

Discussion of “An Integrated Framework for Analyzing Multiple Financial Regulations”*

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1. Introduction

It is a great pleasure to be at this conference. Earlier, Mark Gertler’s paper incorporated credit spreads into a DSGE model and explored how different types of (central bank) policy action work in that setup. Crudely, two policy instruments were examined, with the conclusion that QE-type interventions work by substituting the central bank in an otherwise broken credit process. In other words, the central bank steps in for the banking system. The current paper, by Goodhart, Kashyap, Tsomocos, and Vardoulakis, is quite different. It does not incorporate the time-series saddle-path dynamics of DSGE models, but it has a much richer set of frictions and a correspondingly richer set of possible instruments. It also incorporates a shadow bank. An initial rise in defaults by end-borrowers can impair the functioning of both bank and shadow bank intermediaries, leading to a tightening in credit supply, lower asset prices, and a further impairment of borrower balance sheets. There is an *explicit* role for default, building on Shubik’s work of more than a decade ago.

As such, the model in this paper captures many of the mechanisms omitted by mainstream macroeconomic models. That enables the authors to engage directly with the choices that the authorities face in the real world about “macroprudential” instruments—the tools that might be used to restrain a buildup in risk when the next bout of misplaced exuberance occurs. Such policy questions include the following: Are macroprudential instruments best targeted at the

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financial sector or end-borrowers (or both)? Should they focus on net worth (capital) or on liquidity (or both)? Policymakers badly need models that can help shed some light on such questions. The rich interplay between the balance sheets of borrowers and intermediaries described in this paper makes an excellent contribution. We need more models as rich as this. And I hope other researchers will code up this model and see what they can get out of it.

2. Overview of the Model

At the heart of the model is a need for trade across different types of households (see figure 1). There are two periods. Rich, landed households are endowed with a large amount of housing in each period but want to sell some of that in exchange for potatoes. Poorer farmers lack housing but grow potatoes. One set of farmers are guaranteed a crop in the first period and face the risk of either a bumper crop or a small crop in period 2. A second set of farmers, “first-time buyers” (FTB in figure 1), are born in the second period, receive a fixed crop of potatoes and use some of that to purchase housing.

The financial sector provides three roles to facilitate trade in this economy. *Within each period*, there is a timing mismatch between the openings of the housing market and of the potato market. The potato farmers need to raise funds to buy a house before their crop arrives. That creates room for an intermediary to temporarily take

Figure 1. The Real Economy

	Period 1 (small initial potato crop)		Period 2 (two states, risk of bad crop)	
	<u>START</u> Housing market	<u>END</u> Potato market	<u>START</u> Housing market	<u>END</u> Potato market
Rich Landowner	Sell housing	Buy potatoes	Sell housing	Buy potatoes
Poor Potato Farmer	Buy housing	Sell potatoes	Buy/sell housing	Sell potatoes
Young Potato Farmer (FTB)			Buy housing	Sell potatoes

Figure 2. The Financial System

Shadow Bank (risk taker)		Bank (risk averse)	
Asset	Liabilities	Assets	Liabilities
MBS	Repo loans Equity	Risky Mature at End of Period 2 { Retained mortgages Repo loans	Deposits
		Risk Free { Intraproduct loans Cash	Central bank loan Equity

funds on deposit from the landowner and use them to make short-term loans to the potato farmers within each period. Those loans are risk free because there is no uncertainty within each period.

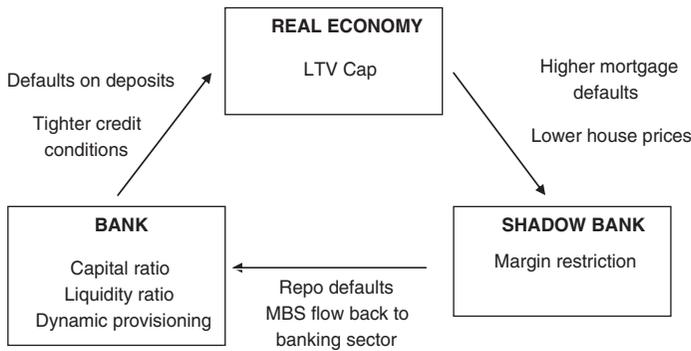
Across periods, the poor potato farmer has low resources in the initial period but might be resource rich in the second period. That creates a second role for the financial sector: the extension of longer-term loans (mortgages) to allow farmers to smooth their consumption over time. Banks can facilitate intertemporal trade.

