Discussion

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Although Franklin Allen and Elena Carletti's paper on banks, markets and liquidity is in itself very stimulating and interesting, the emergence of the recent financial market turmoil has made this paper even more topical and important. The crisis illustrates a key message of the paper; given incomplete markets, even relatively small losses can lead to large swings in asset prices, bank defaults and financial instability. As politicians have already called for tighter regulation of banks, the paper provides a timely reminder that regulation should address market failures and not be led by political point scoring.

The authors ask a fundamental question: what is the welfare argument for regulating banks? It is surprising how little agreement and understanding there is on this question, even though banks are heavily regulated at considerable cost. Franklin and Elena survey the literature and propose two market failures justifying regulation: a coordination problem among depositors that can lead to inefficient bank runs; and incomplete markets with inefficient liquidity provision resulting in financial fragility, asset-price bubbles and contagion. In line with the state of the literature, they are not able to provide easy answers on how to design optimal policy rules to enhance overall welfare.

My comments focus on both of these market failures in turn. In contrast to Franklin and Elena, I argue that coordination problems are not a deep-rooted market failure because they are themselves caused by incomplete markets and informational asymmetries. Before doing so, I briefly comment on the debate about whether bank runs are driven by panics or fundamentals. Later in my comments I suggest several *ex post* and *ex ante* policy instruments to address inefficient liquidity provision due to incomplete markets.

Panic versus fundamental-based bank runs

Our understanding of bank runs as panics is based on the classic papers by Diamond and Dybvig (1983) and Bryant (1980). They show that there are multiple equilibria since it is optimal to run if everyone else runs, but not to run if no-one runs. This is the coordination problem identified by Franklin and Elena as the first market failure. Gorton (1988) on the other hand advocates the view that bank runs are driven by adverse fundamentals and banks only fail when they are fundamentally insolvent. Based on the empirical literature the authors conclude that the evidence largely supports the fundamental view, but that panics have also occurred.

Given the location of the conference, it may be worth noting the Australian banking crisis of the early 1890s (see Dowd 1992). Similar to many other crises it was preceded by a property market boom. Once the first big bank failed, runs took

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place on several other institutions. However, one could also observe a flight to quality. In particular, three big banks received substantial deposit inflows. It is interesting to note that these banks had pulled out of the property market before it turned down at the end of the 1880s, suggesting that runs were driven by fundamentals, not random panics.

Discussing a banking crisis that occurred more than 100 years ago is not uncommon in the banking literature even though the structure of the current financial industry has changed substantially. This reveals a fundamental problem; crises are rare and hence limited data exist to undertake empirical analysis. I am therefore sceptical that the question of whether bank runs are driven by panics or fundamentals can be solved by looking at the empirical evidence only. However, economists have more tools than just theory or econometrics – they can also undertake economic experiments. A good example of how experiments can help to improve our understanding in this area is a study by Heinemann, Nagel and Ockenfels (2004), which assesses whether global games can solve the problem of coordination failures. As discussed by Franklin and Elena, a small amount of asymmetric information can theoretically eliminate the multiplicity of equilibria which imply the coordination problem underpinning bank runs.[2] The experimental results indicate that observed behaviour does not change much, regardless of whether the experiment is based on a global games framework or more classical set-ups.

Given the importance and costs of bank regulation, it is surprising how few experiments have been undertaken. I see experimental economics as a fruitful avenue for providing more behavioural data, which could be a valuable input to the design of optimal regulation. However, it is hard to use experiments to identify the underlying market failures that justify welfare-enhancing regulation in the first place.

Funding liquidity risk

Franklin and Elena base the need for regulation on coordination problems and incomplete markets. Coordination problems can be thought of as 'funding liquidity risk' and incomplete markets as 'market liquidity risk'; concepts which are more commonly used by regulators, bankers and the press. For the purpose of this discussion, funding liquidity risk is the risk that a bank is unable to meet its obligations when due, for example, when withdrawals are unexpectedly large because of panics driven by coordination problems. Market liquidity risk is the risk that assets cannot be sold at their fair value with immediacy, for example, when markets are incomplete or characterised by inefficient liquidity provision.

