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Changing credit limits, changing business cycles☆

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ABSTRACT

In the last half-century, capital markets across the industrialized world have undergone massive deregulation, involving large increases in the loan-to-value (LTV) ratios of households and firms. We study the business-cycle implications of this phenomenon in an estimated dynamic general equilibrium model with multiple credit-constrained agents. A progressive relaxation of credit constraints initially leads to both higher macroeconomic volatility and stronger comovement between debt and real activity. This pattern reverses at LTV ratios not far from those currently observed in many advanced economies, due to credit constraints becoming non-binding more often. The non-monotonic relationship between credit market conditions and macroeconomic fluctuations carries important lessons for regulatory and macroprudential policymakers. While reducing the average LTV ratio may unintentionally increase macroeconomic volatility, a countercyclical LTV ratio proves to be successful in dampening business cycle fluctuations and, most importantly, avoiding dramatic output drops.

1. Introduction

Credit flows are crucial for the functioning of an economy where inhabitants want to alter the profile of purchases over time. Consumers may want to smooth consumption and finance their purchases of durable goods. Likewise, firms may desire to obtain funds for investment projects that only pay off later. Such intertemporal trades are typically plagued by informational problems leading to a multitude of financial market imperfections. One implication is that households and firms become credit constrained, and often have to provide collateral to obtain loans. Under such circumstances, the degree to which credit constraints bind is influential for the economy's response to various disturbances. The main purpose of this paper is to study the business-cycle properties of a conventional DSGE model with credit constraints à la Kiyotaki and Moore (1997) under different credit conditions. Since credit availability is largely determined by how much an agent can borrow against his collateral—the loan-to-value (LTV) ratio—we model changes in credit conditions as changing LTV ratios.

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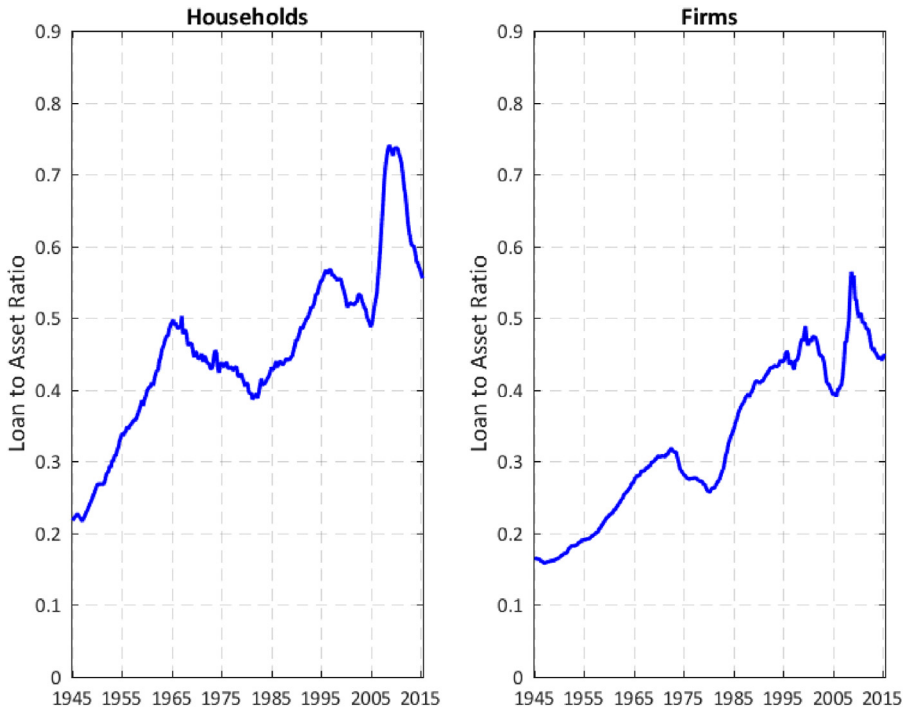

Fig. 1. The ratio of liabilities to assets for households and firms in the United States, 1945Q4–2016Q2. Source: Flow of Funds data from the U.S. Federal Reserve. See Appendix A for details.

Capital markets have undergone massive deregulation across the industrialized world in the past half-century. Looking at the credit market, one dimension of this phenomenon has consisted in a large increase of both household and corporate debt secured by some form of collateral. This has been documented, among others, by Jordà et al. (2017) for households and Graham et al. (2014) for firms. Fig. 1 shows loans relative to assets for households and firms in the US in the post-war period. The observed secular increases are consistent with increased credit availability through higher LTV ratios.[1] To study the effects of this structural transformation on the U.S. business cycle, we incorporate collateral constraints into a real business cycle model with heterogeneous agents, in the vein of Iacoviello (2005), Liu et al. (2013), Justiniano et al. (2015); *inter alia*. A durable good, land, is used for both consumption purposes and production. In addition, land serves as collateral for "impatient", credit-constrained households, as well as for entrepreneurs. The lenders in the economy are "patient", financially unconstrained households. In contrast to most of the existing business cycle literature, we explore the implications of credit constraints not binding at all points in time.[2] To ensure that the model matches key features of the U.S. economy, we estimate it using the Simulated Method of Moments. This approach allows us to account for the non-linearities arising from occasionally binding constraints.

Our main findings are that macroeconomic volatility and co-movement between debt and real variables display a hump-shaped pattern in response to changes in the LTV ratio. Starting from relatively low LTV ratios, higher credit limits allow financially constrained agents to succumb to their relatively higher impatience and engage in debt-financed consumption and investment. This reinforces the macroeconomic repercussions of shocks affecting the borrowing capacity of these agents. As a result, output fluctuations become larger and credit issuance becomes more procyclical with a deepening of financial markets. Eventually, a further increase in the LTV ratio reverses this pattern. While credit constraints remain binding after negative shocks to the economy, higher LTV ratios increase the likelihood that credit constraints become non-binding in the face of expansionary shocks. In such cases, the consumption and investment decisions of households and entrepreneurs are delinked from changes in the value of the collateral assets, dampening the volatility of aggregate economic activity and the co-movement between debt and real activity.

The non-monotonic relationship between credit market conditions and macroeconomic fluctuations poses important challenges for regulatory and macroprudential policies. In fact, our analysis establishes a macroeconomic volatility trade-

[1] As we discuss in Appendix A, the aggregate ratios of loans to assets reported in Fig. 1 are likely to understate the actual LTV requirements faced by the marginal borrower. However, while alternative measures may yield higher *levels* of LTV ratios, they give rise to the same conclusions about the development over time of these ratios. See also Taylor (2015), who documents the rise of household and firm borrowing in a sample of 17 advanced economies dating back to 1870.

[2] See Guerrieri and Iacoviello (2017) and Maffezzoli and Monacelli (2015) for two recent contributions which also incorporate occasionally binding credit constraints.