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The impact of the liquidity coverage ratio on money creation: A stock-flow based dynamic approach

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ABSTRACT

This paper examines money creation process of the banking system when it is complying with the Liquidity Coverage Ratio (LCR). A stock-flow based dynamic model of credit creation process is developed in which the commercial bank supplies loans to the firm. The change of credit is governed by the bank lending and the repayment of the existing loans, where the equilibrium stock of credit could be attained once the lending is exactly equal to the repayment. However, the supply of bank loans is restricted by both the reserve requirement set by the central bank and the LCR prescribed by the banking authority; and, as a result, money creation must be affected by all these regulations. The bank loan supply under the constraint of the required liquidity buffer might have different prescriptions under different economic scenarios, and would eventually result in an equilibrium monetary stock correspondingly. The final formula of money multiplier is derived respectively as the rational response of the bank to the corresponding regulation. When the reserve requirement is tighter than the LCR, the money multiplier has the same expression of that in the prevailing fractional reserve regime. Yet when the situation departs from this regime, the determinants of the money multiplier are found to be associated with the parameters that characterize the behavior of banks subject to the regulation and of the private sector rather than those monetary structural factors. It is noteworthy that there may be a credit contraction and even a significant reduction in money multiplier when the bank is regulated by the LCR. This novel perspective on credit creation of the banking system also offers us an insightful understanding on the impacts of banking regulations on the stability of the banking system and suggests a new guide tool for designing them.

1. Introduction

The financial crisis erupted in 2008 and the great recession have vividly revealed that the banking systems in most of countries are far from sound systems. It is clear that this crisis has multiple causes such as financial deregulation (Crotty, 2009), loose monetary policy (Taylor, 2009), global imbalances (Obstfeld and Rogoff, 2009), misperception of risk (Baily et al., 2008). Nevertheless, it has been recognized by people from academia, business, and politics (Acharya and Richardson, 2009; Farhi and Tirole, 2012; Kashyap et al., 2008; Liikanen, 2012; Stiglitz, 2009; Vickers, 2011) that the main culprit of recent crisis should be attributed to the banking systems which are the cornerstone of complex financial systems on account of enjoying the privilege of creating credit. Accordingly, central bankers and regulators bear ineluctable responsibility, for the legislated policies could not follow the track of financial development in recent decades.

In response to the deficiencies of financial regulations revealed by this crisis, the Basel Committee on Banking Supervision (BCBS)

published the Basel III accord: A global regulatory framework for more resilient banks and banking systems (BCBS, 2011). In order to reach the ultimate objectives, beyond strengthening the well-known capital adequacy requirement (CAR), Basel III introduces new liquidity requirements and macroprudential regulations. Compared to the unsettled macroprudential policy, the liquidity regulations have been published and subsequently revised. Especially, the liquidity coverage ratio as the most prominent and earliest introduced rule for liquidity regulation has been gradually approaching full compliance from January 2015.

It is the original objective of the LCR that the stock of unencumbered high-quality liquid assets ensures a bank to survive in a stress scenario lasting 30 calendar days, during which it is assumed that appropriate corrective actions can be taken by managers and supervisors, or that the bank can be resolved in an orderly way (BCBS, 2013a). And the rationale for this regulation is that a buffer of liquid assets must be held as a defense against liquidity distress for individual financial institutions. There are several ways or channels through

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which the LCR can achieve its objective at the individual level (see, Hartlage, 2012; Kowalik, 2013), e.g., as follows: the LCR protects the bank from runs by increasing the creditor's confidence; it makes the bank rely more on equity and less on debt, i.e., deleveraging; it may also reduce their maturity mismatches by means of extension in the liability maturities and the reduction of asset maturities.

Despite the microprudential objective mentioned above, the LCR has also some macroprudential characteristics that are capable of mitigating the systemic liquidity risk (BCBS, 2013b; ECB, 2012). Indeed, the resilience and robustness of the financial system as a whole could be promoted through the actions of the banks as a response to this regulation. However, it is also pointed out that the LCR raises incentives for the bank to self-insure against liquidity shocks, the effect is incapable of achieving the resilience of the banking system under liquidity stress (Hardy and Hochreiter, 2014; Shin, 2011). Nevertheless, the most significant and essential impact of the LCR considered by the academia and policymakers is how this regulation affects the monetary policy implementation (Bech and Keister, 2013; Bonner and Eijffinger, 2016; ECB, 2013, 2012; Schmitz, 2011; Stein, 2013). The reason is based on the inseparable and natural relationship between the central bank as the supply side of the prime liquidity asset accepted in the LCR—central bank reserves; and commercial banks, the corresponding demand side. Thus, the banks may rely more heavily on the central bank's provision of reserves (Bindseil and Lamoot, 2011). However, when researchers investigated the bilateral causality between the LCR regulation and monetary policy implementation, they placed much emphasis on the channel of inter-bank interest rate (Bech and Keister, 2013; Schmitz, 2011) and open market operations (Bindseil and Lamoot, 2011), instead of credit creation through which the banks play the essential role in economy.

