shadow banking system. The new capital adequacy requirements established under Basel III have placed constraints on the off-balance-sheet operations of banks, but have not changed the incentives for regulatory arbitrage, because they increase the cost of doing banking within the regulatory perimeter, as opposed to shadow banking.

On the demand side, the growth of the shadow banking system is attributable to several macroeconomic developments around the world, which created room for new markets. The savings glut starting from 2003,⁷⁷ especially from China and the Middle-East, led to a sizable demand for safe assets where those savings could be safely invested. This shift of the demand for safe assets, however, happened at a time when the supply of such assets was diminishing, especially in the US, where the government debt-to-GDP (gross domestic product) ratio was shrinking and a considerable amount of the US government debt was retired. This shortage of safe assets prompted the private sector to create such assets, at a profit.⁷⁸ A large amount of these assets was created using securitization, repo contracts, and credit derivatives replacing government guarantees by implicit or explicit private sector guarantees.⁷⁹

In addition to the savings glut, the rise of professional asset management (mutual funds and pension funds) also generated a demand for safe assets for the optimal management of institutional investors' cash balances.⁸⁰ Since deposit insurance throughout the globe is capped at amounts too low for institutions,⁸¹ turning to traditional bank liabilities is not

⁷⁶ The main reason, why capital regulation had an impact on bank profitability is not because the capital is 'set aside', but it is because of the subsidies offered to debt finance. See Admati and Hellwig (n 44).

⁷⁷ Ben S Bernanke, Carol C Bertaut, Laurie DeMarco and Steven B Kamin, 'International Capital Flows and the Return to Safe Assets in the United States, 2003–2007' (2011) FRB International Finance Discussion Paper No 1014 <www.federalreserve.gov/pubs/ifdp/2011/1014/ifdp1014.pdf> accessed 5 June 2017.

⁷⁸ For the concept of safe assets, see IMF, 'Global Financial Stability Report: The Quest for Lasting Stability' (April 2012) 81–122 <www.imf.org/External/Pubs/FT/GFSR/2012/01/index.htm> accessed 5 June 2017. Safe assets are also described as 'a variety of financial claims on public or private sector entities that are used as if they were risk-free'. See Anna Gelpern and Erik F Gerding, 'Rethinking the Law in "Safe Assets"' in Ross P Buckley, Emiliios Avgouleas and Douglas W Arner (eds), *Reconceptualising Global Finance and Its Regulation* (CUP 2016) 159.

⁷⁹ According to Haldane, the size of the global asset management industry is some \$87 trillion. See Andrew G Haldane, 'The Age of Asset Management?' (Speech at the London Business School 2014) <<http://www.bankofengland.co.uk/publications/Documents/speeches/2014/speech723.pdf>> accessed 5 June 2017.

⁸⁰ Zoltan Pozsar and Manmohan Singh, 'The Nonbank–Bank Nexus and the Shadow Banking System' (2011) IMF Working Papers 2011 <www.imf.org/en/Publications/WP/Issues/2016/12/31/The-Nonbank-Bank-Nexus-and-the-Shadow-Banking-System-25421> accessed 5 June 2017.

⁸¹ Currently, the amount insured by the Federal Deposit Insurance Corporation (FDIC) is \$250,000 and in the European Union (EU), it is €100,000. See art 6(1) of the Deposit Guarantee Scheme (DGS) directive. For an empirical investigation of deposit insurance coverage, and an

an option for institutional investors, even in the presence of brokered deposits.⁸² Banks could cater to this demand through a very old financial instrument, the repo, which thanks to over-collateralization (that is, a haircut on the market value of the collateral) and the short maturity provides an efficient substitute for demand deposit. Because the repos' safety does not depend on the amount of the contract, they are suitable for the cash-management needs of institutional investors.⁸³

The ability of shadow banking to supply safe assets in response to the rising demand for them is, in principle, efficient for the financial system as well as for the real economy. First, a shortage of safe assets creates a macroeconomic imbalance where savings exceed investments, which ultimately leads to reduced output and unemployment.⁸⁴ Moreover, securitization and securities financing transitions (SFTs), which are at the heart of shadow banking, are beneficial for the financial markets. The benefits include price discovery, market efficiency, credit creation, and market liquidity. All of this translates into more efficient finance and economic growth.⁸⁵ In sum, by providing alternatives to bank deposits for large investors, shadow banking benefits society.⁸⁶

The key question is, however, the cost of shadow banking for society. This cost can be substantial because of systemic risk. The same mechanism to meet the demand for safe assets by global investors is responsible for the collapse of the financial system when the promise of safety cannot be honored. In economic terms, this means that safe assets are overproduced owing to a negative externality. That is, the social cost of the liquidity and leverage produced by shadow banking is higher than the private cost. Similar to banks, the case for regulating shadow banking stems from the circumstance that shadow banking crises impose negative externalities on the rest of the system.

analysis of its consequences, *see* Asli Demirgüç-Kunt, Edward Kane and Luc Laeven, 'Deposit Insurance around the World: A Comprehensive Analysis and Database' (2015) 20 *JFinancStab* 155.

⁸² Brokered deposits are also called jumbo deposits. The FDIC defines a brokered deposit as 'any deposit accepted by an insured depository institution from or through a third party, such as a person or company or organization other than the owner of the deposit'. *See* Federal Deposit Insurance Corporation, 'Guidance on Identifying, Accepting, and Reporting Brokered Deposits: Frequently Asked Questions' (2014) <www.fdic.gov/news/news/financial/2015/fi115002a.pdf> accessed 5 June 2017. Deposit brokerage has popped up to circumvent the upper limits on covered deposits. *See* Mark D Vaughan and Timothy J Yeager, "'Cedars' Deposits: Will They Fly?" (2003) (Oct 2003) *RegEcon* 10.

⁸³ Pozsar et al, 'Shadow Banking' (n 2) 6.

⁸⁴ DeLong (n 63).

⁸⁵ For a brief overview and why some of these expected benefits were overoptimistic, *see* European Commission, 'European Financial Stability and Integration Report 2013' (Commission Staff Working Document April 2014) 107–08 <http://ec.europa.eu/finance/financial-analysis/docs/efsir/140428-efsir-2013_en.pdf> accessed 5 June 2017. For the benefits of the shadow banking in developing economies, *see* Ghosh (n 52); Viral V Acharya, Hemal Khandwala and Öncü T Sabri, 'The growth of a shadow banking system in emerging markets: Evidence from India' (2013) 39 *JIMF* 207.

⁸⁶ For an overview of the benefits of market-based finance (which includes financing through the shadow banking system) as opposed to bank-based finance, *see* European Commission, 'Economic Analysis Accompanying the Document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Action Plan on Building a Capital Markets Union' (2015) COM (2015) 468 final, 17–25.

5. THE CASE FOR REGULATING SHADOW BANKING

The negative externalities of shadow banking are the cost of a financial crisis. To prevent such a crisis from destroying the financial system, governments support systemically important firms with various forms of safety nets, including bailouts. Since the GFC, these safety nets have notably extended to non-banks, which engaged in shadow banking. Bailouts are perhaps the least important social cost of a financial crisis. The persistent reduction of output stemming from the impairment of the financial system has been historically a much higher cost.⁸⁷ Bailouts, however, reveal the weak spots of the financial system in a crisis. Looking at bailouts is thus useful to identify the externalities of shadow banking, with a view to correcting them through regulation.

History reveals that the short-term liabilities of institutions that engage in maturity transformation (whether banks or shadow banks) are most often subject to bailouts when there is a systemic crisis.⁸⁸ The rationale for bailouts is to avoid runs, which are self-fulfilling prophecies of insolvency that can bring down an entire financial system. Runs are systemic when the insolvency concerns affect banking as a whole, not the idiosyncratic features of one or more institutions. A perception of systemic insolvency can happen because of the interconnectedness between the banks (credit channel of contagion) or because all banks are invested in the same classes of assets and their value suddenly becomes unclear (market channel of contagion). Both factors are usually at play at the same time. However, we focus on the market channel because it seems to be the starting point for shadow banking.

