Loughborough University

This item was submitted to Loughborough's Research Repository by the author.
Items in Figshare are protected by copyright, with all rights reserved, unless otherwise indicated.

Register, cap and trade: a proposal for containing systemic liquidity risk

PLEASE CITE THE PUBLISHED VERSION

http://dx.doi.org/10.5018/economics-ejournal.ja.2013-7

PUBLISHER

Kiel Institute for World Economy and the ZBW – Leibniz Information Centre for Economics

VERSION

VoR (Version of Record)

PUBLISHER STATEMENT

This work is made available according to the conditions of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0) licence. Full details of this licence are available at: https://creativecommons.org/licenses/by-nc-nd/4.0/

LICENCE

CC BY-NC-ND 4.0

REPOSITORY RECORD

Milne, Alistair. 2019. “Register, Cap and Trade: A Proposal for Containing Systemic Liquidity Risk”. figshare. https://hdl.handle.net/2134/24358.

Economics
The Open-Access, Open-Assessment E-Journal

Vol. 7, 2013-7 | March 05, 2013 | http://dx.doi.org/10.5018/economics-ejournal.ja.2013-7

Register, Cap and Trade: A Proposal for Containing Systemic Liquidity Risk

Alistair Milne

Abstract
A fundamental cause of the global financial crisis was excessive maturity mismatch, notably shadow banking holdings of sub-prime MBS and other structured credit instruments and cross-border Euro area interbank lending to the uncompetitive Euro area periphery. The costs of short term funding do not fully reflect underlying asset risks and this created systemic liquidity and credit risks. This externality can be controlled through the issue of tradable licenses for short term funding. This is a simpler and more efficient way of addressing systemic liquidity risk than the controls on individual institutions proposed by international regulators.

Published in Special Issue Coping with Systemic Risk

JEL E44 G28 G21
Keywords Basel III; debt deflation; endogenous money; financial regulation; global financial crisis; limited purpose banking; maturity mismatch; narrow money; Pigouvian taxes; ring fencing; systemic financial risk; systemic financial externalities; Tobin tax

Authors
Alistair Milne, ✉ School of Business and Economics, Loughborough University, a.k.l.milne@lboro.ac.uk

Previously titled 'A 'cap and trade' approach to containing systemic financial risk'. I wish to acknowledge helpful comments from an anonymous referee, the special issue editor Sheri Markose, Dave Elder-Vass, Charles Goodhart, Laurence Kotlikoff, Harry Leinonen, Marcus Miller, Enrico Perotti, Jeremy Stein, Lei Zhang, members of the 'Campos Santos' group at Cass Business School, the Financial Regulation seminar at the London School of Economics, Warwick University and the 2011 IBEFA-WEAI meetings in San Diego. The contents are my responsibility alone.

Citation Alistair Milne (2013). Register, Cap and Trade: A Proposal for Containing Systemic Liquidity Risk. *Economics: The Open-Access, Open-Assessment E-Journal*, Vol. 7, 2013-7. http://dx.doi.org/10.5018/economics-ejournal.ja.2013-7

Received False **Published as Economics Discussion Paper** False
Revised False **Accepted** False **Published** False

© Author(s) 2013. Licensed under the Creative Commons License - Attribution 3.0

1 Introduction

This paper proposes the creation of national (currency specific) registers of short term monetary and money-like liabilities, and the use of these registers to control the aggregate amount of maturity mismatch in the financial system.

Many steps have been taken by the global authorities in response to the global financial crisis that erupted in 2007-2008 both to contain its impact and to prevent a recurrence.[1] Arguably amongst the most fundamental changes are some of those yet to be implemented: the introduction of global liquidity regulation as part of Basel III, through the imposition of the 'Liquidity Coverage Ratio' or LCR and the 'Net Stable Funding Ratio' or NSFR;[2] and the recent proposals for oversight of shadow banking proposed by the Financial Stability Board.[3]

These measures reflect the regulatory consensus that a major regulatory failing pre-crisis regulation was the failure to contain systemic liquidity risks. The LCR will require every bank to hold enough high quality liquidity assets to cope with a one-month stressed runoff. It will be gradually brought into effect between January 2015 and January 2019. The NCFR will require every bank to have enough stable (long term) funding to fully finance its holdings of long term assets. It is due to come into force in January 2018, although this timetable is currently under review. The FSB proposes a range of further regulations aimed at containing risk posed by the potential loss of liquidity in repo markets, in money market mutual funds and other forms of short term funding markets outside of the formal regulated banking sector i.e. in 'shadow banking'.

These new regulations are both inconsistent and inefficient. They are inconsistent because they take a different approach to regulation of maturity

[1] A partial list includes the major expansion of the balance sheets of the Federal Reserve, the ECB and the Bank of England and emergency provision of central bank liquidity against a range of collateral; US dollar swaps provided by the Federal Reserve to other central banks; the capital and liquidity requirements of Basel III (BCBS (2010a); additional oversight requirements on systemically important financial institutions; central registration and clearing of OTC derivative markets; the imposition of resolution plans to avoid future tax-payer bail-out of failing financial institutions; the creation of new 'macroprudential' policy making bodies and various forms of structural intervention including the US Volcker rule limiting commercial bank activities the UK ring fencing of retail banking and EU Liikanen proposals for ring fencing of trading.

[2] See BCBS (2010b, 2013).

[3] See Financial Stability Board (2012b).

mismatch within and outside of the regulated banking sector, creating potential for new forms of regulatory arbitrage between regulated and 'shadow' banks. They are inefficient for two further reasons. They make the adjustment of *individual* balance sheets difficult and costly, inhibiting the trading of liquidity between individual institutions and so requiring the hold much more liquidity than is necessary to contain idosyncratic liquidity risks. They are inefficient also because of the complexity of the new rules adds to what is already a very heavy administrative compliance burden imposed post-crisis on all regulated financial institutions.

The proposals of this paper are designed to achieve the same end – control of systemic liquidity and any consequent credit risk – but with a simpler, more effective and less burdensome regime. The paper is organised as follows. Section 2 sets out the two elements of the proposal. The first is the register itself. Compliance is ensured by requiring that liabilities that are not recorded in this register can be postponed rather than repaid if the borrower does not wish to make repayment. The second element is a system of 'cap and trade' of registered short term liabilities. The government issues licenses for holding these liabilities. A penalty is imposed on financial institutions issuing registered short term liabilities not matched by the possession of a license. Licenses are tradable to ensure that liquidity – in the form of short term liabilities – is allocated to uses which earn the greatest return.

Section 3 discusses the rationale for this proposal. Costs are small. It will be relatively low cost because the creation of a short-term liability register is something that will likely be needed anyway, in order to fulfil the commitment of policy makers and regulatory authorities to ensure that financial institutions issuing short-term liabilities can be resolved without tax-payer support. It also has relatively low compliance costs because of the flexibility offered by 'cap and trade' to individual institutions. Benefits are large. Using registration to support a system of cap and trade provides the regulatory authorities with a direct control over aggregate short-term funding and accompanying credit creation; and therefore prevents the possibility of monetary stimulus leading to unsustainable creation of money and credit. It is also a valuable complement to higher bank capital requirements, because it is more universal (it applies to non-banks as well as banks) and poses less risk of reducing the supply of sustainable and value creating credit.

Section 4 discusses some practical concerns and consequences of introducing this registration and licensing of short term liabilities. Can the register be avoided? Because the control is focus short term liabilities, not on control of assets, avoidance is difficult. Does it not require fundamental change the business models of both banks and long term investors? Yes but this change is desirable in itself with a shift from focus on short term to longer term returns. Section 5 discusses how the ideas of this paper relate to some other policy proposals. Section 6 offers some concluding remarks.