Actually, the neglect of credit creation and its possible impacts on macroeconomic performance may cause an unanticipated consequence outweighing the effects projected by the policymakers. It has been put forward by some minority economists that the credit has its separate channel in stimulating the macroeconomy, especially in times of stress (Bernanke and Blinder, 1988; Bernanke and Gertler, 1995; Stiglitz and Blinder, 1983). However, a few early insightful works have shown and warned that raising credit to stimulate aggregate demand may trigger an adverse positive feedback between assets prices and the real burden of debt referred to as debt deflation (Fisher, 1933), or drives an economy to financial crisis after exceeding the critical point (Minsky, 1986). The reason has been highlighted by the recent financial crisis that the excessive stock and rapid expansion of credit created by banks could even destroy macroeconomic stability (Bernanke, 2010; Glick and Lansing, 2010; Gourinchas and Obstfeld, 2012; Mian and Sufi, 2011; Sutherland and Hoeller, 2012). The recent studies further identify that financial crises are almost always preceded by excessive credit booms (Jordà et al., 2013; Schularick and Taylor, 2012). In one word, the credit level and growth has profound impacts on macroeconomic performances, and should be naturally the heart of the macroeconomic models for the analysis of monetary and bank regulatory policy.

Although some efforts as to understanding the mechanism of current financial crisis are witnessed in the mainstream economics; to our disappointment, how credit works with the LCR regulation has not yet been addressed so far. Of course, the lack of data on the bank's cash flows poses a fundamental obstacle to empirically assess impacts of the LCR (King, 2010). In fact, what sets the persistent barrier at the way approaching to the truth is the misconception on banks and credit creation—the banks simply lending out the deposits that savers place with them as the financial intermediaries (McLeay et al., 2014a). According to the traditional viewpoint, the most significant and ultimate restriction on the supply of bank loans is the quantity of pre-existing loanable funds collected mainly by expansion of deposits. So the banking regulation generates up to indirect and secondary impacts on the lending of banks. In contrast to this dominant view on

banks, an alternative theory named the credit creation theory of banking attracts rapidly growing attention thanks to the financial crisis, which had been widespread in the late 19th and early 20th century (Phillips, 1920), but was discarded and excluded by current mainstream economic theory. It argues that each individual bank makes a loan with simultaneously creating a matching deposit in the borrower's bank account, thereby creating new money rather than transferring deposits or central bank reserves to the borrower. In recent years, owing to substantial progress in data collection and analysis, the credit creation theory of banking has even been supported by the empirical study (Werner, 2014a). After being received increasing attention, the credit creation theory of banking has been applied to analyze the present monetary systems (Borio and Disyatat, 2011; Disyatat, 2011; Jakab and Kumhof, 2015; King, 2016; McLeay et al., 2014a, 2014b; Ryan-Collins and Greenham, 2012; Werner, 2014b, 2014c, 2005). This alternative concept of credit creation implies the majority of money in the modern economy is created by commercial banks, and therefore the assessment of money creation turns into analyzing the credit creation process of banking systems (McLeay et al., 2014a, 2014b).

As we all know, the prevailing metric used to measure the money creation process is called money multiplier, which indicates what multiple of the monetary base is transformed into the money supply. However, the description of the money multiplier in the dominating textbooks has been criticized as being misleading after the crisis (Carpenter and Demiralp, 2012; Disyatat, 2011; Goodhart, 2010; King, 2016). Indeed, this type of multiplier is nothing more than a static identity of some structural factors. In particular, it ignores the role of the banking system, or it does not contain any information about behavior of banks as the creator of money (ECB, 2011; Goodhart, 2010; Keister and McAndrews, 2009). This argument is in line with treating individual banks as mere financial intermediaries just playing passive roles in the mainstream economic models.

Our main effort of this work is to examine how the money supply is determined when a bank complies with the liquidity coverage ratio. We build a model of bank lending whereby we can describe the dynamics of the balance sheet of a representative bank and regard it as the banking sector's aggregate balance sheet, thus illustrating the money creation process. The model has several main implications. Above all, the bank is the creator of money instead of a common financial intermediary, as argued by the credit creation theory of banking. According to this perspective, in our model, the deposit or money is created by bank lending and destroyed by repayment, i.e., each change in bank deposits is driven by and always identical to that in the loans. This characteristic gives this model its distinctive feature compared to the dynamic banking model proposed recently, in which the bank's portfolio separation holds, the deposit and loan paths to be considered independently (Balasubramanian and VanHoose, 2013; Van den Heuvel, 2002). Moreover, the ultimate constraint on bank lending turns out to be the banking regulations or monetary policy instead of the loanable funds mainly governed by deposits (Disyatat, 2011; McLeay et al., 2014a).

Although the way we present the outcome of money creation process is consistent with the traditional one, our results of the money multiplier are fundamentally different. Specifically, in contrast to the traditional money multiplier, the determinants of the money multiplier obtained in our work are found to be associated with the LCR provisions and lending behavior of the bank. It is noteworthy that we prove the bank's lending capacity and the expression of the money multiplier depend on the economic situation. The most interesting outcome, is that, this connection between economic environment and the regulatory constraint may reinforce each other in such a way that economic booms usually imply sufficient cash inflows of the bank resulting in more loans the banks can supply and further stimulating the economy, and vice versa. This result uncovers the LCR has the potential to be procyclical in terms of credit creation, this procyclicality

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