The definition of funding liquidity risk already hints at an important distinction. While solvency is determined by stocks, funding liquidity is determined by flows. A bank is liquid if its cash outflows are less than its cash inflows, including income from asset sales and new borrowing. This can be written as:

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2.   Theoretical research into global games was initiated by Carlsson and van Damme (1993) and applied to banking crisis by Rochet and Vives (2004) and Goldstein and Pauzner (2005).

$$Cash\ Outflows \leq Cash\ Inflows \qquad\qquad\qquad (1)$$

Or in more detail as:

$$Expenses + Liabilities_{(due)} + Assets_{(new/rolled\ over)} + Off\text{-}balance\ Sheet_{(net\text{-}liquidity\ demand)}$$
$$\leq \qquad\qquad\qquad (2)$$
$$Income + Liabilities_{(new/rolled\ over)} + Assets_{(due)} + Value\ of\ Assets\ Sold$$

While banks' liquidity risk managers look at funding liquidity risk as a flow constraint, the theoretical literature has not done so even though most papers can easily be rephrased in this way (see Drehmann, Elliot and Kapadia 2007). Take for example Diamond and Dybvig (1983). In the second period, deposits from both early and late depositors are contractually due – $Liabilities_{(due)}$. Cash or short-term assets held by banks – $Assets_{(due)}$ – are used to pay out early depositors.[3] If there is no crisis, late depositors roll over their deposits – $Liabilities_{(new/rolled\ over)}$ – so that total cash inflows equal cash outflows. But if late depositors do not roll over their deposits – that is if there is a bank run – the bank is forced to sell assets to satisfy all cash outflows. As the bank is only able to realise heavily discounted prices for their assets not enough cash can be raised, the flow constraint is not satisfied and the bank fails.

The flow constraint can also capture the downward spiral of funding and market liquidity risk (see for example Gromb and Vayanos 2002; Brunnermeier and Pedersen 2007). Suppose there is a severe drop in asset prices which induces higher margin calls. This would be captured in Equation (2) as an off-balance sheet item. If the funding liquidity of banks is a constraint, higher margin calls can only be satisfied by selling assets, which lowers asset prices further because of a lack of market liquidity. In turn this raises margin calls, leading to increased funding liquidity demands and so forth.[4]

It is also interesting to note that banks can adjust the flow constraint by restricting new lending or not rolling over short-term loans – $Assets_{(new/rolled\ over)}$. Banks are reluctant to do this to safeguard their customer relationships, but they may be forced to do so in severe crises. Depending on the structure of the financial system, this channel may contribute to contagion in the interbank market. It may also aggravate the impact on the real economy if lending to non-financial firms is curtailed.

An important consideration for this discussion is that funding liquidity, and hence the coordination problem, is only a result of imperfect information and imperfect capital markets. In a world with perfect information, examining the stock of assets and liabilities of a bank is sufficient to assess its health. And solvent institutions are always able to finance random liquidity demands by borrowing from other financial institutions or the central bank. Even if borrowing is impossible, the flow

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3. *Expenses*, *Income* and *Off-balance Sheet* items are all zero in the model.

4. Liquidity demand from off-balance sheet items also includes committed credit lines to companies and liquidity lines to conduits. In the recent turmoil, the latter proved to be the key transmission channel from liquidity problems in the structured credit to the interbank market.

constraint can never bind if the bank is fundamentally solvent – as long as the bank can sell all assets at their fair value with immediacy. In other words, if assets are liquid a bank cannot fail because of funding liquidity problems. Hence, incomplete markets and imperfect information – not coordination problems – are the underlying market failures.

Market liquidity

The current crisis highlights again that funding liquidity risk can indeed be crucial for financial stability. Designing policies to address these problems requires an understanding of the impact of incomplete markets and asset-market liquidity. Unfortunately, academics and policy-makers have thus far made little progress in this respect, which means that my following remarks will be more speculative.

Optimal policy intervention can be either *ex ante* or *ex post*. One *ex ante* mechanism Franklin and Elena discuss is regulation. They cite work by Allen and Gale (2004) and Gale and Özgür (2005), which show that capital or liquidity regulations for banks can indeed improve welfare. But the information requirements are enormous, which raises questions about the practical validity of such an approach. It is important to point out that the welfare argument in Allen and Gale is based on *ex ante* risk-sharing rather than considering the impact of bank failures on the real economy. The latter is certainly crucial from a policy perspective even though the extent of our understanding of these issues is insufficient to formally justify bank regulation from this perspective.