Shadow banks can credibly promise to convert their short-term liabilities into money by investing their funds in financial assets, which are marketable. Under certain conditions, specified by risk models, these assets can be liquidated safely and deliver the funds necessary to honor the liabilities. One of these conditions is the haircut (or margin), which defines the amount of equity that intermediaries have to maintain to always make good on their liquidity promise. Importantly, when the asset is considered sufficiently liquid, the haircut can be zero – that is, the collateral itself is sufficient to back the liquidity promise. Moreover, shadow banking often relies on a liquidity put by banks for the very unlikely situation in which the safety conditions do not hold true.⁸⁹ Asset safety is based on statistical models that can be proved wrong. When this is the case – as, for instance, was the case for MBS during the GFC – liabilities such as repos, as well as the assets backing them, are no longer considered safe. A run on shadow banking ensues. This can spread to the more traditional banking system simply by way of activating the above-mentioned liquidity puts.

A run on shadow banking differs from a run on a traditional bank,⁹⁰ but only slightly. In shadow banking, the run tries to recreate the safety of the assets backing the shadow bank liabilities by imposing higher haircuts for refinancing. This is problematic because if the system does not have enough equity to meet the margin call, the price of the col-

⁸⁷ Carmen M Reinhart and Kenneth S Rogoff, *This Time Is Different: Eight Centuries of Financial Folly* (Princeton University Press 2009).

⁸⁸ Mehrling et al (n 11).

⁸⁹ Darrell Duffie, 'The Failure Mechanics of Dealer Banks' (2010) 24(1) *JEconPerspec* 51.

⁹⁰ Gorton and Metrick, 'Securitized Banking and the Run on Repo' (n 19).

lateral will crash. This, in turn, will lead to increasing haircuts making more financial intermediaries insolvent. However, this is not the only way in which a run can occur on shadow banking. A withdrawal from shadow banking can resemble a 'classic' bank run in two situations. First, the collateral may suddenly become unacceptable (that is, haircut equal to 100 percent) and no refinancing be offered.⁹¹ Second, shadow-banking liabilities are not always guaranteed by what we would call proper collateral in legal terms. For instance, similar to demand deposits, MMMF shares are not collateralized. In addition, banks issue other short-term wholesale liabilities, such as commercial paper, which may or may not be collateralized.⁹² All of these liabilities are susceptible to runs.

Collateral is still a distinctive feature of banking – both traditional and shadow – if understood in economic, not legal terms. What matters to investors is the assets backing the liquidity promises of a bank. In economic terms, these assets are collateral regardless of whether lenders can seize them to get their money back, which would characterize proper collateral in legal terms. The key issue is whether the assets can be sold for a price enabling the repayment of short-term debt. In the event of illiquidity, the credibility of the bank's promises depends on how much of this 'collateral' it owns to absorb the volatility of assets prices. The reciprocal of this equity margin of safety – which is also known as 'haircut' – is the leverage.

In principle, shadow banking can create money-like short-term liabilities, and get them accepted, with or without posting collateral in a narrow sense. When collateral is posted, the leverage can be measured directly on the asset. This is what lenders do all the time when they set a haircut, which is effectively a constraint on leverage. When no collateral is posted, the leverage can be measured only on the balance sheet of (shadow) banks as a ratio of liabilities to the market value of the equity. In this case, lenders cannot impose a leverage requirement, but can only decide whether to lend or not, given the leverage they observe.

The law and economics debate on shadow banking focuses on collateral because that appears to be responsible for the externalities of shadow banking. Indeed, collateral crises have been the main driver of financial instability in recent times. Shadow banking has promised immediacy (that is, money) against securities (that is, collateral) deemed safe according to the prevailing risk models. Upon materialization of tail risk undermining this perceived safety, collateral crises have ensued, triggering withdrawals from all sorts of collateralized lending. The latter typically includes repos but, as illustrated earlier, derivatives follow the same logic. When haircuts go up, asset prices go down because the agents with leveraged long positions lose wealth and must sell, whereas new agents cannot leverage as much as to absorb the forced sales.⁹³

Haircuts are a measure of leverage, but because we speak about banking, leverage implies liquidity and vice versa. Rising haircuts on several classes of assets mean systemic

⁹¹ This is actually what happened in the crisis and some collateral became suddenly unacceptable. *See* *ibid.*

⁹² Andrei Shleifer, 'Comments and Discussions (Regulating the Shadow Banking System by Gary Gorton & Andrew Metrick)' (2010) *Brookings Papers on Economic Activity* 298.

⁹³ Fostel and Geanakoplos (n 38); John Geanakoplos, 'The Leverage Cycle' in Daron Acemoglu, Kenneth Rogoff and Michael Woodford (eds), *NBER Macroeconomics Annual 2009*, vol 24 (University of Chicago Press 2010).

bank runs that reduce market liquidity and funding liquidity simultaneously.⁹⁴ Such runs can only be stopped by a central bank credible enough to recreate the perception of safety that was lost. Showing willingness to buy any quantity of the distressed assets at a given price, the central bank effectively sets an upper limit on haircuts and, by stabilizing the price of the assets being levered upon, stops a financial crisis.

Unfortunately, by stopping a collateral crisis, the central bank suspends market discipline too. Assets purchased by the central bank cannot be worth less than what the central bank is willing to pay for them. They become 'safe' again precisely for this reason. Although this kind of intervention is supposed to remedy illiquidity, it can conceal insolvency. More importantly, expectations of such central bank intervention fuel moral hazard. With moral hazard in place, the negative externalities of shadow banking are exacerbated. The overproduction of safe assets by the private sector, which characterizes shadow banking, would be an even bigger problem if central banks guaranteed the safety of collateral at no cost.

In order to address this problem, some commentators have proposed to charge for the prospective liquidity insurance by the central bank. To operationalize this levy, access to collateral for short-term funding should be restricted. This could be done by restricting collateralized borrowing to a special class of financial institutions, which would be regulated, and pay for insurance, like banks do for deposit insurance.⁹⁵ Alternatively, the levy could be charged as a condition for collateral to enjoy the bankruptcy law privileges that make it attractive for backing short-term liabilities.⁹⁶ Collateral in repos and marked-to-market derivatives can be seized immediately in case of default, by way of exception to the bankruptcy rules. Charging for the use of bankruptcy-exempt collateral is effectively a Pigovian tax to correct the externality, aiming to make shadow banks bear *ex ante* the social cost of illiquidity.⁹⁷

Although we agree that regulation of shadow banking should be instrument based, we think that an approach based on liquidity insurance has the following shortcomings. First, it would be overly difficult to set a price for this insurance accurately. The unavoidable intervention by central banks in collateral crises makes liquidity a public good. The liquidity provided by central banks works because it is unlimited, hence it is non-rival and no one can be credibly excluded from it when there is a systemic crisis. Setting the price of public goods is always difficult, but pricing a liquidity put can be a daunting task. To avoid moral hazard, the price of insurance should be risk based. However, the risk of illiquidity is systemic, which as we discussed is difficult to define, let alone to measure. Although we acknowledge the efforts by authoritative economists to measure systemic risk,⁹⁸ this measurement will never be precise because of Knightian uncertainty.⁹⁹ Because illiquidity

⁹⁴ Brunnermeier and Pedersen (n 44).

⁹⁵ Gorton and Metrick, 'Regulating the Shadow Banking System' (n 73).

⁹⁶ Enrico Perotti, 'The Roots of Shadow Banking' (2012) Duisenberg School of Finance Policy Paper Series 2012 <www.dsf.nl/wp-content/uploads/2014/10/DSF-Policy-Paper-No-24-The-roots-of-shadow-banking.pdf> accessed 5 June 2017.

⁹⁷ Enrico Perotti and Javier Suarez, 'The Simple Analytics of Systemic Liquidity Risk Regulation' in Dirk Schoenmaker (ed), *Macroprudentialism* (CEPR Press 2014).

⁹⁸ See broadly, Brunnermeier and Krishnamurthy (n 3).

⁹⁹ Frank H Knight, *Risk, Uncertainty and Profit* (Houghton Mifflin 1921).

stems from the failure of credit risk models, there is no reason why systemic risk models, however sophisticated, should be infallible.