2 The Proposed Mechanism

It is a little surprising that – despite all the discussion of systemic risk following the global financial crisis – all the regulatory responses to the crisis have been focused on controlling the behaviour of individual institutions or the terms of individual contracts. Little or no attention has been paid to developing measures which allow individual institutions maximum freedom to take their own business decisions and meet customer needs, while still giving the regulatory authorities control over aggregate outcomes.

This paper suggests a comprehensive registration of assets and liabilities, which can be used to monitor the extent of aggregate maturity mismatch and its contribution to systemic liquidity risks. This is in line with other current initiatives. Regulators are, increasingly, paying attention to the need for good quality data in order to contain systemic financial risk, an example being the requirements for registration of over the counter derivative positions in trade repositories, the development of a system of global legal entity identifiers for wholesale market participants and the establishment, in the US, of the Office of Financial Research with responsibility for the collection and analysis of data on systemic financial risk.[4]

It also proposes a system of 'cap and trade' for controlling aggregate systemic liquidity risk, while providing individual institutions with maximum freedom to manage their own liquidity. This is conceptually simple and also has a further

[4] See also De Soto (2012) who emphasises the fundamental role of information on ownership in control of system wide risks.

merit, compared with the panoply of measures in Basel III, of *asymmetry*, discouraging any rapid expansion of funding and credit relative to existing levels while putting no pressure on institutions to contract their balance sheets. This could be a critical advantage, given the weak state of the global economy and the fear that reregulation threatens to lower credit supply and help create a renewed global economic downturn.

These proposals can be implemented as follows.

2.1 Registration

- A central register of financial assets and liabilities is established, and updated in real time. All domestically held financial assets and liabilities must be included. For implementation of 'cap and trade' the detail on asset holdings can be sketchy (the main reason for including them is to ensure complete coverage of liabilities through the balance sheet identity) but full details must be provided on maturity and promised cash flows on each liability.
- There must be incentives for accurate registration. The main incentive is a requirement that, in order for repayment of a short-term liability to be legally enforceable under domestic law, it must be contained in the register.[5] If a short-term liability is not registered then it can be rolled over at a current market rate of interest.

2.2 Cap and Trade

- The systemic risk regulator (for example the Financial Policy Committee of the Bank of England in the case of the UK) determines on a quarterly basis an amount, say £100bn, as the upper limit on short term liabilities of financial intermediaries in the relevant currency. Licenses for this amount are distributed to financial institutions (an appropriate basic criteria for allocation is usage over a previous 3 month period, but a degree of re-

[5] See Stout (2009) for a related approach to derivative regulation, based on limited enforceability of contract.

allocation might be undertaken e.g. in order to achieve further goals such as promoting new entry into lending markets).

- The short term liabilities of non-financial companies (trade credits, corporate paper, drawn down lines of credit from banks etc.) are included in the register but are not subject to licensing control. All short term liabilities used to finance financial investments, both loans and securities, are subject to licensing control. Also any offshore funding, whether short or long term, is subject to licensing control at the full rate. In offshore financial centres (including London) an exemption might be made for offshore foreign currency funding used to finance the holding of offshore foreign currency assets, or such exposures might be subject to separate licensing regimes.
- The license requirements are netted off within the same balance sheet. So for example when £10mn of registered short term funding is used to hold £6mn of short term registered assets subject to licensing by their issuer, then this counts as only £4mn use of short term funding.
- In advance of each quarterly period licenses are auctioned. One way this can be done is by requiring financial institutions to submit schedules for purchase or sale of licenses (relative to their initial allocation), stating how much they are willing to pay for acquiring licenses or what they would be willing to sell them for. Then a cut-off price can be established at which the supply of licenses sold equals the demand for licenses purchased, and schedules are exercised at prices up to and including this cut-off.
- During the subsequent quarterly period short term liabilities (and all offshore liabilities) are measured and monitored on a end of working day basis; and, if at any time they exceed what is allowed by the licence, then a fine is due (the level of the fine should be large enough to provide a strong discouragement, but not preclude emergency borrowing; this might be perhaps 4 basis points per day, equivalent to an annual rate of interest of around 10 per cent.) These controls apply to all financial institutions – commercial banks, investment bank trading, market making and brokerage, hedge funds, and also investment institutions such as insurance companies and pension funds (although normally these will not borrow short term). They cover not just unsecured borrowing but also secured contracts such as repo. Licensing applies to retail deposits as well as to wholesale.

- Intra-quarter (daily) trading of licenses can be permitted to allow more efficient use of liquidity.
- To allow for control of 'near-money' liabilities of relatively short maturity, the quantity of short term liabilities subject to licensing can be calculated on a '(365-t)/365' basis where *t* is the residual maturity. An overnight liability (*t*=0) would have a full 100% weighting; and three month liability (*t=91*) would have a 75% weighting etc. All liabilities would however have to be included in the register, so that when the residual maturity of longer term liabilities falls to less than one year, they fall within the ambit of the licensing system.

The control over the stock of licenses limits the amount of maturity mismatch in the entire financial system. A great advantage, relative to existing policy measures, is the asymmetry of this approach to regulation, discouraging rapid expansion of short term liabilities and credit, but (unlike the Basel III capital and liquidity requirements) creating no short or long term incentive to reduce short term liabilities and credit. An appropriate target is to limit total short term financial sector liabilities to a given ratio of nominal GDP. This target can be based on the average ratio of short term liabilities to GDP in the recent past. What is important is that the licensing prevents rapid increase in the ratio of short term liabilities to nominal GDP, and hence prevents the unsustainable build up of maturity mismatch in the system as a whole.

3 The Rationale for Register, Cap and Trade

The case for register and for cap and trade is straightforward. The benefits are clear. Registration is a fundamental for adequate control of systemic financial risks of all kinds. A cap and trade system would have prevented much of the build of the key sources of systemic credit and liquidity crisis during the global crisis: both the large expansion of US mortgage backed securities and other structured credit instruments, financed using short term funding in short term money markets such as repo and ABCP; and the large scale use of short term money market funding by banks in periphery Europe. Moreover the costs of implementation are small (especially when compared to other alternative regulatory measures).

3.1 Registration is a Necessity

Asset and liability registers will be needed for several aspects of post-crisis regulation, especially the practical execution of the 'resolution plans' regulators are now requiring of all major financial firms. Rapid identification of claimants is an essential requirement for orderly resolution, i.e. allocation of losses and continuity of services, when a bank or trading firm is in financial distress and this identification needs a complete register of liabilities. The mechanics of dealing with a bank resolution are well understood, at least for the case of small institutions with relatively simple structure.[6] It is necessary, if immediate liquidation is to be avoided, to have a special resolution regime distinct to that applied to non-financial corporations.[7] For large complex institutions, especially those active across borders, resolution is more complex. In this difficult case, an asset liability register is of great value, for example quickly allowing the authorities to determine the extent which other institutions are exposed to the institution in trouble.

3.2 Cap and Trade Can Help Restrain Credit Booms

The build-up to the recent financial crisis, like most others, was characterised by rapid expansion of credit, financed by short term funding and increasing maturity mismatch. Such credit booms cannot be easily controlled using traditional monetary policy instruments – based on the control over short and (most recently) long term interest rates. The central bank has a considerable influence over interest rates, both short and long term, from its power to create monetary liabilities (via open market operations, repo and reverse repo lending, and purchase of long term assets). But aggregate money and credit is determined by the credit decisions of commercial banks and other financial institutions and these decisions depend on

[6] The research and publications of the International Association of Deposit Insurers http://www.iadi.org/ contain much standard information.

[7] In contrast to a non-financial corporation, it is not possible to impose a stay on creditors; the usual route for maintaining a troubled company as an active concern. Doing this would require a freeze on all deposits, effectively putting a bank out of business.

many other factors, including business confidence and expectations of future interest rates and inflation.

