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Estimating the impact of changes in aggregate bank capital requirements on lending and growth during an upswing ☆

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ABSTRACT

This paper estimates the effect of changes in banks' capital requirements on lending by studying the joint dynamics of the historic aggregate capital ratio of the UK banking system and a set of macro-financial variables. This is achieved by means of sign restrictions that attempt to identify shocks in past data that match a set of assumed directional responses of other variables to future changes in capital requirements aimed at increasing the resilience of the banking system to losses during an upswing. This may provide policy-makers with a plausible 'upper bound' on the short-term effects of future increases in macroprudential capital requirements in certain states of the UK economic cycle. An increase in the aggregate bank capital requirement during an economic upswing is associated with a reduction in lending, with a larger effect on lending to corporates than on that to households. The impact on GDP growth is statistically insignificant.

1. Introduction

The recent financial crisis and economic contraction that followed highlighted the crucial role that banks play in facilitating the extension of credit and enabling economic growth. This underlies the economic rationale for imposing regulations on the banking industry, including minimum capital requirements designed to mitigate risks banks would not otherwise account for in their behaviour. A growing international consensus is emerging on the need to re-orientate the regulatory framework to place stronger emphasis on the mitigation of risks in the financial system as a whole.[1] One aim of the Basel III Accord is to raise permanently the level and quality of capital held by banks, in order to improve their ability to absorb loss.

Macroprudential policy also includes provision for dampening cyclical over-exuberance through a regime of risk-weighted capital buffers on top of prevailing *micro*prudential regulatory capital requirements. Such a 'countercyclical capital buffer' could be increased in a credit boom in order to generate greater self-insurance for a system as a whole and act as a restraint on overly exuberant lending.[2] This mechanism could also operate in reverse, with capital requirements being lowered in a bust to provide incentives for banks to increase their lending and reduce the likelihood of a collective contraction in credit exacerbating the downturn and hence banks' losses.

In addition, the Basel III framework is in the process of introducing a simple leverage ratio to act as a supplementary measure to risk-based capital requirements.[3] Whereas risk-weighted capital requirements differentiate capital requirements according to estimates of the relative riskiness of different types of asset, a leverage ratio weights all assets equally. In the UK, the Bank of England's Financial Policy Committee also plans to vary UK banks' regulatory leverage ratio over time, in parallel to changes in banks' risk-weighted countercyclical capital buffer.[4] This is designed to mitigate

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[1] See Financial Stability Board (2011).

[2] See Bank for International Settlements (2010).

[3] See Bank for International Settlements (2014).

[4] See Bank of England (2013).

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risks associated with the excessive expansion in banks' leverage of the sort seen pre-crisis.

These developments have raised the issue of how increases in regulatory capital ratios – both risk-weighted, and their leverage-based counterpart – might affect the broader macro economy. There is a high degree of uncertainty as to how banks might respond to future increases in macroprudential capital ratio requirements, the effect of such responses on the real economy, and how this might vary depending on the prevailing economic circumstances and state of the business cycle. For example, in periods – such as during the recent crisis – where there are concerns about the strength of financial institutions, an increase in macroprudential capital requirements will likely support resilience and lending. For those banks that are perceived by the market to be inadequately capitalised, official action to increase their equity capital will boost resilience and improve market confidence in their solvency. This should reduce their cost of funding, have a positive effect on lending, help arrest the build-up of vulnerabilities created by an overextension of credit and thereby boost banks' resilience.

Conversely, however, in an environment where market participants perceive risks to the financial system to be small, banks may be able to borrow at a rate that is relatively insensitive to how much capital they have. In that case, an increase in macroprudential capital requirements could cause banks' cost of funding to rise. Banks might pass this increase in funding costs on to their borrowers by raising interest rates on loans, and/or reduce the quantity of credit they extend. This might, at least in the short term, lead to a tightening in credit conditions for the real economy.[5]

Estimating the effect of the future operation of a countercyclical capital buffer on economic variables is also complicated by the fact that such a policy tool has never before been used. There are, moreover, very few changes to aggregate regulatory capital requirements observable in past data. And for those changes in regulatory capital that have occurred, it is difficult to isolate how much of the change in bank lending behaviour was as a result of regulation, rather than broader macroeconomic developments affecting the prospects for banks or health of their balance sheets.