A second problem with charging for the central bank's liquidity put is time inconsistency. The threat to withhold the liquidity put from those who have not paid the insurance premium is not credible. As soon as the collateral crisis becomes systemic, the central bank's liquidity put is the tool of last resort to avoid financial collapse. Note that this problem cannot be overcome *ex ante*, for instance by imposing an automatic stay on uninsured collateral in the event of default. Because lenders do not run on the collateral, but on the liabilities backed by it, fire sales of collateral happen much earlier than default. Therefore, the automatic stay may only accelerate default by making lenders more nervous.

Furthermore, as mentioned, the economic definition of collateral is much broader than the legal definition. This leads us to the third problem with a liquidity tax: it can only be imposed on entities or instruments we know of. We do not know what shadow banking will look like in the future. In particular, shadow banking may not rely explicitly on collateral as we know it, but still produce money-like liabilities in such proportions as to claim the liquidity put by the central bank during a financial crisis. Note that large banks have been playing this strategy for centuries, with and without collateral.

Owing to the above concerns, we do not think that restricting access to collateral as a way to charge for liquidity insurance could work. Rather than curbing shadow banking, this approach may miss it altogether. This would be a serious problem in light of the macroeconomic imbalances feeding on shadow banking. Currently, the global excess demand for safe assets pushes yields down, and central banks have been accommodating this to avoid depression. However, that cannot be the end of the story. The ultimate consumers of safe assets – the asset management industry measuring some \$86 trillion worldwide¹⁰⁰ – need yield too, if only to fund retirement payments, which are increasing owing to demographic factors. As we discuss in the next section, post-GFC regulation has curbed the ability of the official banking sector to leverage, take risks, and provide liquidity. Therefore, the demand for safe assets delivering some yield must be satisfied by some other parts of the financial system. Shadow banking is the natural candidate for this.

To cope with the externalities of shadow banking, we rather advocate quantity regulation. Quantity regulation is preferable to a Pigovian tax when the social cost is difficult to estimate, as the individual contribution to systemic risk by shadow banks.¹⁰¹ Moreover, quantity regulation is relatively easy to implement via a single-policy variable, which is leverage. Finally, leverage is a straightforward indicator to which regulation can be immediately linked (for example, as minimum haircut regulation), without need

¹⁰⁰ Haldane (n 79).

¹⁰¹ Law and economics generally favors the corrective taxation of externalities over quantity regulation. See Louis Kaplow and Steven Shavell, 'On the Superiority of Corrective Taxes to Quantity Regulation' (2002) 4(1) *AmL&EconRev* 1. This is based on the assumption that social harm can be measured, which does not hold true in the case of shadow banking. If the social harm is measurable, a Pigovian tax is preferable to quantity regulation because it can be adapted to the severity of the harm, for instance by way of a variable tax. This is not an option for shadow banking, because systemic risk can only be imperfectly measured owing to model uncertainty. As discussed earlier in the text, this circumstance disallows a risk-based liquidity tax.

to rely on a complex, thus fallacious, model of systemic risk.¹⁰² Leverage is a necessary condition for shadow banking, so the latter can be identified and cut down in size through the former. Following the economic literature advocating monitoring and curbing leverage on the assets that can be pledged as collateral,¹⁰³ we argue that shadow banking should be regulated indirectly, by capping the admissible levels of leverage on these assets. Regulation can constrain leverage at the asset level by setting up minimum requirements in terms of collateral ownership by the borrower, that is, minimum haircut regulations.

In our opinion, minimum haircuts should be established on every debt contract generating short-term, money-like liabilities. Apart from the difficulty for regulation to identify the optimal leverage on every class of assets being used as collateral for short-term promises, that would not be enough to curb shadow banking. Short-term liabilities could also be issued without explicit reference to any asset. Therefore, leverage should be monitored and restricted at the level of the entities making such promises, too. This would seem to put us back into the difficulty of mapping the entities constituting shadow banking at any point in time. However, this is not the case.

It is practically difficult to imagine credible liquidity promises which are not backed by marketable assets *or* a robust liquidity put. In normal times, the latter is only available to official banks and their affiliates. Banks are able to make unsecured promises because they rely on a web of credit and liquidity puts from the public sector. For this reason, banks' leverage is directly regulated. The post-GFC regulation has extended this regime to shadow banking inasmuch as it is sponsored by banks. As we illustrate in the next section, this is another form of indirect regulation of shadow banking. We advocate it as a complement to minimum haircut regulation.

The advantage of our approach is that it identifies all the items of the financial system requiring backstops (or bailout) in the event of a crisis. These are the assets being levered upon to promise liquidity or the banks that back up such liquidity promises. Financial innovation must use one of these channels to create private money. Over time, this would increase systemic risk. Importantly, these channels are defined broadly enough to capture different ways in which shadow banking may play out in different jurisdictions. This is very useful for international cooperation, which is essential to regulate shadow banking effectively. Moreover, asset leverage and bank leverage restrictions are sufficiently specific concepts to embed into legislation. This overcomes the legitimacy concerns that could arise if these restrictions were to be established exclusively by regulatory agencies.

Two challenges remain, however. The first challenge is to set the minimum haircuts (maximum leverage) at the right level, bearing in mind that excessive curbs on (shadow) banking undermine efficiency. The second challenge is to adjust these regulations over time. Dealing with the first problem requires statistical models, similar to those necessary to identify the optimal leverage (and liquidity) ratio(s) for banking institutions. Asset-

¹⁰² John Geanakoplos and Lasse Heje Pedersen, 'Monitoring Leverage' in Markus Brunnermeier and Arvind Krishnamurthy (eds), *Risk Topography: Systemic Risk and Macro Modeling* (University of Chicago Press 2012).

¹⁰³ See Geanakoplos, 'Leverage, Default, and Forgiveness' (n 42); Brunnermeier and Krishnamurthy (n 3).

based models of risk assessment, however, are much simpler than the models used to measure systemic risk. Setting conservative haircuts only requires identifying the worst-case price scenario for each class of assets.

The second problem is more difficult to deal with. On the one hand, new classes of assets may be used for leverage. On the other hand, the conservative haircuts will have to be adapted to new circumstances, in one direction or another. The adaptation problem depends on the same reason why, in the end, all preventative regulations for minimizing systemic risk – including shadow banking regulation – will fail and require crisis management. This is a general problem in the pursuit of financial stability as a policy goal. We argue that the regulation of leverage, particularly at the asset level, fares better than alternative approaches to regulating shadow banking. However, the efficient regulation of shadow banking, as of any other source of systemic risk, calls upon financial regulators to exercise some discretion in order to adapt to unforeseen circumstances.

6. REGULATORY RESPONSES TO SHADOW BANKING

It is often argued that shadow banking played a key role in the GFC because of lack of regulation. This is not entirely correct. The participants in the shadow banking system were, and still are, regulated individually. However, regulators have failed to see the forest for the trees and concentrated on regulating separate parts of the system, without considering the impact of regulation on shadow banking as a whole.

In this section, we take a different approach to reviewing the regulation of shadow banking. Having identified the roots of shadow banking in leveraging on financial assets, which is instrumental to liquidity promises, we look at the entities that perform this activity or support it indirectly. Moreover, to cope with regulatory arbitrage and financial innovation, we focus on how regulation addresses the instruments of shadow banking. We take a critical view to existing regulations in light of the conclusion we reached in the previous section regarding the optimal design of shadow banking regulation.

The regulation of shadow banking entities may be direct or indirect. Direct regulation of shadow banking focuses on shadow banks as we know them, and tries to address the systemic risk stemming from their operations. Money market mutual funds are a case in point. Direct regulation also tries to adapt to new forms of shadow banking, either by defining new entities based on certain activities (roughly the EU approach) or by giving regulators the authority to include new entities into the regulatory perimeter (basically the US approach). Shadow banking may also be regulated indirectly, through its connections with the banks. For instance, because the largest securities dealers are associated with banks, they are affected by the regulation of bank capital. This is important in view of shadow banking's reliance on backstops from the official banking sector (and hence, from the public sector). Other examples of this approach include the regulation of banks' large exposures as well as the structural regulations aimed to separate traditional banking from shadow banking. Indirect regulation of this kind may have unintended consequences. Increasing the regulatory burden on the banking industry tends to push shadow banking towards bank-independent entities that may escape regulation's outreach.

