

Liquidity Risk Charges as a Macroprudential Tool

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The recent financial crisis was unprecedented in scale and speed of propagation. A well recognised reason is that the original shock (started in US real estate funding structures heavily distorted by regulatory arbitrage) was severely compounded by the extreme funding fragility built up by banks (Brunnermeier, 2009). Bank risk absorbing capacity had been reduced not just by lower capital buffers, but by extremely short term funding.

The panic withdrawals of wholesale short term investors (Gorton, 2009) propagated and compounded losses as it forced massive distress sales. These in turn caused rapid asset price declines triggered further margin calls and thus more fire sales across markets. The resulting uncertainty undermined access to new financing, leading to inefficiently rapid deleveraging (Brunnermeier, 2009). After wholesale money markets had been severely dysfunctional for over a year, barely contained by massive liquidity provision, practically all uninsured bank liabilities had to be bailed out after panic broke out in September 2008.

Systemic risk and its prevention

The crisis led to a consensus on the need to control propagation risk. Last February we proposed a new macro prudential tool, liquidity risk charges, to discourage liquidity risk creation by banks (Perotti and Suarez, 2009). The charges target liability risk, so they need to be complemented by other reforms, such as capital requirements, aimed at asset risk.

The proposal has been extensively debated, and is currently receiving substantial attention by policymakers engaged in defining macro prudential policy. The objective of this policy note is to refine the proposal, addressing a number of frequently asked questions, and

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offer more implementation details.

We briefly restate the central argument and ingredients of the proposal then proceed to discuss many challenging questions we received, in order to summarise the discussion and address critical implementation issues.

Our proposal in a nutshell

Macro prudential policy should discourage individual bank strategies which cause systemic risk, a negative externality on the financial system. We propose to interpret systemic risk as propagation risk, when shocks spread beyond their direct economic impact, resulting in diffused distress and disruption of the real economy.

A lesson from this and other crises is that whatever the initial shock, the scale and speed of liquidity runs are the primary cause of propagation. Banks that rely excessively on short-term uninsured funding contribute to fire sales in a panic, and thus to excess propagation.¹ In turn, propagation compounds losses, undermines confidence and access to finance, causing economic disruption. Accordingly, our proposal aims at correcting the *negative externalities* caused by banks' excessive reliance on short-term, 'uninsured' funding. It acknowledges that central banks and governments will be forced during a systemic crisis to provide significant *liquidity insurance* even for nominally uninsured funding.²

This de facto insurance calls for a *system of liquidity risk charges* (in brief, LRCs). These charges would be essentially Pigouvian, aimed at making banks internalise the negative systemic effects of fragile funding strategies³. The goal is to prevent excess reliance on short-term funding in good times. As taxes they would com-

1 This is confirmed by the evidence in Adrian and Brunnermeier (2009) after constructing measures of each bank's contribution to systemic risk. Acharya and Merrouche (2009) confirm that banks with more wholesale funding and more fire sale losses had a disproportional effect on panic propagation. For a theoretical statement, see Huang and Ratnovski (2008).

2 We state this as an observation rather than a normative suggestion. A normative defense of insurance can be found in Caballero (2009), among others.

3 The need for a Pigouvian approach to target negative externalities in financial regulation has also been stressed by Acharya et al (2009) and Brunnermeier et al (2009).

plement deposit insurance charges, without creating any explicit commitment to liquidity support.⁴

As a principle, a unit of short-term funding should be taxed in proportion to its marginal contribution to a bank's contribution to systemic vulnerability. A general approach would estimate the systemic contribution of more bank characteristics (Adrian and Brunnermeier, 2009), a challenging task.⁵ Our simpler approach is to levy charges on banks' funding maturity, a simple yet critical proxy for propagation risk.

The formula for total charges to bank j in period t would be of the form:

$$LIC_{jt} = c(z_{jt}) S_{s=1\dots S} w(s)x(s)_{jt}, \quad (1)$$

where $x(s)_{jt}$ are bank liabilities with maturity of s days, $w(s)$ is the refinancing-risk weight for maturity s , with $w(1)=1$, $w(S)=0$, S is a sufficiently large maturity to be considered safe (e.g. one year), $c(z_{jt})$ is the charge per unit of refinancing-risk-weighted liabilities, z_{jt} is a vector of additional factors (such as size and interconnectiveness). The weighting function $w(s)$ would be decreasing in s and, smooth so as to avoid regulatory arbitrage which may distort market rates.