The existing literature proposes two broad methods for surmounting this problem. First, one strand of literature attempts to estimate the impact of future macroprudential policy by explicitly representing the dynamics of banks' balance sheets using dynamic stochastic general equilibrium (DSGE) models (BIS (2010) provides a summary). A second seeks to proxy the effect of future changes in macroprudential requirements by performing a 'bottom-up' estimation of the effect of past changes in observable microprudential 'Pillar 2' regulatory capital requirements (Aiyar et al. (2014) and Bridges et al. (2014)). But neither is without caveats. In particular, there are reasons to believe that such positive shocks to individual Pillar 2 capital requirements are an imperfect proxy for increases in capital requirements *affecting all banks simultaneously*, not least given how in the latter case, lending could less easily shift to other banks (or to shadow banks, see Meeks et al. (2014)).

In contrast, the approach offered here seeks to quantify the effect of changes in regulatory capital requirements by studying the 'top-down' joint dynamics of the *aggregate* capital ratio across all UK-resident banks and a set of macro-financial variables, including lending growth. This is achieved by means of sign restrictions that attempt to identify shocks in *past* data that match a set of assumed directional responses of other variables to *future* changes in aggregate bank capital requirements. The same technique is used in the recent monetary policy literature aimed at disentangling the effect of credit demand and supply shocks (De Nicolo' and Lucchetta (2010), Hristov et al. (2011), Gambetti and Musso (2012) and Barnett and Thomas (2014)). But – to the best of the authors' knowledge – this is the first time it has been used to estimate the likely future effect of banks' aggregate regulatory requirements.

In doing so, the analysis here uses data on the aggregate ratio of UK banks' capital-to-assets where assets are not risk weighted; that is, not adjusted by a regulatory risk weight that is designed to capture their relative risk. This differs to the definition of banks' 'capital ratio' as it was originally defined in Basel III, and is instead closer to the definition of the regulatory 'leverage ratio' of capital as a proportion of (unadjusted) assets (or inverse thereof). This means that the effect of a change in bank capital ratios being quantified here is unlikely to correspond directly with a change in risk-weighted requirements.

Our motivations for using non-risk-weighted series are two-fold. Firstly, non-risk-weighted series are available over a longer time frame, since risk weights were only introduced in the late eighties after the advent of the Basel I accord in 1988. This extends the length of the available data. Second, they prevent our results being corrupted by any attempts by banks to alter their balance sheets in order to obtain a more favourable regulatory treatment. During the period 1989–2007, UK bank risk-weighted capital ratios rose relative to their non-risk-weighted counterparts, suggesting that banks may have altered their balance sheets, or the models they used to represent their risk, in order to obtain a more favourable regulatory treatment (see Francis and Osborne (2009)). Using a non-risk weighted series may therefore provide a more faithful representation of banks' true leverage, which is immune to such adjustments.

Whilst this empirical focus on changes in banks' leverage ratios means that the results may not be directly applicable to changes in risk-weighted capital requirements (for example of the sort defined in Basel III), they may nonetheless permit insight in the possible effect of time variations in a regulatory leverage ratio, of the type proposed, for example, by Bank of England (2015).

This analysis deals with the case of how an increase in banks' macroprudential capital requirements might affect banks' lending specifically in the face an unsustainable credit boom. In doing so, it assumes that an increase in banks' aggregate regulatory capital represents a negative credit supply shock, and, as such, has a negative effect on the provision of bank lending, at least in the short run. This technique follows from literature examining the effects of shocks to credit supply (see discussion in Hristov et al. (2011)) and provides a 'top-down' complement to 'bottom-up' studies of Aiyar et al. (2014) and Bridges et al. (2014) that find an increase in regulatory capital to be associated with a significant short-run reduction in bank lending growth. In order to identify this type of credit supply shock, an increase in regulatory capital is also associated with an *increase* in issuance of bonds by non-financial firms (as firms substitute their borrowing away from that from banks), and a *decrease* in the return on bank equities relative to that of the rest of the market, reflecting a decline in the profitability of banks as they forego otherwise profitable lending opportunities. Since their introduction by Uhlig (2005), such sign restrictions have proven to be a robust means of analysing the effects of economics shocks and have been widely used in the literature (see Fry and Pagan (2005) for discussion). This is, however, the first time that such an approach has been used to estimate the effects of an increase in regulatory capital.[6]

[5] See Tucker et al. (2013).

[6] It is possible, however, that their use here may conflate the effect of an increase in regulatory capital with that of a broader shock entailing 'bad news' for the financial sector, which is also associated with the same directional response in the other variables. In that case, this methodology would overestimate the effect of an increase in macroprudential requirements.