Another form of indirect regulation is based on the instruments of shadow banking. Examples include, among others, securitization, securities financing transactions (for

instance, repos) and derivatives. These are all instruments of leverage based on liquidity promises. Securitization generates market liquidity for illiquid assets; repos transform market liquidity into funding liquidity; and derivatives allow all kinds of synthetic leverage via the exposure to a notional amount. All of these instruments rely on some sort of collateral. Regulatory reforms aim to improve the transparency of this collateral and to constrain shadow banking by capping the admissible leverage at the asset level.¹⁰⁴ The advantage of this approach is that, as long as the instruments to be regulated are defined functionally, regulation may remain effective despite financial innovation. Moreover, if collateral is monitored carefully, cutting ties with the banking system would not be an effective strategy for regulatory arbitrage. As a practical matter, both of these conditions for an effective instrument-based regulation are not perfectly attainable. Combining entity-based and instrument-based regulation of leverage is therefore necessary to cope with the systemic risk implications of shadow banking.

There are several ongoing regulatory reforms around the world. We critically review only the regulation of shadow banking in the US and the EU, which are expected to provide the main regulatory models.¹⁰⁵

6.1 Entity-based Regulation

6.1.1 Direct regulation

The EU response to shadow banking includes both entity-based and instrument-based regulation. In March 2012, the European Commission launched a public consultation, after which a two-fold legislative package was proposed.¹⁰⁶ The first part is the Regulation on Transparency of Securities Financing Transactions and of Reuse (SFTR).¹⁰⁷ Because this is an instrument-based approach to shadow banking regulation, we discuss it in the next subsection. The second prong of the EU response is instead entity based. It consists of a regulation to directly regulate MMMFs,¹⁰⁸ which generally follows the US model of

¹⁰⁴ FSB 'Transforming Shadow Banking into Resilient Market-based Finance: An Overview of Progress' (2015) 5–13 <www.fsb.org/wp-content/uploads/shadow_banking_overview_of_progress_2015.pdf> accessed 5 June 2017.

¹⁰⁵ Adrian and Ashcraft, 'Shadow Banking Regulation' (n 55) 26.

¹⁰⁶ In 2012, the European Commission (EC) published a Green Paper on shadow banking. See European Commission, 'Green Paper: Shadow Banking' COM (2012) 102 final <http://ec.europa.eu/internal_market/bank/docs/shadow/green-paper_en.pdf> accessed 12 September 2017. Further on, the regulation of shadow banking at the EU level was put on the regulatory agenda by European Commission, 'Proposal for a Regulation of the European Parliament and of the Council on Money Market' COM (2013) 615 final. The communication on shadow banking is the second prong of the EU package. It reviews all existing measures and additional measures that can be considered to regulate shadow banking activities. This proposal basically sets out the policy objectives and timeline for the regulatory reform of shadow banking. See European Commission, 'European Financial Stability and Integration Report 2013' (2014) 116 <https://ec.europa.eu/info/system/files/efsir-2013-28042014_en.pdf> accessed 5 June 2017.

¹⁰⁷ Regulation (EU) of the European Parliament and of the Council 2365/2015 of 25 November 2015 on transparency of securities financing transactions and of reuse and amending Regulation (EU) No 648/2012 [2015] OJ L 337/1.

¹⁰⁸ Regulation (EU) 2017/1131 of the European Parliament and of the Council of 14 June 2017 on money market funds, OJ L 169, 30.6.2017, pp. 8–45.

MMMF regulation except where the regulation is concerned with idiosyncrasies of the EU MMMFs.¹⁰⁹

Money market mutual funds are financial intermediaries that connect short-term debt issuers with providers of funds who need daily liquidity. Starting from the 1970s, in the US, financial products developed by the MMMFs, called negotiable order of withdrawal (NOW) accounts, were widely accepted as a direct substitute for bank deposit. These products were the pioneering examples of shadow banking disintermediating depository institutions. Currently, constant net asset value (CNAV) MMMFs are substitutes for insured deposits. They provide a source of safe assets for those institutional investors having surplus funds who need to keep such funds liquid. Money market mutual funds are supposed to make good on the promise to never 'break the buck'. However, when the Reserve Primary Fund was unable to keep that promise during the GFC, public authorities were forced to intervene and offer a liquidity put to all MMMFs. This circumstance drew attention to the risk of runs on MMMFs, calling for the regulation of such entities.

Although MMMFs provide a functional substitute for a bank's demand deposits, legally speaking they are mutual funds. Formally, MMMFs are not leveraged because their liabilities are equities. The problem is that MMMFs promise to redeem their equities at par. Therefore, regulation should either prohibit such a promise, by imposing a floating net asset value (NAV), or impose on the funds that offer CNAV leverage and/or liquidity restrictions comparable with those applicable to banks. Although a proposal was made to combine these approaches,¹¹⁰ on both sides of the Atlantic regulation has chosen to allow MMMFs to offer a stable NAV under strict liquidity conditions.

In the US, the Securities and Exchange Commission (SEC) overhauled rule 2a-7, imposing on MMMFs restrictions in terms of investment diversification and liquidity, as well as customer profiling.¹¹¹ Today, in order to be able to offer CNAV MMMFs to institutional investors, US funds must invest almost exclusively in government securities.¹¹² Additional rules are established to disincentivize redemptions in situations of stress. The EU regulation is similar to the US regulation. Although the European Commission initially proposed to mandate a 3 percent capital buffer on all CNAV funds,¹¹³ this proposal was scrapped at the request of the European Parliament. The final compromise agreed by the EU institutions and adopted in the Regulation (EU) 2017/1131 on money market funds, allows funds to offer CNAV only if they invest in public debt or in a new

¹⁰⁹ See 17 CFR 270.2a-7.

¹¹⁰ Martin N Baily, John Y Campbell, John H Cochrane, Douglas W Diamond, Darrell Duffie, Kenneth R French et al. 'Reforming Money Market Funds: A Proposal by the Squam Lake Group' (2011) <www.squamlakegroup.org/Squam%20Lake%20MMF%20January%202014%20Final.pdf> accessed 5 June 2017. Some commentators, however, believe that this proposal could not rule out runs. Tobias Adrian and Adam B Ashcraft, 'Shadow Banking: A Review of the Literature' in Garrett Jones (ed), *Banking Crises: Perspectives from The New Palgrave Dictionary* (Palgrave Macmillan 2016).

¹¹¹ 17 CFR 270.2a-7.

¹¹² Darrell Duffie, 'Financial Regulatory Reform after the Crisis: An Assessment' (2016) <www.darrellduffie.com/uploads/policy/duffiesintraJune2016.pdf> accessed 5 June 2017.

¹¹³ European Commission, 'Proposal for a Regulation of the European Parliament and of the Council on Money Market' (n 106).

class of low volatility assets, which are narrowly defined in terms of liquidity and residual maturity.¹¹⁴

The approach by the American and the European regulators seeks to avoid runs on MMMFs by imposing liquidity rules. In principle, this approach cannot rule out runs in the absence of insurance.¹¹⁵ However, restricting the investments of MMMFs to government securities effectively implies a liquidity put by the central banks dealing in these securities.

Although MMMFs are large (some €3.2 trillion in 2014),¹¹⁶ shadow banking includes much more than MMMFs. Including more entities into shadow banking is challenging because while many entities potentially qualify, they do not necessarily create systemic risk.¹¹⁷ Regulating financial entities in the absence of systemic risk is usually inefficient. Moreover, because the participants in the shadow banking system change with time,¹¹⁸ entity-based approaches to regulation, however sophisticated, become quickly outdated. Nevertheless, in both the US and the EU, regulation tries to include dynamically new entities in the regulatory perimeter of shadow banking.