This lack of control of central banks over monetary and credit aggregates is a key source of systemic financial risk.[8] The decision in good times by individual banks and other lenders to increase credit and money exposes the financial system as a whole to disruption when market participants lose confidence in the value of underlying assets. This disruption is especially pronounced when this lending is financed using short term liabilities (maturity mismatch); [9] and in particular when maturity mismatch is created by borrowing using short term wholesale funding instruments, such as repo or interbank borrowing rather than retail funding (short term retail funding is relatively sticky and only 'runs' when severely provoked).[10] Wholesale funding is subject to the threat of a collapse of confidence such as undermined interbank, repo and money markets during the 2007 to 2009 crisis.[11] 'Cap and trade', by imposing a constraint on the creation of deposits and other short term quasi-money, provides a direct mechanism of control, preventing the emergence of such vulnerabilities.

One way of understanding this systemic risk is as an economic externality. The returns demanded on short term liabilities, insured or uninsured, do not fully reflect the risk that underlying assets may not fully repay these liabilities. This understatement of risk is especially pronounced in credit booms and underpins the growth of shadow banking that contributed substantially to the build of risk prior to 2007.[12] The externality is accentuated by 'firesales', the pressure on illiquid

---

[8] The autonomous creation of bank money and credit is the essential mechanism in Von Mises theory of the business cycle (Von Mises (1981)); the inability of the central bank to control the money supply is also a key element the criticism of monetarism of Kaldor (1970); for more extended recent discussion see Collins et. al. (2011).

[9] See Besar et. al. (2011) for a detailed and extended analysis of the sources of systemic financial risk, including maturity mismatch.

[10] A good illustration is the run on UK bank Northern Rock in September 2007, which was essentially a wholesale not a retail run (for a full description see Milne and Wood (2009) and Shin (2009)).

[11] See for example Brunnermeier (2009) and Milne (2009).

[12] Tarullo (2012: 3) describes the role of shadow banking well: 'Shadow banking also refers to the creation of assets that are thought to be safe, short-term, and liquid, and as such, cash equivalents

institutions especially those with relatively high leverage and maturity mismatch to sell assets in order repay short term liabilities, leading to substantial credit losses and sharp declines in mark to market valuations, so further undermining confidence.[13]

By analogy with environmental externalities such as acid rain and greenhouse gases, this systemic risk can be controlled by setting aggregate emission limits (the license cap) and allowing exchange between institutions (the trade of licenses) to determine the most efficient allocation between institutions. The analogy is not exact. Not every single dollar of short term liabilities can be expected to make exactly the same contribution to systemic financial risk, the contribution will vary with the liquidity of underlying assets and with the stability as well as the maturity of liabilities. But cap and trade still limits the amount of short term funding to finance holdings of financial assets and will, in particular, prevent large scale increases in maturity mismatch which trigger systemic problems when the value and liquidity of underlying assets is called into question.

3.3 Cap and Trade is a Valuable Complement to Other Prudential Instruments

'Cap and trade' deals with potential weaknesses of other prudential instruments, notably capital regulation or lending controls. The incentives for shareholders to exploit the financial safety net (bank 'moral hazard') and the resulting possibility of systemic crisis could be dramatically reduced simply by requiring banks to hold sufficiently high levels of capital. By avoiding any concern about underlying solvency, any 'firesale externality' from forced asset sales and thus any resulting liquidity risk would not arise. In short, it can be argued that a sufficient level of equity capital will make all forms of debt finance, short or long term, entirely safe and make liquidity regulation redundant.

This reasoning is however weak because it does not take account of limitations of higher capital requirements. Most obviously, higher capital requirements apply

similar to insured deposits in the commercial banking system. Of course, as many financial market actors learned to their dismay, in periods of stress these assets are not the same as insured deposits.'

[13] There is an extensive technical academic literature on such firesale externalities, see for example Stein (2011), Kashyap and Stein (2012) and Korinek (2012).

only to banks and so may lead to intermediation moving out of the regulated banking sector into 'shadow banking'. Cap and trade avoids this problem by imposing the same prudential control over both shadow and regulated banks.

But perhaps the more crucial limitation of higher capital requirements is that this may lead to unwanted short-term reduction in the supply bank lending, especially when the economy is weak. While an increase in capital ratios has no long term resource cost, the adjustment to higher capital requirements is difficult, especially when loan performance is poor and when banks are still absorbing past losses, and when shareholders do not trust that managers will operate banks in the interests of shareholders (the familiar 'agency cost of equity' discussed in the corporate finance literature).

This is a crucial advantage of cap and trade. In present circumstances, when the economic and financial problems facing the global economy, notably the challenge of controlling fiscal deficits in the industrialised countries and the continuing problems of debt overhang in the periphery of the Euro area there is a real danger of regulatory pro-cyclicality making matters worse. Higher capital and liquidity requirements are creating balance sheet pressures on banks that lead to a shortage of credit and a direct reduction of global economic activity, all this at a time when global economic output is already weak. Better therefore to have greater flexibility in capital requirements (perhaps by making use of the Basel 'conservation buffer' and/ or extending the timetable for compliance) and accompanying them with a regime of 'cap and trade'. Cap and trade will also reduce concerns that monetary stimulus will lead to rapidly rising inflation, and hence make it easier for monetary authorities to employ sufficient stimulus to avoid a global shortage of aggregate demand.

3.4 Cap and Trade is Less Costly than Basel III Liquidity Proposals

Cap and trade is a relatively low cost form of liquidity regulation for two reasons: first it allows liquidity to be exchanged between firms and allocated where it is obtains the highest return; second it can be calibrated to discourage unstable increases of maturity mismatch without, at the same time, requiring costly change in financial structure.

Unlike Basel III liquidity requirements gives firms flexibility in their business decisions. Individual institutions can choose for themselves an appropriate balance

of short- and long-term funding and to cope relatively easily with short term difficulties in issuing of long-term debt.[14] An example of the low costs of 'cap and trade' relative to Basel III liquidity measures are the difficulties posed by the LCR for French banks. An important source of funding for French banks are retail money market mutuals (often sponsored by the banks themselves to obtain the tax benefits to the 'livre A' category of funds). This funding is treated by Basel III as short term that can be withdrawn within one month and therefore be matched by liquid assets. But the resulting requirement to hold liquid and therefore low yield assets against customer funds imposes a higher cost on French banks than on those in other countries. The netting of licensing requirements under cap and trade gets around this difficulty. This is a general property of cap and trade, by focusing on the aggregate maturity mismatch it minimises interference in individual firm decisions.

There are concerns that Basel III liquidity requirements, similar to those voiced about Basel III capital requirements, will lead to an undesirable contraction in the supply of bank credit. This is why the timescale of implementation of the Basel liquidity regulations has recently been extended.[15] A advantage of having 'cap and trade' alongside higher regulatory capital requirements is that it can be introduced immediately with a sufficiently high level of licenses to ensure there is no restriction on the current use of short term funding, while still being effective at preventing future unsustainable increase of money and credit.

4 Practical Concerns and Business Impact

This section addresses concerns about the practical implementation and business impact of the liability register and its use for cap and trade.

---

[14] For more detailed assessment of the liquidity and capital requirements in Basel III, see Allen et. al. (2012).

[15] See BCBS (2013).

4.1 Will the System Work?

Several practical objections can be raised. Will cap and trade encourage a 'black market' where firms obtain short and long term debt in order to avoid licensing restrictions? Will clever financial engineers not move assets and liabilities 'off balance sheet' so that they escape the discipline of the licenses? Will banking and other activities not move overseas to other jurisdictions (if the licensing is not applied on a global basis)?