If the crop is bad in the second period, the older potato farmer can default. That can lead intermediaries to pay back only a fraction of the deposits of the rich landowner. In effect, the banking system effects sharing of that risk from a bad crop between the rich landlords and the poorer farmers. So the third role of the financial system is to help trade *across different states* of the world.

The model’s financial system has two parts (see figure 2). There is a banking sector. Banks are endowed with an initial equity base, and they make loans to the potato farmers funded from deposits from the landowner.

There is also a shadow bank. The bank lends to the shadow bank, via repos, to fund holdings of mortgage-backed securities (MBS). The loan is subject to a haircut; i.e., the bank takes collateral worth more than its loan. Since there are no other sources of finance for the shadow bank, those repo haircuts determine its leverage. The shadow banks are specified as being less risk averse than banks, and so can take risk out of the bankers’ hands. In effect, the banks exchange a direct claim on a pool of mortgages for a claim on the shadow bank, secured on the same mortgage pool.

Figure 3. The Adverse Feedback Loop and Potential Firebreaks



The banking system can also borrow funds from the central bank (at an exogenous interest rate) and can either hold on to that cash or lend it to the household sector. The central bank is passive in the model. It simply supplies whatever base money is demanded at the exogenous path for the interest rate. Central bank lending is always repaid, and so they take no risk.

This setup mimics amplification channels familiar from the real world (see figure 3). If the potato crop fails in the second period, the farmer is less able to repay the loan. There is, therefore, a rise in mortgage defaults, which is accompanied by a fall in the value of mortgage-backed securities. Shadow bankers' repo loans are left underwater, and they default, returning their MBS collateral to the banks. Balance sheet constraints can impair banks' capacity to extend new loans. Tighter credit conditions make things worse. There is a fall in house prices. Banks default on their deposits by meeting only a fraction of their obligations, and so on.

The focus of the paper is to use this model to examine whether different macroprudential tools can help, alone or in combination. It is a novel feature of the paper that combinations of tools can be examined. A number of tools are explored: a capital requirement on the banks, a (so-called) liquidity requirement on the banks, dynamic provisioning against losses, limits on the loan-to-value ratios on which banks will lend against housing collateral, and margining limits on the haircuts applied to the collateral the banks take when lending, via repo, to the shadow bank.

Because bank credit is the only source of borrowing for households and shadow banks, the LTV and margining tools are economically equivalent to restrictions on the leverage of the households and the shadow banks, respectively.

In other words, all the tools operate on balance sheets—some on intermediaries and some on households.

3. Comments and Questions on the Model

I have four comments on the model setup. First, the model employs a particular welfare criterion to rank the effects of different types of financial regulation. It looks for policies that can improve the expected net present value of *both* household utility and financial sector profits. Using financial sector profits as a welfare criterion is interesting and, perhaps, uncomfortable. The standard approach is to boil things down to household utility alone. Perhaps related to that, the flow of funds, and resources, in the model appears not to be fully closed. Profits build up the equity base of the financial sector (and any losses detract from it), but that wealth is not distributed to a shareholder. Profits of the bankers do not, therefore, directly reduce households' consumption (of potatoes and houses). In other words, the financial sector's surplus doesn't appear to be spent.

Second, alongside a measure of welfare, it would be useful to see some proxy for systemic risk. How big an amplification role is played by the financial sector when the shock to the potato crop is realized in the second period? One possible such measure might be the volatility in credit supply in the second period. A measure that would, perhaps, get closer to our everyday concept of *systemic* risk would be the volatility in credit supply caused by the interlinkages between the banks and shadow banks.

Third, I have some queries about how the various macroprudential tools are specified. For example, the form of liquidity regulation worries me. The liquid assets recognized by regulation in the model are the intraperiod loans to the household sector. While it is true for the model that these loans are both short term and completely risk free, household sector credit does not always have those characteristics in the real world. The crucial point is that this is "inside liquidity": the banks can generate as much of it as they want. But in

the real world, the more they generate, the less liquid it will prove to be when it is needed. Thus, in the model, we have the perverse implication that a tightening in liquidity regulation causes banks to extend *more* short-term loans to the household sector. For that very reason, liquidity regulations in the real world are often specified in terms of “outside” liquid assets such as central bank reserves or high-quality government bonds.