In the EU, regulation seeks to capture new forms of shadow banking through the Alternative Investment Fund Managers Directive (AIFMD).¹¹⁹ This Directive includes hedge funds, private equity funds, real-estate funds and infrastructure funds as alternative investment funds (AIFs). The AIFMD requires managers of AIFs to report their leverage and liquidity policies to the competent supervisory authorities.¹²⁰ Moreover, the AIFMD provides for regulation of both liquidity and leverage in order to reduce systemic risk.¹²¹ No leverage or liquidity requirements are established on such investment funds in the US. However, the Dodd–Frank Act grants the Financial Stability Oversight Council (FSOC) the authority to determine whether a non-bank financial company (NBFC) should be supervised by the Federal Reserve and be subject to enhanced prudential standards, possibly even more stringent than those applying to regular banks.¹²²

¹¹⁴ Essentially, after a transition period of two years, all existing CNAV funds in the EU will have to be invested exclusively in public debt instrument or converted into low volatility net asset value (LVNAV) funds. Council of the European Union, ‘Proposal for a Regulation of the European Parliament and of the Council on Money Market Funds’ (n 106). See also: Art. 2 (11) for the definition of a public debt CNAV MMF as adopted in the Regulation (EU) 2017/1131 of the European Parliament and of the Council of 14 June 2017 on money market funds, OJ L 169, 30.6.2017, pp. 8–45.

¹¹⁵ Adrian and Ashcraft, ‘Shadow Banking Regulation’ (n 55) 45. The NAV rule makes runs possible. Stable NAV rule is what distinguishes MMMFS from other mutual funds.

¹¹⁶ Heike Mai, ‘Money Market Funds – an Economic Perspective: Matching Short-Term Investment and Funding Needs’ (Deutsche Bank Research 2015) <www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD0000000000351452/Money_market_funds_%E2%80%93_an_economic_perspective%3A_Matc.pdf> accessed 5 June 2017.

¹¹⁷ Claessens and Ratnovski (n 21).

¹¹⁸ Mehrling et al (n 11).

¹¹⁹ Directive of the European Parliament and of the Council 2011/61/EU of 8 June 2011 on Alternative Investment Fund Managers and amending Directives 2003/41/EC and 2009/65/EC and Regulations (EC) 1060/2009 and (EU) No 1095/2010 [2011] OJ L 174/1.

¹²⁰ Michael McDonald, ‘Containing Systemic Risk: New Developments in Trans-Atlantic Hedge Fund Regulation’ (2011) 34 *LoyLA.Int'l&CompLR* 237 261–63.

¹²¹ art 16(1) of the Directive 2011/61/EU (n 119).

¹²² Such a designation cannot be delegated and requires a vote by two-thirds of the voting

To date, the FSOC designated four firms as systemically important NBFCs including American International Group, Inc. (AIG),¹²³ General Electric Capital Corporation, Inc. (GE Capital),¹²⁴ Prudential Financial, Inc. (Prudential) and MetLife, Inc. (MetLife).¹²⁵ MetLife successfully challenged the constitutionality of its designation¹²⁶ and overturned it on the grounds of arbitrariness.¹²⁷

This US–EU comparison reveals a fundamental trade-off in designing the adaptation strategy of a direct, entity-based regulation of shadow banking. This strategy may rely on a list of entities. Although the precise identification of entities facilitates enforcement, it may be both over-inclusive and under-inclusive with respect to systemic risk, particularly in a dynamic perspective. A strategy relying on the discretion of regulators is preferable to adapt to unforeseen circumstances. However, from a legal perspective, this strategy creates legitimacy concerns, which may be well founded from an economic standpoint in the absence of an incentive-compatible governance of financial regulators.¹²⁸ The indirect regulation of shadow banking aims to overcome these problems.

6.1.2 Indirect regulation

Somewhat counterintuitively, a key constraint on shadow banking stems from the regulation of banking proper. In particular, the Basel III standards require banks to fund themselves with more equity of higher quality, impose new liquidity requirements and overall aim to keep bank size manageable in the event of a crisis (that is, to avoid the too-big-to-fail problem).¹²⁹ Such requirements affect shadow banking, too, to the extent that it is affiliated or otherwise interconnected with banks.

The first consequence of Basel III on shadow banking is the treatment of off-balance-sheet vehicles, such as ABCP conduits. Prior to the GFC, these vehicles were not subject to capital regulation. Today, capital requirements are to be applied to consolidated securitization transactions and ABCP conduits of depository institutions.¹³⁰ The on-balance-sheet treatment of securitization does increase the capital requirements of banks.¹³¹ Although shadow banking could avoid those in the absence of affiliation with a

members including the Chairperson of the FSOC. The Secretary of the Treasury is the chairperson of the FSOC. 12 USC § 5323 (a)(1). See also 12 CFR § 1310.10.

¹²³ On September 29, 2017, the FSOC rescinded the designation of AIG as a systemically important NBFC.

¹²⁴ On June 28, 2016, the FSOC rescinded the designation of GE Capital Global Holdings, LLC, the successor to General Electric Capital Corporation as a systemically important NBFC.

¹²⁵ Financial Stability Oversight Council, 'Designations' (2016) <<https://www.treasury.gov/initiatives/fsoc/designations/Pages/default.aspx>> accessed 5 June 2017.

¹²⁶ *MetLife Inc v Financial Stability Oversight Council* 15-cv-00045, US District Court, District of Columbia.

¹²⁷ See Robert C Hockett, 'Oversight of the Financial Stability Oversight Council: Due Process and Transparency in Non-Bank SIFI Designations' (2015) Cornell Legal Studies Research Paper No 16-20 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2796331> accessed 5 June 2017.

¹²⁸ Ross Levine, 'The Governance of Financial Regulation: Reform Lessons from the Recent Crisis' (2012) 12(1) *InterRevFinan* 39.

¹²⁹ Basel Committee on Banking Supervision, 'Basel III: A Global Regulatory Framework' (n 47).

¹³⁰ See 12 CFR § 567.

¹³¹ Adrian and Ashcraft, 'Shadow Banking Regulation' (n 55) 27–28.

bank, this is a rather theoretical scenario. Shadow banking needs collateral or a liquidity put. By imposing capital requirements on the latter, the reform reduces the scope for regulatory arbitrage. The downside is that genuine risk transfer to third parties no longer enjoys regulatory capital relief.¹³²

Another important feature of Basel III is the introduction of liquidity requirements, such as the liquidity coverage ratio (LCR)¹³³ and the net stable funding ratio (NSFR).¹³⁴ These requirements aim to stop sudden flights to liquidity, which are disruptive. Liquidity requirements are based on the idea that reliance on short-term funding can be highly contagious in the event of exogenous shocks to a bank.¹³⁵ Liquidity crises are, however, endogenous. In this perspective, liquidity requirements rather matter as a constraint on the growth of (shadow) banking. Neither the LCR nor the NSFR are defined as requirements to hold an amount of cash (or cash equivalent) against short-term liabilities, as they should be.¹³⁶ However, if these were proper liquidity requirements, they would operate in the same fashion as the reserve requirements for demand deposits.

Reserve requirements constrain the ability of banks to lever on collateral, because a part of the latter must always be set aside for any amount of short-term liabilities issued. Liquidity requirements for banks constrain shadow banking indirectly. Although independent shadow banks could theoretically do away with these requirements, this would be unthinkable in the absence of a liquidity backstop from a depository institution. One of the purposes of liquidity regulation is indeed to make such backstops from banks more expensive.¹³⁷

Basel III has also introduced a straight leverage ratio, which is invariant to the risk of the banks' investments.¹³⁸ In the US, this is called the supplementary leverage ratio (SLR) and it is more stringent than in the EU. In the US, banks need to fund at least 6 percent of their asset with equity, whereas the European requirement is only 3 percent and has still to be phased in.¹³⁹

¹³² *ibid.*

¹³³ Basel Committee on Banking Supervision, 'Basel III: The Liquidity Coverage Ratio and Liquidity Risk Monitoring Tools' (January 2013) <www.bis.org/publ/bcbs238.htm> accessed 5 June 2017. *See also* art 412 of CRR (liquidity coverage requirement).

