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The role of on- and off-balance-sheet leverage of banks in the late 2000s crisis

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ABSTRACT

Extensive regulatory changes and technological advances have transformed banking systems to a great extent. Banks have reacted to the challenges posed by the new operating environment by creating new products and expanding their activities to some uncharted business areas. In this paper, we study how modern banking which gave birth to the off-balance-sheet leverage activities affected the risk profile of U.S. banks as well as the level of systemic risk before and after the onset of the late 2000s financial crisis. Towards this, we separate on- from off-balance-sheet leverage and capture the latter with different, yet complementary, measures which do not exist in the current literature. Special attention is paid on the deleveraging process that occurred in the banking market after the crisis erupted, which is an additional innovative feature of this study. Our findings reveal that leverage, both explicit and hidden off-the-balance-sheet, increases the individual risk of banking firms making them vulnerable to financial shocks. Reverse leverage, on the other hand, is beneficial for individual banks' health, but is found to be harmful for financial stability. We also demonstrate that the banks which concentrate on traditional lines of business typically carry less risk compared to those involved with modern financial instruments.

1. Introduction

The late 2000s financial crisis, whose origins can be traced in the rising delinquencies in the U.S. subprime mortgage market in 2006 and the succeeding collapse in housing prices in August 2007, has revealed several inadequacies in the functioning of the financial system: loose monetary policies, performance-based remuneration practices, and inefficient regulatory and supervisory rules in the years preceding the crisis are amongst the perceived causes of making the entire system more vulnerable to shocks. A factor which is related to the aforementioned shortfalls and is identified in the current crisis literature as having a substantial role in the buildup of severe structural weaknesses and adverse market dynamics during the pre-crisis period is the high leverage of financial institutions worldwide.

In general terms, leverage is viewed as one of the main underlying features of banks' balance sheets. Traditionally, leverage arises directly through formal debt where the most popular types of debt are bonds and credit lines. Nevertheless, in the years before the crisis, banking firms were deemed to have leveraged their positions to a much greater extent than they used to by taking advantage of financial engineering techniques, which allowed them to transfer a large part of their leverage off their balance sheets.[1] Therefore, a significant degree of leverage was assumed implicitly, in the sense that it was not recorded on the balance sheet of banks. However, shortly after the crisis erupted, financial organisations sought to deleverage their positions thus amplifying the already existing downward pressure on asset prices which, in turn, encouraged the deleveraging spiral even further. This procyclical process was exacerbated by the large size and the systemic importance of the financial institutions that were engaged in the off-balance-sheet activities. Overall, the malfunctions of the banking industry strongly affected the rest of the financial system resulting in a massive contraction of liquidity and credit availability which,

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[1] It is true that the corporate financial sector was also engaged in high-leverage business projects before the onset of the crisis. However, this issue is out of the scope of the current study.

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shortly later, exerted a serious adverse influence on the real economy.

Even though the impact of leverage on the health of the financial system has been discussed in several policy and academic studies (see, e.g., CRMP Report, 2008; Greenlaw et al., 2008), not enough empirical evidence has been gathered to provide concrete answers about the relevance of leveraging and the role of deleveraging in the propagation and prolongation of the latest financial crisis. Along these lines, little attention has been paid to the overall leverage behaviour of banks in the sense that the extant literature mainly focuses on the traditional on-balance-sheet leverage, neglecting, to a great extent, the importance of the implicit leverage in the operation and the soundness of the banking system. In this paper, we make an attempt to fill part of this void by empirically assessing how modern banking, which gave birth to the off-balance-sheet leverage, has affected the health of the U.S. systemically important banking companies as well as the level of risk of the entire U.S. banking system before and after the onset of the late 2000s crisis. To this aim, we separate on- from off-balance-sheet leverage activities and capture the latter set of activities with different, yet complementary, measures which do not exist in the current literature. Importantly, we devote special attention to the deleveraging process which took place in the banking market after the crisis erupted.

Our findings reveal, among other things, that on-balance-sheet leverage has a negative impact on the health of individual banks as well as on the stability of the system. By the same token, we find that the different types of off-balance-sheet leverage are negatively linked to the soundness of the banking system as a whole. This result is even stronger in case systemic risk is considered. Reverse leverage, on the other hand, has beneficial effects on individual banks' health, but increases the fragility of the entire system. We also demonstrate that the banks that concentrate on the traditional activity of taking deposits from households and making loans to agents who require capital carry less risk to the system compared to banks which are involved with new financial services. On the whole, our results provide a better understanding of one of the root causes of the global financial crisis and contribute to the discussion on the restructuring and strengthening of the existing regulatory framework for banks.