Even if the system is effective, will it not impose unnecessary costs? Will the costs of registration not prove to be prohibitive? Would it in effect operate like a system of capital controls, preventing the free international flow of capital and hence reduce the available funds for productive investment opportunities. At the domestic level would it not increase funding costs and hence limit the supply of credit. Would it not also create barriers to entry and so reduce competition in the financial system, with some firms unfairly benefiting, at the expense of others, from the distribution of licenses? Is 'cap and trade' really necessary to correctly aligning private sector incentives, can this not be achieved simply by imposing very high capital requirements? Finally it might be objected that 'cap and trade', far from promoting financial stability, could result in large fluctuations in the cost of funding and might even trigger instability if it triggered a withdrawal of deposits from institutions close to exhausting their licensing capacity.

Scepticism towards cap and trade is understandable. It's application in the European Union has not worked especially well as a tool for containing carbon emissions (although it has worked well for controlling US acid rain emissions, see Enironmental Protection Agency (2003)), being weakened by partial coverage, for example not extending to automobile or aviation fuels and the opportunity for companies to reduce their need for licenses by transferring production outside of the EU and then sell unneeded licenses. There is also a further criticism that the 'caps' in environmental cap and trade have sometimes been insufficiently restrictive, allowing too high a level of continued emissions. Maybe so, but this reflects scientific uncertainties and the response of policy makers to the relatively high costs of altering production technologies; it is not a criticism of the effectiveness of cap and trade per se.

A further reason for scepticism is that there have been previous unsuccessful attempts at using rationing systems or other direct control over bank balance

sheets, notably the attempt in the UK in the early 1970s, under the regime of 'competition and credit control' to impose restrictions on the expansion of bank credit known as the corset. These arrangements were a response to the erosion of traditional institutional arrangements, in turn weakening the influence of the Bank of England over the growth of domestic money and credit. Increasingly the London clearing banks were learning to turn to the London wholesale funding markets as a source of marginal finance, allowing them to expand or contract their balance sheets independently of the guidance and monetary operations of the Bank of England.

The corset attempted to impose controls on the growth of lending of individual institutions. It failed because where there was demand, credit grew regardless of the presence of the corset, supplied off balance sheet or by non-banks ('shadow banks') funding themselves in wholesale markets. Cap and trade of maturity mismatch is however *not* subject to the same weakness, because it does not aim to directly control aggregate credit creation. Yes, short term funding can still be provided 'off register', but the providers of this funding will be aware that, in the event of a crisis, their short term claims will be postponed until liquidity problems have been resolved. Therefore borrowers cannot be forced to sell assets at low 'firesale' prices because of the withdrawal of this funding and, if firms fail, these shorter lenders will expect to be in the same position as any other creditor with a claim in a bankruptcy proceeding. Thus, provided that they do not expect to be bailed out by government, these funders will require to be compensated according their perception of the long term risk of losses on the underlying assets.

What about the costs of registration? Registration of asset and liabilities is something that is will eventually be required of the industry, in order to fulfil the authorities' objective of ensuring that all firms are resolvable.[16] Such registration is already well advanced in relation to over the counter derivative markets. It is only a matter of time before similar developments occur for short term funding and other markets.

Yes registration is a substantial practical challenge and it could take some time to agree on such standards and get the asset and liability register up and running.[17]

---

[16] The latest statement of this from the global authorities is Financial Stability Board (2012).

[17] One comparison is with the European Central Bank's 'Target 2 securities' (T2S) system for pan-European settlement of securities trades. This is a central register that mirrors the positions of

There would have to be extensive testing to ensure that system is operationally sound, but these operational challenges can be dealt with over time.

What about the possibility of financial engineering that replicates short term funding, outside of the register, hence undermining the effectiveness of the cap? Again this does not undermine the 'cap and trade' of short term funding, provided unregistered claims are not legally enforceable. Such claims might be created but they cannot create a destabilising run because a borrower can always refuse immediate repayment.

Another potential weakness is 'offshoring'. Will the response not be the same for example as to the imposition of 'Regulation Q' constraints on US dollar rates of interest in the 1960s, with business migrating to other financial centres where there is no requirement for licensing? Indeed yes, there could be large scale short-term offshore funding, booked in a foreign jurisdiction, of domestic assets. This was a feature of the crisis of 2007-2008 because many US dollar structured securities, backed by US domestic assets, were held and financed using dollar financing in overseas jurisdictions (for documentation of the extent of these exposures see McCauley et. al. (2010)) and this in turn forced the Federal Reserve to provide dollar swaps to central banks around the world, so that they in turn could provide the necessary liquidity support for these dollar exposures. Such positions would be an avoidance of 'cap and trade' funding restrictions, if both assets and funding move to foreign jurisdictions where register, cap and trade is not applied.

Although such avoidance can occur, if register, cap and trade is applied in some jurisdictions but not others, this does not undermine its effectiven2ss. Avoidance of this kind also removes systemic liquidity risks from domestic institutions, transferring it instead to institutions in other jurisdictions. This means that register, cap and trade is still effective in reducing the systemic liquidity risk exposure of domestic institutions.

What about the extension of domestic trade credit, e.g. when a large customer borrows from a supplier by making payment after delivery of a goods and services, or a large supplier borrows from a customer, by insisting on payment before delivery of a goods and services? In principal these short term liabilities could also

---

individual national depositories through overnight uploading of liability (security account) data. Getting T2S up and running has been a multi-year project. But T2S is a greater challenge than the asset liability register, because of the need to implement real time delivery against payment (DVP).

be brought within the scope of the licensing scheme. As a practical matter it seems easier if they are excluded, but trade credit should still be recorded in the asset liability register, so that if the firm begins to use trade credit to engage in financial intermediation the licensing requirements can then be applied to its activities. Similarly the short-term liabilities of companies to financial institutions are best recorded but not subject to license.

It might be thought that derivative or off-balance sheet contracts could replicate short term funding and undermine the system. For example, derivative contracts which are economically similar to short term deposit claims, such as an 'in the money' call option for purchase at a fixed exercise price of low risk assets such as short term government bonds. The existence of such derivative contracts does not undermine 'cap and trade' because, without registration, they are not legally enforceable short term obligations.

A natural concern is that such 'cap and trade' could end up operating like a system of exchange controls, preventing the free international flow of capital and hence reduce the available funds for productive investment opportunities. This is not the case. While under cap and trade UK based subsidiaries could not lend to or borrow from non-UK institutions, except at maturities of well over 12 months, such business can be conducted by non-UK subsidiaries and UK institutions can freely make outright purchases or sales of foreign currency, with any entity worldwide. Moreover non-UK institutions can still establish subsidiaries in the UK to conduct short-term sterling transactions, so there is free entry of overseas institutions into short term money markets.

Another concern is that could create barriers to entry and so reduce competition in the financial sector, especially in deposit markets. This depends on the allocation of licenses. If licenses are given only to existing incumbents, then competition is indeed reduced. But the distribution of licenses can also be used, for example, to encourage new entry in customer deposit markets. It therefore may be appropriate to involve the competition authorities in the process for allocation of licenses.

Finally it might be objected that 'cap and trade', far from promoting financial stability, could result in large fluctuations in the cost of funding and might even trigger instability if it triggered a withdrawal of deposits from institutions close to exhausting their licensing capacity. But this depends on the volume of available licenses. It could induce such instability if the stock of available licenses were

contracted sharply during periods of financial vulnerability. But if used appropriately, to constrain excessive build up of maturity mismatch (excessive that is relative to the level of nominal GDP) when credit and financial institution balance sheets are growing strongly, then it will reduce exposure to systemic liquidity risk; and in the event of an episode of financial instability the volume of licenses can be increased to support access to short term funding.