¹³⁴ Basel Committee on Banking Supervision, 'Basel III: The Net Stable Funding Ratio' (October 2014) <www.bis.org/bcbs/publ/d295.htm> accessed 5 June 2017. *See also* art 413 of the CRR.

¹³⁵ Hal Scott, 'Interconnectedness and Contagion: Financial Panics and the Crisis of 2008' (2014) 9–10 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2178475> accessed 5 June 2017. The alternative to liquidity requirements is the emergency public lending facilities. However, it is argued that such requirements which can protect against the liquidity-driven runs are of limited effectiveness and the role of central banks in providing liquidity will remain essential in guarding against contagion. *See ibid.*

¹³⁶ Charles W Calomiris, 'Getting the Right Mix of Capital and Cash Requirements in Prudential Bank Regulation' (2012) 24(1) *JApplCorpFinance* 33.

¹³⁷ Adrian and Ashcraft, 'Shadow Banking Regulation' (n 55) 30.

¹³⁸ Basel Committee on Banking Supervision, 'Basel III: A Global Regulatory Framework' (n 47).

¹³⁹ The CRR entered into force on 27 July 2013. The in-scope institutions are required to apply the rules starting from 1 January 2014. However, full implementation will not take place until 1 January 2019. According to the Basel standards and the CRD IV package, the leverage ratio was set at a 3 percent limit during the testing phase ('parallel run' period = 1 January 2013 to 1 January

Supplementing the traditional risk-weighted capital regulation with leverage restrictions makes regulatory arbitrage more difficult, but it comes at a cost. All else being equal, institutions subject to an SLR will rather choose riskier investments. Moreover, financial institutions will try to avoid the leverage ratio to begin with. Both these issues reflect on shadow banking, as revealed by the experience with the SLR in the US.

Recent studies found that pursuant to the introduction of the SLR in 2014, repo borrowing by bank-affiliated broker-dealers has decreased,¹⁴⁰ but the use of repo backed by riskier collateral has increased.¹⁴¹ In addition, there is indirect evidence that bank-affiliated broker-dealers have been discouraged from borrowing in tri-party repo markets.¹⁴² This development was concomitant with an increase in the activity of non-bank-affiliated dealers entering tri-party repo markets. This suggests that risk-taking in the repo markets is shifting from the banking sector to independent shadow banking.¹⁴³ A similar development may be predicted for Europe. Pushing certain risks away from official banking, leverage regulations may increase the overall fragility of the credit intermediation system.¹⁴⁴ Besides, risk-insensitive leverage restrictions undermine efficient risk-taking by both shadow and official banks.

By way of steering banks away from low-risk, low-return strategies, a straight leverage ratio curbs all shadow banking which is affiliated with, or sponsored by, the official banking sector. Banking regulation may indirectly constrain independent shadow banking, too, by limiting the exposure of banks to counterparty risk. In the EU, an exposure is large if it exceeds 10 percent of an institution's eligible capital.¹⁴⁵ Exposures exceeding 25 percent of the capital or €150 million are prohibited.¹⁴⁶ Similar rules apply to US depository institutions and under Basel III.¹⁴⁷ These exposure limits are meant to ensure that a bank will not become insolvent upon the failure of one large counterparty. Because large counterparties can be shadow banks, exposure limits may limit the reliance of shadow

2017), with disclosure starting from 1 January 2015. The current level of leverage ratio, applicable from January 2018, has also been set at 3 percent.

¹⁴⁰ For the complexities involved in the US bank holding structures, *see* Avraham et al (n 69).

¹⁴¹ Meraj Allahrakha, Jill Cetina and Benjamin Munyan, 'Do Higher Capital Standards Always Reduce Bank Risk? The Impact of the Basel Leverage Ratio on the US Triparty Repo Market' (Office of Financial Research Working Paper 2016) <www.financialresearch.gov/working-papers/files/OFRwp-2016-11_Higher-Capital-Standards.pdf> accessed 5 June 2017. As revealed by Gorton and Metrick, a run on repos backed by risky collateral can be highly disruptive of the financial system. *See* Gorton and Metrick, 'Regulating the Shadow Banking System' (n 73).

¹⁴² Duffie, 'Financial Regulatory Reform after the Crisis' (n 112). On the functioning of tri-party repos, *see* text accompanying notes 169 and 1701.

¹⁴³ Allahrakha et al (n 141).

¹⁴⁴ Samuel G Hanson, Anil K Kashyap and Jeremy C Stein, 'A Macroprudential Approach to Financial Regulation' (2011) 25(1) *JEconPerspec* 3, 25.

¹⁴⁵ art 392 CRR.

¹⁴⁶ art 395 CRR, the European Banking Authority (EBA) has recently (3 June 2016) published guidelines on limits on exposure to shadow banking <www.eba.europa.eu/regulation-and-policy/large-exposures/guidelines-on-limits-on-exposures-to-shadow-banking> accessed 5 June 2017.

¹⁴⁷ 12 CFR § 206.4 (a)(1). Similar requirements exist in Basel III. For Basel standards on large exposures, *see* Basel Committee on Banking Supervision, 'Standards: Supervisory Framework for Measuring and Controlling Large Exposures' (Bank for International Settlements, Basel April 2014) <www.bis.org/publ/bcbs283.pdf> accessed 5 June 2017.

banks on bank funding or liquidity puts. More generally, focusing on the largest exposures of the largest banks is a good strategy to identify systemic risk without having to rely on particular entities definitions or risk models.¹⁴⁸

A final way to constrain shadow banking indirectly is to prohibit, by way of structural regulation, banks from engaging in it.¹⁴⁹ Having a tradition of such a structural regulation, dating back to the separation between commercial and investment banking, the US has pioneered this approach with the Volcker Rule.¹⁵⁰ This rule aims to limit the extension of government backstops from depository to non-depository institutions by prohibiting the former from engaging in proprietary trading either directly or by sponsoring hedge and private equity funds.¹⁵¹ Although the Volcker Rule limits the interconnectedness between traditional and shadow banking, it is necessarily imprecise in defining the latter and may have other unintended consequences. In particular, the Volcker Rule may increase systemic risk by incentivizing financial institutions to shift their proprietary trading to 'a frailer part of the financial system'.¹⁵² Similar considerations apply to the EU version of the Volcker Rule, which has been proposed by the European Commission along similar lines.¹⁵³ The UK approach to structural regulation is slightly different. Acknowledging the difficulties in identifying shadow banking for the purpose of separation, the UK regulation rather defines core banking services and mandates their ring-fencing of their liabilities from any other activity carried out within the group.¹⁵⁴

Structural reforms may do more harm than good. They tend to decrease market liquidity and to push credit intermediation into independent shadow banking. Moreover, they are unlikely to be as effective in curbing the government support as the prudential regulations that indirectly affect shadow banking, such as the consolidation obligations and the new rules on liquidity and leverage that we have reviewed at the beginning of this subsection. These rules affect the banks' operational choices via the pricing of their liquidity put to shadow banking. Finally, whether prudential or structural, banking regulation can only partly reach out to independent entities engaging in shadow banking. In order

¹⁴⁸ Darrell Duffie, 'Systemic Risk Exposures: A 10-by-10-by-10 Approach' in Markus Brunnermeier and Arvind Krishnamurthy (eds), *Risk Topography: Systemic Risk and Macro Modeling* (University of Chicago Press 2014).

¹⁴⁹ John C Coates IV, 'The Volcker Rule as Structural Law: Implications for Cost-Benefit Analysis and Administrative Law' (2015) 10(4) CMLJ 447.

¹⁵⁰ s 619 of the Title VI of the Dodd-Frank Act (12 USC § 1851).

¹⁵¹ Hossein Nabilou, 'Bank Proprietary Trading and Investment in Private Funds: Is the Volcker Rule a Panacea or Yet Another Maginot Line?' (2017) 32(2) BFLR 297.

¹⁵² Kern Alexander and Steven L Schwarcz, 'The Macroprudential Quandary: Unsystematic Efforts to Reform Financial Regulation' in Ross P Buckley, Emiliios Avgouleas and Douglas W Arner (eds), *Reconceptualising Global Finance and Its Regulation* (CUP 2016) 153. Arguing that the Volcker Rule may not only increase systemic risks, but also it may impair efficiency because commercial banks have to forgo the revenue from prop trading.