The remainder of the paper proceeds as follows. In Section 2, we examine how on- and off-balance-sheet leverage as well as reverse leverage are linked to the soundness of individual banks and to the health of the banking system; both an empirical and a theoretical approach are taken to illustrate the aforementioned relationships. Section 3 provides a description of the data set and a justification of the variables used in our baseline empirical analysis; the regression model, together with the descriptive statistics and the estimation methodology are also presented in this section. Section 4 then reports and discusses the empirical results, which are subjected to robustness checks in Section 5. The policy implications of our findings along with the concluding remarks are presented in Section 6.

2. The nexus between leverage, reverse leverage and risk in the banking system

2.1. An empirical perspective

Generally speaking, bank leverage refers to the use of debt in financing new assets and investments. Regarding the on-balance-sheet leverage of banks, this is related to the use of deposited funds or any other balance sheet items like, for instance, bonds to supplement banks' equity capital in financing fresh loans and investments. Banks expect that the granted loans will produce a higher rate of return compared to the interest rate that they have agreed to pay to their depositors (or, investors in the case of bonds). If the loan/investment return rates turn out to be lower than anticipated, the bank's equity capital (or net worth) will inevitably shrink since the bank will have to cover the difference between deposit and lending rates by resorting to its equity capital. Further, if we presume that a loan fails to perform and that the bank is not able to recover it, the loan will be charged off, implying that the institution will lose an amount of assets equal to the loan loss. Charge-offs will have an impact on the liabilities side of the bank's balance sheet as they will reduce the bank's net worth by the amount of the loss. Overall, equity is viewed as a buffer against the losses a bank suffers in case loans – or other bank investments – go sour. Apparently, if several – let alone many – borrowers default on their obligations, then the equity capital will be in peril. Should nonperforming and defaulted loans accumulate, which is a common phenomenon in bad economic times, equity capital would disappear. In sum, on-balance-sheet leverage maps the riskiness of a bank's asset position into the riskiness of its equity stake.

Leverage can also be traced off the balance sheet of banking organisations. Specifically, in the years running up to the crisis, banks have been transferring a part of their leverage and the accompanying risk off their balance sheets mainly through their engagement in securitisation activities and Over-The-Counter (OTC) derivatives trading. Both these undertakings are strongly linked to the so-called 'regulatory arbitrage'. This sort of arbitrage refers to the response of banks to regulatory restrictions (especially those on capital requirements) that were imposed by Basel I and II. In more details, regulatory arbitrage is the game that takes place between banking firms and regulatory authorities, whereby the former innovate and develop new financial instruments in order to elude the scrutiny of supervisors and increase their returns, and the latter tighten the rules to avoid excessive risk-taking with the utmost purpose to safeguard the stability of the financial system.[2]

Securitisation was mainly achieved through the setup of Asset Backed Commercial Paper (ABCP) conduits and Structured Investment Vehicles (SIVs) where banks could transfer large portions of their assets. More concretely, a considerable amount of bank assets was transferred to the above-mentioned investment pools, whilst, at the same time, the sponsoring banking institutions were providing these pools with liquidity and credit enhancements (or backstops) in order to ensure funding liquidity for them. Those backstops could attract a low charge under Basel Agreements and were funded mostly by short-term securitised debt and only by very little equity capital – or any other long-term investments – which has been always costly for banks. In so doing, the sponsoring institutions were able to free up capital and, hence, originate more assets – generally of lower quality (like, e.g., subprime mortgage loans) – that were typically hidden in the so-called shadow banking system.[3] Therefore, banks deliberately avoided issuing new equity capital in order to originate new assets and, more generally, to finance their activities.[4] As a consequence, conduits and

[2] For a thorough discussion of regulatory capital arbitrage through derivative instruments, see Breuer (2002).

[3] Shadow banking consisted of non-bank financial institutions like hedge funds, insurance funds, investment funds, pension funds, SIVs, conduits, to name the most important ones. Some of these institutions, like SIVs and conduits, are not in operation anymore.

[4] Banks were very keen on engaging in securitised activities not only because they could qualify for lower capital requirements, but also because securitisation had the extra advantage of generating fee income. Fees did not have to be returned in case securities suffer losses thus providing banks with an additional incentive to structure products and leverage their positions even further.

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