The fraction of funding coming from capital or

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insured retail deposits would be exempt from charges (i.e. it would be assigned maturity S). In addition, the taxable base should be scaled down by holdings in assets which remain liquid during systemic crisis, such as government bills and central bank deposits.

Charges should be paid at high frequency (say weekly), requiring a large scale but straightforward data collection on liability maturity structure.⁶

Assigning a maturity to a liability is quite simple, except in the case of contingent liabilities. Here setting a measure robust to manipulation calls for using contingent maturity, namely the shortest possible withdrawal date (as in the worse case scenario). This is consistent with the goal to measure the speed at which liquidity will be withdrawn in a systemic crisis.

The per-unit charge $c(z_{jt})$, as well as the minimum maturity S above which charges are zero, are the key

fine-tuning instruments. To start with, it would be reasonable to impose a low experimental flat charge, e.g. in the range of 0.001-0.003 per annum, which would entail a penalisation of short term funding (say, below 6 months) of 10-30 basis points per year. Even such charges might significantly tilt banks' funding strategies towards longer maturities, without constraining valuable resort to short-term financing. We think this price effect compares favourably with the rigid effect of undifferentiated minimum liquidity ratios.

Charges should be stable, but adjustable by the macro prudential authority in response to aggregate risk accumulation, such as asset bubbles based on fragile funding,⁷ and broader systemic stability goals. Policy tightening may be achieved by a parallel increase in the structure of charges $c(z)$, in a further penalisation of very short maturities (with higher $w(s)$ for lower s), or in surcharges for further increases in exposure. Adjustments might be non-retroactive to differentiate between marginal charges (on new funding) versus historical average charges. The new instrument addresses solely funding risk. It is meant to be complementary to other reforms, primarily higher, countercyclical capital requirements.⁸

Frequently asked questions

Why charge banks for liquidity insurance if ex post liquidity support is costless and efficient?

Ex post liquidity support is not ex post costless if many banks are not just illiquid but insolvent. If insolvent banks cannot be identified (or it is not credible not to bail them out) then liquidity supports subsidise the least efficient. In this case it is also ex ante costly as it encourages more risk creation. For instance, it enables banks with less capacity to assess risk to raise cheap funding to overextend their lending, which in turn increases the chance of liquidity runs.

Liquidity runs cause economic disruption, as they disrupt planning and business confidence, increase risk perception or decrease the volume of intermediated savings.

Why are liquidity risks charges based on mismatch better than capital requirements indexed to mismatch?

We premise that capital requirements and liquidity charges are complementary, as the first targets asset risk and the second liability risk.

If capital ratios were also based on mismatch, they would produce similar incentives to liquidity risk charges.

However, capital requirements are not appropriate to

4 In their absence there is a fiscal incentive to disintermediate deposit taking via the shadow banking system, such as (nominally uninsured) money market funds.

5 A serious obstacle is that the relevant estimating samples are crisis periods, since the crucial measures are contingent correlations which become larger during systemic events. An additional challenge is that correlation may not fully reflect causation.

6 Regulatory oversight of liquidity exposure appears indispensable for macro prudential monitoring in any case. By its nature, maturity is easily measured and communicated.

7 Only asset bubbles directly affecting the bank sector need to be a concern in terms of fragile funding. For instance, internet stocks were funded with equity and their demise, however massive, did not result in financial instability nor spread to other markets.

8 Important reforms which might be combined with the new instrument are private capital insurance, and regulations limiting or discouraging the holdings of other banks' long-term debts or CDS exposures, and the holdings of nonstandard securities.

target liquidity risk.

- a) As a buffer against liquidity runs, capital ratios would need to be very high, even though the need is for contingent liquidity (and capital) upon runs.
- b) It is much harder and costlier to adjust capital levels and rules than funding structure. Policy adjustments during vulnerable times would be difficult. Moreover, the minimum capital ratios, as all quantity regulation, would create triggers. In a liquidity crisis many banks would be forced to raise capital at the same time.
- c) The 'pre-payment for likely support' associated with LRCs would reduce the political cost of supporting the banks during systemic crises, improving the social perception of legitimacy for the use of government funds in case of need.

Should charges be accumulated in a fund?

Not necessarily, but doing it would reinforce the credibility of the arrangement, and facilitate politically the coverage of costs in case of a crisis. It could also facilitate coordination in a multi-country context. If no fund is created, the liquidity risk charges accrue as general revenue to the treasuries involved in the arrangement (say, in proportion to the contributions made by the banks domiciled in each national jurisdiction).

A fund involves prefunded burden sharing, which

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enables to cover loss associated with liquidity assistance, ensures cooperation, and avoids conflictive ex post discussions on burden sharing among treasuries.