¹⁵³ European Commission, 'Proposal for a Regulation of the European Parliament and of the Council on Structural Measures Improving the Resilience of EU Credit Institutions' COM (2014) 43 final – 2014/0020 (COD) <<http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52014PC0043>> accessed 24 December 2017. This proposal has been withdrawn from the Commission Working Program 2018.

¹⁵⁴ See Part 1 'Ring-fencing' of the UK Financial Services (Banking Reform) Act 2013.

for regulation to restrict this kind of shadow banking, an instrument-based approach is required.

6.2 Instrument-based Regulation

Regulation can curb shadow banking by restricting its instruments. This is another form of indirect regulation. As we argued in section 5, this approach to regulating shadow banking is effective and may be efficient as long as it covers all the instruments of shadow banking and for each of them identifies the optimal leverage. The most important instrument of shadow banking addressed by regulation is the collateral, which underlies shadow banking activities such as securitization, repos and derivatives.

After the GFC, securitization has been regulated extensively. As discussed earlier, banks investing in securitizations even indirectly face enhanced capital requirements. In addition, the post-GFC regulation of securitization mandates a minimum risk retention at the source of securitization. Section 941 of the US Dodd–Frank Act requires that originators retain an interest of at least 5 percent.¹⁵⁵ Similar rules are established by Article 405 of the CRR. The EU has extended the risk retention requirement to non-banks via the AIFM Directive.¹⁵⁶ Risk retention requirements limit leverage in securitizations. However, they are invariant to the risks underlying securitization. This can lead to regulatory arbitrage. Moreover, the risk retention requirements may be too high for certain loans, which would then cease to be securitized. Assuming that regulation can cope with regulatory arbitrage, the cap on leverage stemming from such requirements may make some securitizations uneconomical.¹⁵⁷ Over-regulation might have contributed to securitization disappearing from financial markets after the GFC.

Securitization has been instrumental to shadow banking by providing suitable collateral for short-term funding.¹⁵⁸ Collateralized short-term funding remains a key feature of shadow banking. Shadow banks fund themselves mainly, albeit not exclusively, through repos. Repos are collateralized loans on the global money markets, typically with a maturity of one or a few days. Repos are exposed to run. The regulation of collateral addresses this core vulnerability of shadow banking.¹⁵⁹

¹⁵⁵ 15 USC 78o–11.

¹⁵⁶ art 17 Directive of the European Parliament and of the Council 2011/61/EU of 8 June 2011 on Alternative Investment Fund Managers and amending Directives 2003/41/EC and 2009/65/EC and Regulations (EC) No 1060/2009 and (EU) No 1095/2010 [2011] OJ L 174/1. AIFs cannot invest in securitization products unless the originator, the sponsor or the original lender continuously retains a material net economic interest of no less than 5 percent. *See also* art 51(1) Commission Delegated Regulation (EU) 231/2013 of 19 December 2012 supplementing Directive 2011/61/EU of the European Parliament and of the Council with regard to exemptions, general operating conditions, depositaries, leverage, transparency and supervision [2013] OJ L 83/1.

¹⁵⁷ Stijn Claessens and Laura Kodres, 'The Regulatory Responses to the Global Financial Crisis: Some Uncomfortable Questions' (2014) IMF Working Paper WP 14/46 <www.imf.org/external/pubs/ft/wp/2014/wp1446.pdf> accessed 5 June 2017.

¹⁵⁸ Gorton, *Slapped by the Invisible Hand* (n 19). But *see, contra*, Shleifer, 'Comments and Discussions' (n 92) 300.

¹⁵⁹ Viktoria Baklanova, Adam Copeland and Rebecca McCaughrin, 'Reference Guide to US Repo and Securities Lending Markets' (2015) Federal Reserve Bank of New York Staff Reports No 740 33–37 <www.newyorkfed.org/research/staff_reports/sr740.html> accessed 5 June 2017.

One issue about collateral is that the lender can reuse it to obtain financing. This practice is called rehypothecation and is particularly troublesome for systemic risk.¹⁶⁰ Volatility in collateral prices may lead to a run on the liabilities backed by such collateral.¹⁶¹ Not knowing where the collateral initially posted ended up, borrowers would run as well and close their positions to repossess the collateral.¹⁶² Brokers with matched books on both sides of such transactions, which technically face no risk, may suddenly get into trouble.

Regulation of collateral in the US is entity based and focuses on prime brokers as the key players in collateral intermediation. Federal Reserve Regulation T¹⁶³ and SEC Rule 15c3-3¹⁶⁴ allow prime brokers to rehypothecate collateral up to 140 percent of their clients' liabilities. The EU has chosen instead an instrument-based approach, adopting a regulation of collateral in securities financing transactions (SFTR), which came into force in 2016.¹⁶⁵ This regulation requires any firm engaging in repos or securities lending to report such transactions to trade repositories. The information to be reported notably includes leverage.¹⁶⁶ Moreover, the SFTR sets limits on rehypothecation, by requiring prior consent for the reuse of collateral by the counterparty, who must be duly informed about the consequences of such reuse.¹⁶⁷

The European instrument-based approach has two advantages. First, it generates the information and the data that is needed to monitor the systemic risk stemming from shadow banking directly at the source, which is leverage. Second, because regulation applies to the transaction level, it is much more difficult to circumvent, at least as long as short-term funding is collateralized. This is also the limitation of this approach. Although this is difficult to imagine today, shadow banking might come up with innovative sources of funding that have nothing to do with securities financing. The US entity-based approach would cope better with this circumstance as long as the funding still had to be channeled through prime brokerage firms, or through an affiliation with a bank holding company (BHC). As shown in the previous section, the official banking system is constrained by leverage and liquidity restrictions, which indirectly affect the amount of shadow banking that banks can sponsor or simply participate in.

Another important channel of transmission of systemic risk is the market infrastructure. For instance, repo contracts differ in the way they are settled. During the GFC, increases in the haircuts for certain asset classes were documented in the bilateral setting, where parties directly trade collateral against cash.¹⁶⁸ However, no significant haircut increase was observed in tri-party repo markets.¹⁶⁹ In tri-party repo markets the collateral is managed by two global dealer banks – Bank of New York Mellon and JP Morgan

¹⁶⁰ Steven L. Schwarcz, 'Distorting Legal Principles' (2010) 35(4) JCorpL 699.

¹⁶¹ Scott shows how hedge funds can face a prospect of becoming unsecured creditors under UK legal treatment of rehypothecated collaterals. *See* Scott (n 135) 76–79.

¹⁶² Christian A Johnson, 'Derivatives and Rehypothecation Failure: It's 3:00 pm, Do You Know Where Your Collateral Is?' (1997) 30 ArizLRev 969.

¹⁶³ 12 CFR §220.

¹⁶⁴ 17 CFR 240.15c3-3.

¹⁶⁵ Regulation (EU) 2365/2015 (n 107).

¹⁶⁶ European Systemic Risk Board, 'EU Shadow Banking Monitor' (2016) 1.

¹⁶⁷ art 15, Regulation (EU) 2365/2015 (n 107).

¹⁶⁸ Gorton and Metrick, 'Securitized Banking and the Run on Repo' (n 19).