4.2 Business Impact

The most vociferous objections to 'register, cap and trade' can be expected from financial institutions themselves. This policy will have a substantial impact on their business models, especially for those banks, hedge funds and other institutions that use short term funding to take positions in security and foreign exchange markets. Financial firms have come to rely on their access short term and low cost funding, in order to take advantage of short term profit opportunities. A shift to using long term debt and equity to finance their holdings increases costs of position taking and greatly limit the activity of market makers and dealers as well as of proprietary traders.

A foreign exchange dealer, for example, who wished to borrow in sterling in order to exchange spot for dollars, would require a liquidity license. If 'cap and trade' was introduced unilaterally by the UK, this would raise the cost of short term funding and thus (via covered interest parity) affect the relationship between spot and future exchange rates. Holding long positions in securities would similarly become more expensive. And so too would holding short positions, since the borrowing of securities, in order to hold a short position, is always matched by a counterparty on the other side of the trade who borrows money and providing the security as collateral. The borrowing of the counterparty would be subject to cap and trade licensing and thus security borrowing would become relatively expensive.

Financial market participants are ever inventive and will no doubt find ways to continue taking positions, despite cap and trade on short term borrowing. For example it should be possible to borrow securities using other securities rather than cash as collateral. The secondary trading of licenses can be expected to become highly sophisticated, with the market price of licenses fluctuating

substantially day to day, hour to hour and minute to minute. So there will continue to be short term position taking.

But 'cap and trade' will bite on financial trading. Aggregate short term inflows into security markets no longer be automatically financed by collateralised short term credit; instead investors will have to compete with traditional banks for a limited pool of available short term funds from retail and corporate customers.[18] With investment flows between money and security markets damped, it is likely that security and foreign exchange prices will become less volatile and less cyclical.[19] This in itself seems a desirable outcome, helping prices match more closely to economic fundamentals and more than offsetting the somewhat higher costs of transactions for final investors (such as insurance companies and pension funds).

There is a parallel with the widely discussed proposal by Tobin (1978) for a tax on foreign exchange transactions, a proposal that has since been frequently revived for a range of financial markets as a means of discouraging trading that aims only at achieving short term returns. The current proposals by the European Commission for a financial transactions tax are motivated by a desire to both discourage short term trading and to force the financial sector to make an increased contribution to public sector revenues, but as is well known they will be easily evaded and thus yield little revenue and have only limited impact on market pricing and behaviour.

'Cap and trade' will have a similar impact on short term position taking as a Tobin tax, but can do so in a more cost efficient manner, since it imposes no direct cost on long investors such as pension, insurance or sovereign wealth funds that seek to alter their portfolios. There will of course be an indirect impact. Less short term financing of trading positions will lead to some reduction in price discovery, with current market prices reflecting the views of rather fewer market participants. But market participants will be limited in their ability to use short term funds to make profitable trades based on anticipating short term price movements (a desire

---

18 Adrian and Shin (2009) document of the large cyclical variation in repo by New York broker dealers.

19 See Adrian et. al. (2010) for evidence that fluctuations in repo borrowing in New York markets are associated with fluctuations of exchange rates, implying that 'cap and trade' would reduce exchange rate volatility.

to borrow money to go long, or go short and deposit money, will be largely reflected in an increase in the prices of licenses for short term funding, rather than in fluctuations in the market price of securities). So market prices will approximately more closely to expected long-run fundamentals.

There will be a similarly major impact on asset management firms who will no longer be able to easily move client portfolios out of securities into cash, or from cash into securities. Portfolio decisions will have to be based much more clearly on their assessment of long-run returns. These are major change of business model for both trading and investment firms, but the resulting focus on long term investment returns appear to be a substantial additional benefit from cap and trade (especially if this shifts market equilibrium from an impatient to patient outcome as described by Haldane (2009)).

5 Related Ideas and Policy Initiatives

This section reviews some related ideas – under four broad headings (i) measures to increase transparency and availability of data for the financial sector; (ii) the new 'macroprudential' approach to regulation emphasising containment of systemic financial risk; (iii) the imposition of Pigovian taxes to contain systemic risk externalities; (iv) structural reforms and intervention in the financial sector.

5.1 Measures to Increase Transparency and Data Availability

One of the most notable regulatory developments since the global financial crisis has been steps taken by the regulatory authorities in both the US and Europe to ensure much greater transparency and availability of data, especially in over the counter (OTC) derivative markets. Both the Dodd-Frank act and also forthcoming European regulation are requiring trades in OTC markets to be recorded in central trade repositories, both in order to provide regulators with up to date information on market developments and also to allow market participants to better assess the financial condition of their market counterparties.

A central component of these new requirements will be the establishment of a global system for unique legal entity identification (or LEI) system, which allows unambiguous identification of every participant in a contract between financial

firms.[20] While the global system is still under discussion, the Commodity and Futures Trading Commmission in the US derivatives regulator is pioneering a system of interim compliant identifiers, in order to fulfil its obligation under the Dodd-Frank act to begin tracking swap transactions in 2012. Eventually all OTC derivatives transactions should be fully recorded in trade repositories and where possible cleared through central counterparties.

While the initial efforts of regulators have been focussed on derivatives, especially on interest rate swaps and credit default swaps, a similar shift to recording and monitoring of transactions can be expected in short term money markets, including repo, in order to allow the regulators to monitor risks to the system as a whole and also to track exposures when a firm has to be resolved. The liabilities register similar to that proposed in this paper will be a necessary step to provide such transparency in short term money markets.

5.2 New Regulations to Contain Systemic Financial Risk

The failure of regulators to anticipate and respond to systemic financial risk is now widely acknowledged.[21] Efforts are now being devoted to modeling and measuring such systemic risk externalities;[22] and policy makers have been introducing regulatory measures intended to address them, including the likely introduction of 'cyclically varying' bank capital charges and other macroprudential tools.

Using cap and trade to address systemic risk from maturity mismatch provides a further potentially useful macroprudential instrument. Since cap and trade focuses on preventing further increase in maturity mismatch, rather than the total amount of maturity mismatch, there is no need to determine a correct level of short term financing, either for the industry as a whole or for individual firms. Cap and trade can then be used to put pressure on the system as a whole to refinance at longer maturities, by reducing the stock of available licenses. But this can be done gradually and adjustment can be made most by those firms that have the credibility

[20] See Financial Stability Board (2012a).

[21] Turner (2009), Brunnermeier et. al. (2009).

[22] For example Adrian and Brunnermeier (2009).

with investors that allows them to raise long term funding at low cost (other firms will instead pay the additional costs of obtaining licenses that allow them to continuing to using short term funding.)

A different approach to the containment of systemic financial risk is motivated by a view of the financial system as a 'complex adaptive system' in which, in a stressed situation, shocks can cascade and amplify through the network of connections between firms.[23] This is one motivation for the creation of new macroprudential policy making bodies that can both respond to increasing financial systemic risks and ensure that financial systems are resilient and do not break down when these risks materialise. But there is concern that the actions of these new macroprudential policy making bodies will create uncertainty for both financial institutions and non-financial businesses about the cost and availability of credit and hence interfere with economic activity.[24]

There is therefore a strong case for arguing that macroprudential tools should be used within a strict rule based framework, in which the impact on the cost and availability of credit can be readily predicted. Cap and trade provides an example of how such a rule based macroprudential policy instrument can work, with the aggregate maturity mismatch constrained to grow no faster than a target level established by the authorities. Similar rule based aggregate rules could well be developed for containing aggregate financial sector capitalisation or other primary causes of systemic financial risk.

5.3 Pigovian Taxes

Another widely canvassed idea for making banking safer and limit state subsidy of risk taking is to impose 'Pigovian' taxes, designed so that individual firms end up paying for the additional 'externality' created when their decisions impose risks on other firms and the financial system as a whole. This idea has been taken up in

[23] See Haldane (2009) for an overview.