If a fund is created, where should the funds be invested?

As a reserve against systemic events, they should be held in assets which maintain their value in a systemic crisis, so central bank reserves and government bonds seem a natural choice.

If a fund is created, should it be managed by the macro prudential authority, the central bank, the Treasury or an ad hoc agency?

The critical question is where losses due to systemic liquidity crisis are borne. Assigning funds to the liquidity providers would cushion any losses from liquidity support. On the other hand, the independence of the central bank may come under pressure. Funds could be located at the Treasury, provided it would explicitly guarantee Central Bank solvency in case of liquidity support.

Other factors, such as intermediary size and their

interconnectedness, also contribute to systemic risk creation. Why base charges only on funding fragility?

Charging for funding fragility has a sound theoretical basis in the balance sheet channel of propagation. There is consensus that rapid withdrawals cause fire sales and the spread of trouble across markets. Fundamentally, whatever the initial shock may be, any systemic crisis involves liquidity runs. Reducing the speed of potential withdrawals increases the resilience of the system to panic runs.

We propose to immediately introduce charges based on funding fragility, and scale them by a set of easy-to-measure factors, such as intermediary size and interconnectedness. Over time, the precise impact of these factors will be refined as advances in this area of research provide us with better proxies.

Insisting to start with a broad set indicators has measurement and interpretation risk. Measuring individual contributions to systemic risk requires computing contingent correlations using data from periods of distress, for which there is little data. It is also hard to convincingly measure all factors which cause propagation, rather than being correlated with it. A conceptually more precise measure may be quite controversial and require a long dialogue with industry, with serious risks of excess delay or capture.

The main challenge for any tool to stop speculative risk creation is political. How to ensure decisive action in good time?

If the risk of capture is severe, there are advantages to establishing liquidity risk charges based on very simple rules so as to be robust to manipulation, and defined by an independent the macro prudential regulator removed from industry lobbying.

To ensure maximum independence central banks should take a leading role in macro prudential supervision, irrespectively of whether they have similar micro prudential tasks.

Endowing the macro prudential authority with very few and specific tools would allow to introduce the principle of 'use or explain'. Failure to intervene could not be excused with a lack of adequate instruments or their complexity. Public transparency of the tool would ensure its public credibility and accountability.

Why are liquidity insurance charges better than minimum liquidity requirements or caps to short term funding? Why correcting the externality through prices (liquidity insurance charges) rather than quantities (liquidity requirements)?

A combination may be ideal. However, minimum liquidity requirements do not fully prevent panics and involve an inefficient stocking of unproductive assets in normal times.

Just as tariffs relative to quotas, regulated prices are less distortionary and easier to adjust than mandated quantities.

An important consideration is that liquidity ratios are likely to be breached simultaneously for all banks when confidence ebbs, acting as triggers for further liquidity

runs by banks themselves in the approach to a crisis.

Should banks holding more liquid (and transparent) assets have lower charges?

In principle, assets which are liquid in a systemic crisis, basically reserves at central banks and high-quality government bonds, can be sold without causing fire-sale losses, so these assets should be excluded. However, this seems to be the sole exception to avoid regulatory arbitrage. It is important to recognise that asset liquidity is conceptually distinct from funding liquidity, belongs to the sphere of asset risks and thus could be addressed by capital requirements.

Why should we charge for maturity mismatch? Is

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maturity transformation not the natural tasks of banks?

Yes. Deposit insurance is aimed at bridging the propensity of household to hold liquid assets with the medium term needs of productive financing. In our proposal, the funding coming from insured retail deposits is exempt from charges. But there is no clear social welfare case for promoting wholesale funding flows that are able to jump the queue in any run via electronic or phone 'withdrawals'. Large investors in banks should absorb some risk or its social cost. The de facto insurance enjoyed in systemic crises should be charged, in analogy with deposit insurance, although without creating a similar contractual claim to liquidity insurance.

Are your proposed charges a kind of Tobin tax?

We do not penalise financial transactions per se. As excessive reliance on short-term financing contributes to systemic instability, we propose to tax the negative externalities it causes by a Pigouvian tax, as in the case of pollution taxes.

Would charges shift liquidity risk creation to the shadow banking sector?

The recent experience suggests that the shadow banking system relies critically on contingent liquidity support by the banking sector proper. In this case, liquidity risk would be discouraged if no investors would refuse to fund unsupported investment vehicles. Provided all contingent liabilities to non bank intermediaries are charged properly, risk creation will remain under control.