¹⁶⁹ Adam Copeland, Isaac Davis, Eric LeSueur and Antoine Martin, 'Mapping and sizing

Chase – that act as clearinghouses. During the GFC, runs on tri-party repos followed the more classic pattern of sudden refusal to lend to specific counterparties.¹⁷⁰

This suggests that the central management of collateral is more efficient. Not only counterparty risk management is improved by netting, but also the clearing institutions have strong incentives to get collateral pricing and margins right. Moreover, clearing institutions can be made subject to reporting requirements and other obligations instrumental to monitoring and regulating leverage. For these reasons, there is broad academic support for central clearing of repos,¹⁷¹ which has not yet been picked up by policymakers. One of the disadvantages of central clearing is that the clearinghouses may become too big to fail.¹⁷² This is no different from the current situation of the US tri-party repo market. On the other hand, because the bulk of repos is still intermediated by official banks, the size of the repo market is indirectly constrained by the bank regulation of liquidity and leverage.¹⁷³

Both in Europe and in the US,¹⁷⁴ certain classes of over-the-counter (OTC) derivatives are to be settled centrally. This is another important piece of instrument-based regulation because, as mentioned, derivatives are a sneaky way to build up leverage, and hence systemic risk, through the obligation to pay margins. Effective June 2016, the European Market Infrastructure Regulation (EMIR)¹⁷⁵ requires certain derivatives to be cleared through central counterparties (CCPs). Not only will this improve the transparency of shadow banking, but it will also allow, in time, to constrain it via minimum haircut regulation.

As discussed in section 5, minimum haircut regulation can be very effective to constrain the externalities of shadow banking. This is the form of shadow banking regulation that we advocate across the board. Implementing such regulation only requires that the management of collateral be restricted to specific entities. In this perspective, the EMIR may also be used as a tool for macroprudential regulation, allowing to set countercyclical margin requirements on derivative transactions and, in the future, on all the leverage instruments of shadow banking.¹⁷⁶ Establishing such regulation of shadow banking remains challenging. As mentioned earlier, for haircut regulation to be efficient, regulators must be able to identify leverage restrictions across several classes of assets being used by shadow banking, and to adapt this regulation over time. Still, we believe that a quantity regulation of shadow banking via minimum haircuts is preferable to other forms of collateral regulation.

Another way to regulate collateral is via its bankruptcy law regime, which was also discussed in section 5. The collateral of repos and derivatives transactions (so-called

the US repo market' (Federal Reserve Bank of New York 2012) <<http://libertystreeteconomics.newyorkfed.org/2012/06/mapping-and-sizing-the-us-repo-market.html>> accessed 5 June 2017.

¹⁷⁰ Viral V Acharya and T Sabri Öncü, 'A Proposal for the Resolution of Systemically Important Assets and Liabilities: The Case of the Repo Market' (2013) 9(1) *IJCB* 291, 322.

¹⁷¹ Adrian and Ashcraft, 'Shadow Banking Regulation' (n 55) 42.

¹⁷² Duffie, 'Financial Regulatory Reform after the Crisis' (n 112).

¹⁷³ For the distortions stemming from this circumstance, see *ibid*.

¹⁷⁴ See Title VII of the Dodd–Frank Wall Street Reform and Consumer Protection Act 2010.

¹⁷⁵ Regulation (EU) 648/2012 (n 48).

¹⁷⁶ European Central Bank, *Financial Stability Review* (May 2016) 106–08.

qualified financial contracts, QFC) is exempted from the automatic stay on the borrower's assets in case of bankruptcy. After the GFC, this exemption has come under fire on the grounds that it fuels fire sales and collateral crisis.¹⁷⁷ Yet, this exemption has advantages too.¹⁷⁸ In general, removing the automatic stay exception would act as a curb on repos by reducing the liquidity of the collateral, particularly in tri-party markets.¹⁷⁹ This could be a sensible regulatory measure to reduce the reliance on lower-quality collateral, akin to setting minimum haircuts. However, it would be probably unwarranted for higher-quality collateral, such as most government-guaranteed securities.¹⁸⁰

Scrapping the bankruptcy law exception may be as effective in curbing repos and derivatives as the minimum haircut regulation that we advocate, but because it affects indistinctively high-quality and low-quality collateral, it is less efficient.¹⁸¹ The proposal to make the QFC regime conditional on the payment of a tax, or liquidity insurance, could overcome this problem as long as the tax rate would vary with the quality of collateral. However, as we argued in section 5, this is not possible because the quality of collateral cannot be precisely measured in terms of systemic risk contribution. Moreover, the threat not to backstop collateral that is not explicitly insured would not be credible. Finally, proposals to curb shadow banking by restricting access to collateral all face a fundamental problem: Shadow banking is not necessarily operated via repos or derivatives, and may well rely on collateral that is not bankruptcy remote. Think, for instance, of commercial paper, which is not exempt from bankruptcy law and yet has funded shadow banking. Also, financial innovation might come up with other transactions for which the bankruptcy regime is irrelevant. If reliance on bankruptcy-remote collateral is not essential to shadow banking, the proposals to regulate the latter by restricting access to the former are unlikely to be effective.

¹⁷⁷ Carolyn Sissoko, 'The Legal Foundations of Financial Collapse' (2010) 2(1) *JFinancEconPol* 5. See also Steven L Schwarcz, 'Derivatives and Collateral: Balancing Remedies and Systemic Risk' (2015) 2015(2) *UILLRev* 699.

¹⁷⁸ For why the derivatives contracts should be treated differently on efficiency-based grounds, see Franklin R Edwards and Edward R Morrison, 'Derivatives and the Bankruptcy Code: Why the Special Treatment' (2005) 22 *Yale JonReg* 2005.

¹⁷⁹ Nathan Goralnik, 'Bankruptcy-Proof Finance and the Supply of Liquidity' (2012) 122 *YaleLJ* 460.

¹⁸⁰ In the EU, in 2014, the Bank Recovery and Resolution Directive (BRRD) modified the Financial Collateral Directive (FCD). This modification allows a stay of enforcement and close-out netting provisions for up to 48 hours to allow for a robust and effective resolution. See Directive 2014/59/EU of the European Parliament and of the Council of 15 May 2014 establishing a framework for the recovery and resolution of credit institutions and investment firms and amending Council Directive 82/891/EEC, and Directives 2001/24/EC, 2002/47/EC, 2004/25/EC, 2005/56/EC, 2007/36/EC, 2011/35/EU, 2012/30/EU and 2013/36/EU, and Regulations (EU) No 1093/2010 and (EU) No 648/2012, of the European Parliament and of the Council, OJ L 173, 12.6.2014, pp. 190–348, Articles: 70(1) and 118 (inserting article 1(6) to the FCD).

¹⁸¹ For an alternative proposal to differentiate between high-quality and low-quality collateral, see Acharya and Öncü (n 170) 322, 335.

7. CONCLUSION

In this chapter, we have analyzed the economics of shadow banking and the case for its regulation. We have noted an important challenge in addressing shadow banking, which is to define it. After reviewing the main approaches to defining shadow banking – based on its activities, entities and instruments – we have concluded that all of them have shortcomings. In order to connect shadow banking with systemic risk, we have argued in favor of an instrument-based approach, defining banking as leveraging on collateral to support liquidity promises. Such form of banking qualifies as shadow banking if it is not subject to the same leverage and liquidity regulation as official banking. Having said that, an instrument-based regulation presupposes that the entities having access to the relevant instruments are subject to reporting obligations.

Furthermore, we have discussed the optimal regulation of shadow banking from a law and economics perspective. Shadow banking is beneficial for society because it caters to a demand for safe assets. However, because of negative externalities, shadow banking is overproduced. We have argued that, because uncertainty makes any measure of systemic risk imprecise, quantity regulation is preferable to a Pigovian tax to cope with the externalities of shadow banking. Regulation should limit the leverage of shadow banking by way of minimum haircuts regulation on assets being used as collateral.

Finally, we have reviewed the regulation of shadow banking in the US and the EU based on the insights from economic analysis. We found that such regulation is both entity based and instrument based. Although the latter is to be preferred in theory, the practical difficulties of monitoring leverage at the assets level imply that the regulation of financial collateral should be combined with an indirect regulation of institutional leverage, through the prudential regulation of banks providing explicit or implicit liquidity puts to shadow banking. Unfortunately, risk-insensitive restrictions of leverage undermine the efficiency of banking, whether official or shadow.

We acknowledge that the implementation of an optimal regulation of shadow banking faces two important challenges. First, it is difficult to identify the optimal levels of asset and institutional leverage. Second, it is even more difficult to adapt these levels to new circumstances. These challenges, however, also apply to banking in general. A way to address them may be to provide financial regulators with some discretion under incentive-compatible regulatory governance. This is an interesting avenue for future research.

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