[24] See Clark and Large (2011) for a discussion of the many challenges to faced in establishing an effective macroprudential policy function.

several recent contributions to the debate on regulatory policy.[25] 'Cap and trade' can be seen as one way of implementing such a Pigovian tax.

The contributions closest to the 'cap and trade' licensing of this paper are those of Perotti and Suarez (2009a, 2009b) and Stein (2010). Perotti and Suarez also focus on the systemic risk posed by maturity mismatch, and propose addressing this using a Pigovian tax on short term whole sale funding, aimed at preventing build-up of systemic risk from maturity match. 'Cap and trade' offers one clear advantages over the direct imposition of a Pigovian tax, it is no longer necessary to quantify the external costs of maturity mismatch, in order to determine the level of the tax. Rather instead aggregate maturity mismatch is directly controlled. Still the distinction between the two policies is not a sharp one: provided that system wide maturity mismatch is measured, then this can be controlled either directly using cap and trade or indirectly by setting an appropriate level of Pigovian tax.

Perotti and Suarez (2010) consider a related issue whether such build up is best addressed using taxation or quantity controls, showing that when firms face differing investment opportunities a Pigovian tax is superior to a control of individual short term liabilities (this is because it is more flexible, it does not prevent firms creating value from using short term funding). This same flexibility benefit applies to 'cap and trade'. Korinek (2012) provides a theoretical argument for imposition of such Pigovian taxes and also finds, in the context of his stylised model, that the same control of firesale externalities can be achieved through capital requirements.

The most closely related proposal to the cap and trade suggested in this paper is that of Stein (2011), building on ideas put forward earlier by Kashyap and Stein (2004). Stein provides a theoretical argument in favour of 'cap and trade', developing a model of money creation, in which short term funding creates systemic risk externalities, because of potential firesales of assets. In this context 'cap and trade' is the an effective way of incentivising banks to pursue socially desirable combination of investment levels and maturity composition of funding.

[25] Including Brunnermeier et. al. (2009), Acharya et. al. (2010), Adrian and Brunnermeier (2009), Doluca et. al. (2010), Kocherlakota (2010), Jeanne and Korinek (2010), Shin (2010) and Markose (2012). Note that amongst these papers there are considerable differences of view about what constitutes a contribution to systemic risk.

However, Stein offers little discussion of practical implementation or any comparison with other policies for containing systemic risk.

Kashyap and Stein (2012) consider how such a 'cap and trade' system might be put into practice, arguing that the systemic risk externality associated with short term borrowing could be addressed using the relatively old fashioned tool of setting binding low interest rate reserve requirements on all short term liabilities (one feature of their proposals is that they allow the authorities to independently alter both the level and interest paid on these reserves). Is this not equivalent to 'cap and trade'? There are parallels and differences. The parallel is that both the 'cap and trade' of licenses and of required reserves would penalises the use of short term funding relative to long term funding and hence attenuate the systemic risk externality of maturity mismatch.

However the proposal of Kashyap and Stein (2012) for 'cap and trade', based on reserve requirements, would weaken the ability of the central bank to control short term market rates of interest. Kashyap and Stein (2012) argue that the central bank can assert control over both the quantity and the price of reserves by altering the remuneration paid on reserves. This appears to be true in their theoretical model, but in practice banks experience substantial day to day fluctuations in reserves (for example as a consequence of movements of funds in foreign exchanges markets or large tax payments to government) and central banks have to respond by withdrawing or supply reserves in large quantities (typically using repo to lend reserves or reverse repo to withdraw reserves) so as to correct any imbalances in the market. If they do not do so the consequences are massive fluctuations of overnight money market interest rates such as the Fed Funds rate.[26] This means that, even if reserves are remunerated, it is impossible for the central bank to simultaneously control both their quantity and their price (an exception is when as now central banks expand reserves massively in excess of reserve requirements, then they can control both price and quantity, but this means they cannot use reserves as a constraint on bank decision making). Having, as proposed in this paper, separate traded licences for maturity mismatch allows the authorities to control both interest rates and maturity mismatch.

[26] As occurred during the period 1979-1982 during the brief experiment by the Federal Reserve with monetary base control.

5.4 Structural Reform of the Banking Sector

The cap and trade proposals of this paper seek to limit the extent to which risky credit expansion is financed using short term liabilities. There have been a number of proposals for radical structural reform of the banking industry over the years with similar aims. The literature on so-called 'narrow banking' in which banks would be forced to back deposits only by extremely safe assets such as central bank reserves or short-term government bonds, and deposits could not be used to finance lending, is long standing.[27] The difference is that 'cap and trade' focuses on increases in the stock of money and credit, and does not attempt to change the funding of existing bank loans and other credit assets.

There has been a related recent debate on structural reform in the UK, beginning with Kay (2009) who argues that there should be a clear separation of safe utility banks that take retail deposits from other financial institutions (though a banking group might contain a utility banking subsidiary alongside other riskier activities). Thus retail depositors are not exposed to the riskier aspects of banking and tax-payer protection of deposits, through explicit or implicit deposit insurance, does not subsidise risk-taking. Kay also argues that the ring-fencing of UK banking will help overcome problems of business culture, in which UK retail banks have been influenced by the aggressive nature of wholesale and investment banking and become excessively focussed on short term revenue growth at the expense of customer service and customer satisfaction.

In May 2010 the newly elected coalition government in the UK established the independent commission on banking chaired by Sir John Vickers to look at the structural reform. It has recommended, in its final report of September 2011, a

[27] The concept of narrow banking originated with the 'Chicago Plan', an idea that emerged in the Chicago economics faculty in the 1920s and 1930s that bank deposits should be fully backed by central bank reserves, not used for financing loans or other private sector liabilities. Henry Simons played a key role in formulating these ideas (for his subsequent exposition see Simons (1948)) and it was endorsed by many economists at the time including Frank Knight (Knight (1933)) and Irving Fisher (Fisher (1935)) and actively discussed with the Roosevelt administration. This idea was subsequently endorsed by many other influential economists including Maurice Allais (1948) and Milton Friedman (1960). These proposals for narrow banking were revived in a slightly different form, following the US S&L crisis, by Litan (1987), Tobin (1987), Spong (1989), and Burnham (1991). Phillips (1991, 1994) provides useful review of the intellectual history. Benes and Kumhof (2012) analyse from a modern perspective.

ring-fencing of UK retail banks, in which all customer deposit taking and short term customer lending must take place in separately capitalised ring-fenced subsidiaries.[28] The UK government has accepted these proposals and is due to put them into law by early 2013 with implementation by 2018. However, while the separation of retail deposits and short-term lending into separate 'ring-fenced' subsidiaries is straightforward, the determination of what other activities should be inside and outside the ringfence has proved problematic, with a complex set of rules about what other exposure are legitimate for ring-fenced banks emerging. In the EU the Liikanen commission (Liikanen (2012)) has proposed a different form of ring-fencing, separating trading activities from other banking activities, although it is not yet certain to what extent these proposals will be implemented.

UK and European developments are, to a degree, paralleled in the US, where the proposals of former Federal Reserve Governor Paul Volcker for limiting the engagement of licensed deposit taking banks in relatively risky activities of proprietary trading or participation in hedge funds and private equity funds have been incorporated as part of the 2010 US Dodd-Frank Act). Again however these are proving difficult to implement in practice, with lengthy rule books required in order to distinguish legitimate activities that can be conducted by commercial banks from those that cannot.

A weakness of the Kay version of narrow banking, and its implementation as proposed by the UK Independent Commission on Banking, is that it places no constraints on the use of maturity mismatch by other financial institutions, those that do not take retail deposits. Other institutions (those whose funding comes from wholesale markets rather than retail deposits) could still use short term funding to expand their balance sheets, without being subject to the normal disciplines imposed when firms raise long term debt or equity finance. The combination of maturity mismatch and uncontrolled balance sheet expansion could then still pose a potentially large systemic risk, with a loss of confidence and withdrawal of funds leading to major declines in asset valuations and a significant loss of net worth across much of the financial sector. Some form of 'cap and trade' therefore still seems to be needed to contain the growth of such 'shadow banking'.