How would charges be set, and how to ensure they are set at reasonable rates?

The intent is to start with low charges (see above) and adjust them to achieve a desirable funding structure. A tight benchmark would set them equal to the difference between the overnight and the rate on the 'desired'

minimum maturity. As in the case of monetary policy, controlling 'prices' will be more effective than controlling quantities.

Banks would not be overtaxed if average charges were low but any additional increase in mismatch would face surcharges. Policymakers could adjust surcharges to respond preventively to time varying market conditions.

Do authorities need to declare a systemic liquidity event to trigger the provision of liquidity insurance?

A formal 'activation' of any arrangement for systemic events may create risks on its own. Relative to our February proposal, we no longer need a formal trigger, as our proposal no longer includes capital insurance. The macro prudential authorities would retain discretion as to the amount and possible beneficiaries of liquidity support. The experience of the current crisis does suggest that in some circumstances the authorities should be ready to act much more aggressively and broadly than under conventional lending of last resort principles.

How different is your proposal from capital insurance?

We concur that resolution regimes which activate 'private contingent capital' for individual banks, via automatic or supervisory-triggered conversion of long-term debt into equity would be a most desirable option (Kashyap et al, 2008). We do not believe that the private provision of liquidity or capital insurance would be sufficient to deal with systemic risk.⁹

It is not clear that market-based premia would properly correct the underlying externalities. First, market prices might not fully discount systemic risk because of overconfidence, asymmetric information, and manipulation that can persist due to short term horizons and the low frequency of crises. Second, private insurance policies are likely to be mispriced if their providers may go bankrupt or end up receiving public support during a systemic crisis. In this case, market premia would not sufficiently reflect systemic risk.

Concluding remarks

We have presented a concept for a macro-prudential tool to target systemic risk which is simple and well grounded in theory. It would grant some control over the build up of financial fragility without increasing the cost of credit for non speculative activities. Once introduced and tested, the instrument may be refined over time by making charges depend on other systemic risk factors.

The proposal has encountered strong interest in academia, central banks and regulatory institutions as one possible policy instrument for systemic risk boards. Thanks to the very extensive commentary received, we were able to refine the main conceptual and implemen-

⁹ In this context liquidity insurance will work as some of the protections obtained by corporations under bankruptcy law (e.g. Chapter 11 in the US), buying time for proper reorganisation.

tation issues to allow a proper evaluation by researchers and policymakers.

References

- Acharya, Viral, and Ouarda Merrouche (2009), 'Precautionary Hoarding of Liquidity and Inter-Bank Markets: Evidence from the Sub-prime Crisis,' mimeo, Stern School.
- Acharya, Viral, Lasse Pedersen, Thomas Philippon, and Matthew Richardson (2009), 'Regulating Systemic Risk,' in Viral Acharya and Matthew Richardson (eds.), *Restoring Financial Stability: How to Repair a Failed System*, Wiley, March.
- Adrian, Tobias, and Markus Brunnermeier (2009), 'CoVaR,' Federal Reserve Bank of New York Staff Reports, no. 348.
- Brunnermeier, Markus (2009), 'Deciphering the Liquidity and Credit Crunch 2007-08,' *Journal of Economic Perspectives* 23(1), 77-100.
- Brunnermeier, Markus, Andrew Crockett, Charles Goodhart, Avi Persaud, and Hyun Shin (2009), 'The Fundamental Principles of Financial Regulation,' *Geneva Reports on the World Economy* 11.
- Caballero, Ricardo (2009), 'A Global Perspective on the Great Financial Insurance Run,' *VoxEU*, 23 January.
- Goodhart, Charles (2009), 'Liquidity Management,' paper prepared for the Federal Reserve Bank of Kansas City Symposium at Jackson Hole, August.
- Gorton, Gary (2009), 'Slapped in the Face by the Invisible Hand: Banking and the Panic of 2007,' paper prepared for the Federal Reserve Bank of Atlanta's 2009 Financial Markets Conference, May.
- Huang, Rocco, and Lev Ratnovski (2008), 'The Dark Side of Bank Wholesale Funding,' mimeo, International Monetary Fund.
- Kashyap, Anil K, Raghuram G. Rajan, and Jeremy C. Stein (2008), 'Rethinking Capital Regulation,' paper prepared for the Federal Reserve Bank of Kansas City Symposium at Jackson Hole, September.
- Perotti, Enrico, and Javier Suarez (2009), 'Liquidity Insurance for Systemic Crises,' *CEPR Policy Insight* No. 31, February.

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