The “dynamic provisioning” in the model is not really provisioning against losses at all. Provisioning involves banks setting aside a portion of today’s profits to cover future losses; it depletes banks’ *capital*. The form of “provisions” in the model is more akin to a reserve ratio, a form of liquidity regulation: when loan growth is high, banks are required to hold an increasing proportion of their assets in cash. Further, because the requirement is specified in terms of the *change* in lending, it applies in the second period and then binds only in the good state of the world. (Since credit contracts in the bad state of the world, dynamic provisions are irrelevant then.) We do not get to see the effect of forcing banks to build up provisions *ahead* of the bust. Full exploration of the effect of dynamic provisioning might require a three-period model. In light of my comments above on “inside liquidity,” it would also be interesting to see how outcomes would be affected by a static reserve ratio that applied in the first period and/or in the bad state of the world.

In the model, non-mortgage lending is zero weighted for purposes of regulatory capital. In consequence, the tool that varies the headline capital requirement is close to being equivalent to a sectoral capital requirement applying to residential property loans (and repo lending backed by those claims). So the model does not provide policymakers with much help in adjudicating between an ability to vary headline capital requirements and an ability to alter capital requirements applying to exposures to a particular sector of the real economy.

Finally, on the tools, as I have said, the margining tool is equivalent to being able to apply a leverage limit to the shadow banks.

Fourth, the model’s ranking of different policy tools depends largely on their distributional effects. Stepping back, endowments of potatoes and houses are exogenous to the model. Ultimately, all the financial sector does is alter the way those goods are shared out across the three types of household. The relative price of housing

and potatoes therefore matters a lot. High house prices redistribute spending power away from the potato farmers to the landowner (and vice versa). And the cost of credit reduces the spending power of the borrowers in the model. Though that much is clear, it is sometimes hard to determine why different tools have “better” distributional effects. For example, households’ utility appears to be relatively insensitive to higher margin requirements. Is that because shadow bank leverage—and so shadow bank holdings of MBS—has only a small impact on credit supply? And why does a change in the liquidity coverage ratio have such a different effect to a change in margin requirements? Both should be important for the risk of fire sales. Does this relate to the role of “inside liquidity”?

4. Policy Implications of the Model’s Results

I also have some comments on the conclusions for policy that come out of the paper. The authors’ headline result is a preference for a mix of capital requirements to limit the leverage of the banking sector and margin requirements to limit the leverage of shadow banks. It is important that it is a combination of tools that works best. On its own, a bank capital requirement has the effect of pushing intermediation into the shadow banks, leaving a vulnerability if that sector becomes overleveraged. The margining tool constrains that. Hence the effectiveness of the combination.

The resilience of the financial sector can also be improved, indirectly, by limiting the leverage of households by applying loan-to-value requirements. That comes, however, with the direct cost of a more immediate constraint to intermediation in the first period of the model.

If we can constrain the balance sheets of either intermediaries or end-borrowers, which should we choose? It should depend on which generates the biggest spillovers. Surely, that points us to the intermediaries. When they fail, the costs get spread everywhere. The paper’s results chime with that intuition.

The same line of thought can be found in the planned objective of the United Kingdom’s new Financial Policy Committee (FPC). The objective in the draft legislation going through Parliament “relates primarily to the identification of, monitoring of, and taking of action

to remove or reduce systemic risk with a view to protecting and enhancing the *resilience* of the UK financial system.”¹

At its March 2012 meeting, the Committee issued advice to Her Majesty’s Treasury on the initial set of macroprudential tools that the FPC would have the power to control. The Committee recommended an initial set of tools focused on the balance sheets of intermediaries: powers to control leverage, a risk-weighted capital ratio, and the amount of capital set aside against lending to specific sectors of the economy. The Committee also signaled that it would wish to return to the issue of powers over intermediaries’ liquidity positions and on the margining of intrafinancial sector transactions once the international debate on the microprudential standards in those areas was further advanced.

To conclude, this paper is not only very interesting, it might just mark a watershed in the development of the types of model we—policymakers and researchers—need to think about the design of macroprudential regimes.

¹After these remarks were prepared, the UK Parliament gave the FPC a *secondary* objective, subject to achieving the primary objective for financial system resilience, to support the economic policies of Her Majesty’s Government, including its objectives for growth and employment.