[28] The final report has been published at http://bankingcommission.independent.gov.uk/bankingcommission/ .

Kotlikoff (2010) offers a more ambitious structural reform that he labels 'limited purpose banking', in which all bank liabilities would have to take the form of mutual fund claims on underlying assets. Transaction services could only be offered by cash mutuals, holding government issued money (central bank liabilities such as notes, but also central bank reserves). These cash mutuals are thus very much like the banks envisaged in the Chicago plan, but these 'narrow' banks are only part of Kotlikoff reform proposals. Safe investments, offering similar balance of risk and return as the savings or time deposits offered by today's banks, can be provided by mutual funds as long as they invest only in safe short and medium term bonds, such as government and good quality corporate issuers. Higher returns could be offered by funds investing in longer term and riskier bonds or in equities. Limited purpose banking would eliminate all forms of maturity mismatch, rather than as in 'cap and trade' limiting its growth.

Register, cap and trade can be seen as a variation on all these ideas, in that it is also a form of structural intervention. But it is designed to be relatively low cost to implement and to affect funding and credit decisions at the margin, not to impact on the outstanding stock of bank assets and existing funding arrangements.

6 Concluding Remarks

Current proposals from the Basel Committee (the LCR and NSFR of Basel III) and the Financial Stability Board (for regulation of shadow banking) are amongst the most important elements of post-crisis regulation, forming the primary safeguard against the re-emergence of systemic liquidity risk. But they are also complex and – like much of the post-crisis reregulation – impose large costs on firms.

This paper proposes registration of short term liabilities as a means for monitoring systemic liquidity risk, with an incentive for comprehensive registration imposed by giving a right of rollover to all unregistered short term borrowing. It also proposes 'cap and trade' as an alternative to these liquidity regulations, controlling of maturity mismatch at the level of the system as a whole, rather than by regulation of individual institutions and individual markets. It is then possible to control the total of volume of registered short term funding through the requirement that these are backed by a fixed stock of tradable licenses. This achieves an efficient allocation of short term funding amongst alternative

uses. Registration, together with 'cap and trade' is a simple and effective way of preventing unsustainable expansion of credit financed by short term borrowing, whether inside or outside of the regulated banking system.

Given the large amount of work already undertaken on the existing regulatory proposals for control of systemic liquidity risk, does it really make sense to abandon them now for this alternative proposal, even if it does offer some potential advantages? The answer is yes, it does make sense, for two reasons. The regulatory authorities are already substantially relaxing their proposals for Basel III liquidity regulation of banks. Current proposals for control of shadow banking could well suffer a similar fate. 'Cap and trade' may yet turn out to be the only effective way of implementing liquidity regulation.

Another reason for giving serious consideration to register, cap and trade is that while, in theory central banks can use their wide range of monetary instruments to ensure that the global economy is neither 'too hot' nor 'too cold, and so avoid the extremes of either unsustainable credit expansion or extended periods of demand deficiency. In practice policy making typically swings from one extreme to the other, only recognising and responding to the emergence of an unsustainable credit expansion once it is already underway and difficult to stop without creating a sharp economic contraction. 'Cap and trade' offers an effective and cost efficient tool for automatically preventing such unsustainable credit expansions when monetary policy is at is at its loosest.

Register, cap and trade deserves serious consideration, and the first step towards implementing this policy, the creation of comprehensive asset and liability registers, should be pursued without delay, necessary as they are for other key elements of the global agenda for reform of the financial system, including ensuring all firms have credible 'recovery and resolution' plans i.e. any financial difficulties can be resolved without the need for tax payer support.

References

Acharya, Viral V., Lasse H. Pedersen, Thomas Philippon, and Matthew Richardson (2010). *A Tax on Systemic Risk*, technical paper, Stern School of Business, NYU. http://onlinelibrary.wiley.com/doi/10.1002/9781118258231.ch5/summary

Adrian, Tobias, and Markus K. Brunnermeier (2009). *CoVar*, Federal Reserve Bank of New York Research Paper Series - Staff Report no 348, August. http://ideas.repec.org/p/fip/fednsr/348.html

Adrian, Tobias, Erkko Etula, and Hyun Song Shin (2010). *Risk Appetite and Exchange Rates* (May). FRB of New York Staff Report No. 361. Available at SSRN: http://ssrn.com/abstract=1338121

Adrian, Tobias, and Hyun Song Shin (2009). *Liquidity and Leverage*, FRB of New York Staff Report No. 328. Available at SSRN: http://ideas.repec.org/a/eee/jfinin/v19y2010i3p418-437.html

Allais, Maurice (1948). *Economic and Interet: Exposition nouvelle des problemes fondamentaux, relatifs au role economique du taux de interet et de leurs solutions.* 2 vols. Paris: Librairie des Publication Officielles

Allen, William A., Ka Kei Chan, Alistair Milne, and Stephen Thomas (2012). *Is the Cure Worse than the Disease?*, SSRN, revised version.

Basel Committee on Banking Supervision (BCBS) (2010a). *The Group of Governors and Heads of Supervision reach broad agreement on Basel Committee capital and liquidity reform package*, press release and annex, July 26th.

Basel Committee on Banking Supervision (BCBS) (2010b). *Basel III: International framework for liquidity risk measurement, standards and monitoring*, December 16th.

Basel Committee on Banking Supervision (BCBS) (2013). *Group of Governors and Heads of Supervision endorses revised liquidity standard for banks*, press release and annex, January 6th.

Benes, Jaromir, and Michael Kumhof (2012). *The Chicago Plan Revisited*, IMF Working Paper WP/12/202, August. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2169748

Besar, Poetra, Phillip Booth, Ka-Kei Chan, Alistair Milne and John Pickles (2011). *Systemic Risk in Financial Services*, *British Actuarial Journal*, volume 16, issue 02, pp. 195-300

Brunnermeier, Markus K. (2009). 'Deciphering the liquidity and credit crunch 2007–08', *Journal of Economic Perspectives*: Volume 23, Issue 1, Winter. http://ideas.repec.org/a/aea/jecper/v23y2009i1p77-100.html

Burnham, James B. (1991). 'Deposit Insurance: The Case For The Narrow Bank.' *Cato Review of Business and Government*. http://www.cato.org/sites/cato.org/files/serials/files/regulation/1991/4/v14n2-4.pdf

Clark, Alistair, and Andrew Large (2011). *Macroprudential Policy: Addressing the Things we Don't Know*, G-30 Occasional Paper no 83, Washington. http://www.bankofengland.co.uk/publications/Documents/speeches/2011/speech518.pdf

Collins, Ryan, Tony Greenham, Andrew Jackson, and Richard Werner (2011). *Where Does Money Come From?*, New Economics Foundation, London.

De Soto, Hernando (2012). "Knowledge Lies at the Heart of Western Capitalism," In Financial Times, January 30, 2012. http://www.ft.com/cms/s/0/4520ccda-4769-11e1-b847-00144feabdc0.html#axzz2LvAT41v5

Doluca, Hasan, Ulrich Klüh, Marco Wagner, and Beatrice Weder di Mauro (2010). *Reducing Systemic Risk: A Proposal*, German Council of Economic Experts.

Environmental Protection Agency (2003). *Cap and Trade: Acid Rain Program Results* http://www.epa.gov/capandtrade/documents/ctresults.pdf last accessed Feb 15th, 2013

Financial Stability Board (2012a). *A Global Legal Identifier System for Financial Markets* http://www.financialstabilityboard.org/publications/r_120608.pdf , last accessed July 8th 2012.