Another *ex ante* mechanism widely used by central banks and regulators is communication. A large number of central banks regularly issue financial stability reports with the aim of increasing awareness of financial stability issues and influencing risk-taking behaviour by banks. In addition, central bankers frequently make speeches related to financial stability. The current crisis should give some pause for thought. Notwithstanding the fact that the asset-backed commercial paper market was not specifically highlighted as a possible vulnerability, central banks around the globe had identified complex financial products, high leverage and trading in illiquid markets as financial stability risks before the turmoil (see IMF 2007; Bank of England 2007; ECB 2007; Geithner 2007). And publications demonstrate that these calls were acknowledged by the banking industry (see CRMPG II 2005; IFRI/CRO Forum 2007). Nonetheless the crisis occurred. Can we conclude that communication had no impact? Would the crisis have been worse without financial stability reports? Maybe central bank warnings were not acted upon this time. But given that central banks made valid attempts to identify the vulnerabilities, their reputations should be enhanced. But does this mean that the private sector will be more responsive in the future?

I remain doubtful about how much communication can achieve given considerable uncertainties and the incentives for excessive risk-taking by banks. One way for communication to become more than 'cheap talk' would be to develop reliable measures of financial stability and link those measures to policy instruments such as regulations, thereby affecting banks' incentives to take risks.

Franklin and Elena briefly discuss the use of monetary policy to address financial crises. It is worth pointing out that policy-makers have a wider array of tools than simply changing interest rates, for example, they can provide liquidity with open market operations or act as 'buyer of last resort'. A simplistic reading of the emerging literature on market liquidity suggests that during market liquidity crises central banks should buy assets. This seems optimal if, for example, market illiquidity is driven by search frictions as suggested by Duffie, Gârleanu and Pedersen (2006). A central bank could prevent the drying-up of market liquidity by stepping in to buy assets when there are surprisingly high liquidity demands. It seems that market liquidity risk could also be eliminated via a buyer of last resort if markets are characterised by a 'cash in the market' constraint as discussed by Franklin and Elena. In some sense, a buyer of last resort during market crises would conceptually mirror the lender of last resort function for a bank-specific crisis.

In practice this approach clearly faces great difficulties, such as differentiating between solvency and liquidity shocks or determining the fair value of assets. It also raises moral hazard problems frequently mentioned in the context of lender of last resort interventions. However, there is a historical precedent for a central bank acting as buyer of last resort. In September 2002, the Bank of Japan initiated a stock-purchasing programme, ultimately buying stocks with a total value of 2 trillion yen from commercial banks. The rationale was to avoid the crystallisation of market liquidity risk (see Bank of Japan 2002).[5]

With the exception of the Bank of Japan, which acted in very exceptional circumstances, central banks generally do not buy assets during crises. However, open market operations are an interesting alternative. Rather than outright purchasing, central banks can provide liquidity against collateral using repurchase agreements which are reversed after a specific time. It is interesting to note that the provision of liquidity against collateral is a policy instrument being used in the current crisis, but hardly discussed in the literature. During a liquidity crunch this could be an optimal policy response as it provides liquidity to all players and hence could prevent asset fire sales as well as influence the mood of the market until more fundamental information is available. As repos are reversed, no excess liquidity should build up over time. This should limit inflationary pressures and negative consequences for the economy. At the same time, as transactions are collateralised it is also unclear whether open market operations induce moral hazard, especially if haircuts are set appropriately and interest rates remain at the monetary policy target level.

Ultimately, central banks can lower interest rates to curb the effects of a market liquidity crisis as they have done after the 1987 crash or LTCM crisis. As Franklin and Elena briefly discuss, the interactions between market liquidity and the macroeconomy are not well understood, making it hard to discuss optimal monetary policy intervention.

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5. I would like to thank Marie Hoerova for pointing this historical episode out to me.

Conclusion

Coordination problems are not a market failure *per se* but are themselves driven by incomplete markets and asymmetric information, which also underpin market liquidity risk. Focusing on incomplete markets and asymmetric information is therefore essential when designing optimal regulation or *ex post* policy interventions. However, more research is urgently needed to enhance our understanding of these issues; especially about the interactions between financial crises and the macroeconomy, and how monetary policy or open market operations could alleviate liquidity problems. It is unlikely that these issues will be resolved in time to guide decisions during the current turmoil. But further research will no doubt be of use when the next crisis occurs.

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