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Capital regulation and the macroeconomy: Empirical evidence and macroprudential policy

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ABSTRACT

We present new evidence on the macroeconomic effects of changes in microprudential bank capital requirements, using confidential regulatory data from the Basel I and II regimes in the United Kingdom. Our central result is that an increase in capital requirements lowered lending to firms and households, reduced aggregate expenditure and raised credit spreads. A financial accelerator effect is found to have amplified the macroeconomic responses to shifts in bank credit supply. Results from a counterfactual experiment that links capital requirements to house prices and mortgage spreads indicate that tighter macroprudential policy would have had a moderating effect on house price and mortgage lending growth in the early 2000s, with easier monetary policy acting to offset its contractionary effects on output.

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1. Introduction

Equity capital has special importance for banks. Compared to non-financial firms, banks fund a relatively small proportion of their assets using it.² Prudential regulators have a long history of setting down minimum standards for it.³ And during the financial turmoil in advanced economies that began in 2007, the UK government alone put £37 billion of it into the banking system (HM Treasury, 2009). In this paper we quantify the impact of regulation-induced changes in bank capital on

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² In the UK, for example, quoted and unquoted equity together make up a little over half of the financial liabilities of non-financial firms (ONS Blue Book, various issues). Banking system equity makes up between 4–6% of their liabilities, as measured by their regulatory simple leverage ratio (Bank of England Financial Stability Report, various issues).

³ Capital requirements date back to the mid-19th Century. Countries have historically set a wide variety of restrictions including fixed minimum levels of capital, minimums that depended on the population in a bank's operational locale, and from the early 20th Century minimum proportions of liabilities (Grossman, 2010, Ch. 6). Since the introduction of the Basel Accords in 1988, capital requirements on banks in jurisdictions that adopted the international rules have been formulated in terms of the ratio of capital to risk-weighted assets.

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the macroeconomy, study the interaction between regulatory and monetary policies, and assess post-crisis reforms to the Basel Accords that grant regulators macroprudential powers over minimum capital standards (Basel Committee on Banking Supervision, 2010a).

The central empirical questions we address—whether aggregate variables respond to changes in bank capital, and if so, whether active adjustments in capital requirements might be a useful policy tool—are far from settled.⁴ The reason is that answers to these questions have not been straightforward to obtain. The first difficulty is that most variation in bank capital is likely to be the result of disturbances to macroeconomic variables, such as output or interest rates. These variables affect capital directly by causing variation in retained earnings and in the prices of assets held in bank trading books (the ‘bank capital channel’, Gambacorta and Mistrulli, 2004). The same disturbances also affect credit demand, creating an identification problem. While specific one-off events have provided some convincing evidence of a channel from changes in bank capital to pockets of economic activity, via lending, progress has otherwise been limited by a lack of suitable instruments.⁵

The second difficulty lies in isolating changes in bank capital caused by regulation. In most jurisdictions, such changes have been infrequent, leading researchers to rely instead on qualitative measures of regulatory stringency (Bassett et al., 2015; Peek et al., 2003). Where systematic reviews of individual banks’ capital requirements did take place, the effects of regulation on bank-level loan supply can be estimated. But for a model to be useable in formulating stabilization policies, it must provide estimates of the ‘total’ effect of a shift in bank capital on loan supply, taking into account feedbacks between the banking system and the macroeconomy. This is not possible with a purely bank-level analysis of capital requirements and lending (Aiyar et al., 2016; Francis and Osborne, 2009a).

In this paper we claim to go some way towards resolving these problems. Over the 1990–2008 period covered in this study, regulators required individual banks operating in the UK to hold capital in excess of the time-invariant minimum levels set down in the Basel Accords. Regulators operated a system in which there was variation in capital requirements both over time and across banks.⁶ We combine this confidential regulatory data with aggregate bank lending and bank capital series, and with a set of macroeconomic variables, then estimate a standard macroeconomic vector autoregression (VAR) under a set of restrictions that identify a microprudential policy shock.

The restrictions we formulate to identify regulation-induced shocks to banking system capital exploit features of the institutional framework in which microprudential supervisors operated, as well as more-conventional assumptions on timing. First, for policy and operational reasons, supervisors did not respond to contemporaneous developments in the macroeconomy, and so we impose that condition on the model. We instead allow policy to respond to its second round influence on banking variables, which appear with a delay. Next, capital requirements were confidential to the supervisor–firm relationship, precluding a direct macroeconomic response. We impose the restriction that capital variables have no direct effect on macroeconomic variables, but rather influence aggregate outcomes via a bank lending channel. Last, we assume that there is a delay between the announcement of a regulatory change, and the resulting change in bank lending policy.

Our central finding is that changes in microprudential capital requirements on banks have statistically and economically important spill-overs to the macroeconomy. A tightening of capital requirements reduces credit growth to households and to non-financial firms, and raises spreads on home mortgages and on corporate bonds. Housing market activity is damped down by the regulatory action, which results in both lower average house prices and a higher proportion of mortgages in arrears. We also report important interactions between prudential and monetary policies. Systematic monetary policy easing acts to cushion the effect of changes in prudential policy on output, which for a 50 basis point increase in the average required capital ratio is a little over 0.2% lower than trend, two-to-three years after the shock. In the absence of a monetary policy response, peak output declines are larger, at roughly 0.3%. These findings indicate that the microeconomic frictions that lead bank equity finance to be costly are of macroeconomic relevance. And they complement a growing literature that identifies credit markets as a source of aggregate fluctuations, as in Gilchrist and Zakrajšek (2012), Meeks (2012), and Walentin (2014).

To help inform the conduct of policy with time-varying capital requirements as a macroprudential tool (the so-called counter cyclical buffer found in Basel III), we go on to report the results of a counterfactual simulation exercise. The exercise is motivated by the shortage of direct experience with the tool, and complements the literature that uses DSGE or macroeconomic models to analyse macroprudential policy (Akram, 2014; Angelini et al., 2014). We find that a macroprudential rule linking capital requirements to house prices and mortgage spreads would have led to a substantially higher

⁴ Theoretical arguments rest on there being an economically large deviation from the Modigliani–Miller irrelevance proposition, leading higher capital requirements to raise bank funding costs (Miller, 1995). If such costs are passed through to borrowers, a reduction in credit, and by extension aggregate expenditure, may result. Comparative analysis of models incorporating financing frictions on banks does offer theoretical support to the proposition that changes bank capital can have significant macroeconomic effects (Guerrieri et al., 2015).

⁵ See for example Peek and Rosengren (2000) (commercial real estate construction activity), and Ashcraft (2005) (county-level real activity in Texas). These event-type studies provide a high level of econometric credibility, but by their nature have a scope that is limited in time and place. An influential earlier literature examined the introduction of leverage restrictions and risk-based capital requirements in the U.S. as part of the first Basel Accords; see Berger and Udell (1994), Hancock and Wilcox (1997,1998).

⁶ Francis and Osborne (2009b) provide a description of the institutional environment, and summarize trends in UK banking capitalization. The Bank of England was responsible for banking regulation prior to 1997, with the Financial Services Authority (FSA) in charge thereafter. The Prudential Regulatory Authority, a subsidiary of the Bank, took over from the FSA in April, 2013. However, the earlier date of December 2008 marks a distinct change in FSA policy to an ‘Enhanced Prudential Regime’, and so we end our analysis in 2008:Q3 (see Bailey, 2012).

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