Financial Stability Board (2012b). Consultative Document Strengthening Oversight and Regulation of Shadow Banking , An Integrated Overview of Policy Recommendations http://www.financialstabilityboard.org/publications/r_121118.pdf, last accessed January 2nd 2013.

Fisher, Irving (1935). *100% Money 3rd edition*, New Haven: The City Printing Company, 1945. [first edition 1935].

Friedman, Milton (1960). *A Program for Monetary Stability*, New York: Fordham University Press, 1960.

Haldane, Andrew (2010). *Patience and Finance*, Bank of England. http://www.bankofengland.co.uk/publications/speeches/2010/speech445.pdf , last accessed February 15th, 2013.

Jeanne, Olivier, and Anton Korinek (2010). *Managing Credit Booms and Busts: A Pigovian Taxation Approach*, NBER Working Paper No. 16377, September. http://ideas.repec.org/p/nbr/nberwo/16377.html

Kashyap, Anil K., and Jeremy C. Stein (2004). 'Cyclical implications of the Basel-II capital standards', *Federal Reserve Bank of Chicago Economic Perspectives* 28 Q1, 18-31.
http://ideas.repec.org/a/fip/fedhep/y2004iqip18-31nv.28no.1.html

Kashyap, Anil K, and Jeremy C. Stein (2012). The Optimal Conduct of Monetary Policy with Interest on Reserves, *American Economic Review : MacroEconomics, 4(1): 266–282.*
http://ideas.repec.org/a/aea/aejmac/v4y2012i1p266-82.html

Kay, John (2009). *Narrow Banking: The reform of banking regulation***,** Centre for the Study of Financial Innovation, London.
http://www.johnkay.com/wp-content/uploads/2009/12/JK-Narrow-Banking.pdf

Knight, F. (1933), *Memorandum on Banking Reform*, March, Franklin D. Roosevelt, Presidential Library, President's Personal File 431.

Kocherlakota, Narayana (2010). *Taxing risk and the optimal regulation of financial institutions*, Economic Policy Paper 10-3, Federal Reserve Bank of Minneapolis.
http://ideas.repec.org/p/fip/fedmep/10-3.html

Korinek, Anton (2012). *Systemic Risk-Taking: Amplification Effects, Externalities and Regulatory Responses*, University of Maryland, May.
http://ideas.repec.org/p/ecb/ecbwps/20111345.html

Kotlikoff, Lawrence (2010). *Jimmy Stewart is Dead*: Ending the World's Ongoing Financial Plague with Limited Purpose Banking, Wiley.

Liikanen, Erkki (2012). *High Level Expert Group on reforming the structure of the EU banking sector, chaired by Erkki Liikanen, Final Report*, European Commission, Oct. http://ec.europa.eu/internal_market/bank/docs/high-level_expert_group/report_en.pdf, last accessed Feb 15th, 2013.

Litan, Robert (1987). *What Should Banks Do?* Washington: The Brookings Institution, 1987.

Markose, Sheri M. (2012). *Systemic Risk from Global Financial Derivatives: A Network Analysis of Contagion and its Mitigation with Super-Spreader Tax* (November 2012). IMF Working Paper No. 12/282.
http://www.acefinmod.com/docs/April2012newdrafts/27FebSheriMarkose4777611%20-%20Working%20Paper%20on%20Systemic%20Risk%20From%20Global%20Financial%20Derivatives%20A%20Network%20Analysis%20of%20Contagion.DOCX

McCauley, Robert; Patrick McGuire, and Goetz von Peter (2010). 'The architecture of global banking: from international to multinational?', *Bank for International Settlements Quarterly Review*, March, pgs. 25-37.
http://ideas.repec.org/a/bis/bisqtr/1003e.html

Milne, Alistair (2009). *The Fall of the House of Credit*, Cambridge University Press.
http://ideas.repec.org/b/cup/cbooks/9780521762144.html

Milne, Alistair, and Geoffrey Wood (2009). *Shattered on the Rock? British Financial Stability from 1866 to 2007*, Bank of Finland Discussion Paper series, 2009.
http://ideas.repec.org/p/hhs/bofrdp/2008_030.html

Perotti, Enrico, and Javier Suarez (2009a). 'Liquidity Insurance for Systemic Crises', *CEPR Policy Insight* 31, February.
http://cepr.eu/pubs/PolicyInsights/PolicyInsight31.pdf

Perotti, Enrico, and Javier Suarez (2009b). 'Liquidity Risk Charges as a Macro prudential Tool', *CEPR Policy Insight* 40, November.
http://www.cepr.org/pubs/policyinsights/PolicyInsight40.pdf

Perotti, Enrico, and Javier Suarez (2010). *A Pigovian Approach to Liquidity Regulation*, Technical Paper, CEMFI.
http://ideas.repec.org/a/ijc/ijcjou/y2011q4a1.html

Phillips, Ronnie J. (1991). *Credit Markets and Narrow Banking*, Levy Institute Working Paper no 77.
http://ideas.repec.org/p/lev/wrkpap/wp_77.html

Phillips, Ronnie J. (1994). *The Chicago Plan and New Deal Banking Reform*, M E Sharpe.
http://ideas.repec.org/p/lev/wrkpap/wp_76.html

Shin, Hyun Song (2009). 'Reflections on Northern Rock: The Bank Run That Heralded the Global Financial Crisis.' *Journal of Economic Perspectives*, 23(1): 101–19.
http://ideas.repec.org/a/aea/jecper/v23y2009i1p101-19.html

Shin, Hyun Song (2010). *Policy Memo: Non-core Liabilities Tax as a Tool for Prudential Regulation*, working paper.
http://www.princeton.edu/~hsshin/www/NonCoreLiabilitiesTax.pdf

Simons, Henry (1948). *Economic Policy for a Free Society*, Chicago: University of Chicago Press.

Spong, Kenneth (1989). *Narrow Banking and its Implications for Deposit Insurance Reform*. Kansas City: Division of Bank Supervision and Structure, Federal Reserve Bank of Kansas City.

Stein, Jeremy C. (2011). *Monetary Policy as Financial-Stability Regulation*, NBER Working Paper No. 16883.
http://ideas.repec.org/a/oup/qjecon/v127y2012i1p57-95.html

Stout, Lynn (2009). 'Regulate OTC derivatives by de-regulating them', Regulation, Vol. 32, No. 3, pp. 30-41, Fall 2009.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1485518 last accessed January 6th 2013.

Tobin, James (1978). 'A Proposal for International Monetary Reform'. *Eastern Economic Journal*, July-October, pp. 153–159.
http://ideas.repec.org/a/eej/eeconj/v4y1978i3-4p153-159.html

Tobin, James (1987). *The Case for Preserving Regulatory Distinctions*, in Restructuring the Financial System, Federal Reserve Bank of Kansas City, 1987, pp. 167-183.
http://ideas.repec.org/a/fip/fedkpr/y1987p167-205.html

Turner, Adair (2009). *The Turner Review: A Regulatory Response to the Financial Crisis*, UK Financial Services Authority, March, available at
http://www.fsa.gov.uk/pages/Library/Corporate/turner/index.shtml , last accessed February 15th, 2013.

Von Mises, Ludwig (1981), *The Theory of Money and Credit*, translation of the 1924 German second edition of 'Theorie Des Geldes und der Umlaufsmittel', Liberty Classics

Economics
The Open-Access, Open-Assessment E-Journal

Please note:

You are most sincerely encouraged to participate in the open assessment of this article. You can do so by either recommending the article or by posting your comments.

Please go to:

http://dx.doi.org/10.5018/economics-ejournal.ja.2013-7

The Editor

© Author(s) 2012. Licensed under a Creative Commons License - Attribution-NonCommercial 2.0 Germany