Economic Studies 159

Rachatar Nilavongse

Housing, Banking and the Macro Economy
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The Department of Economics at Uppsala University has a long history. The first chair in Economics in the Nordic countries was instituted at Uppsala University in 1741.

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Abstract

Essay 1: Expectation-Driven House Prices, Debt Default and Inflation Dynamics
We contribute to the literature on dynamic stochastic general equilibrium (DSGE) models with housing collateral by including shocks to house price expectations. We also incorporate endogenous mortgage defaults that are rarely included in DSGE models with housing collateral. We use this model to study the effects of variations in house price expectations on macroeconomic dynamics and their implications for monetary policy. Model simulations show that an increase in expected future house prices leads to a decline in mortgage default rate and interest rates on household and business loans, whereas it leads to an increase in house prices, housing demand, household debt, business debt, bank leverage ratio and economic activity. In contrast to previous studies, we find that inflation is low during a house price boom. Finally, we show that monetary policy that takes into account household credit growth reduces the volatility of output and dampens a rise in housing demand, household debt and bank leverage ratio that enhances financial stability. However, a central bank that reacts to household credit growth increases the volatility of inflation.

Essay 2: House Price Expectations, Boom-Bust Cycles and Implications for Monetary Policy
This essay examines the role of household expectations about future house prices and their implications for boom-bust cycles and monetary policy. Our findings are as follows. First, waves of optimism and pessimism about future house prices generate boom-bust cycles in house prices, financial activities (household debt, business debt, bank leverage, interest rates on household and business loans) and the real economy (housing demand, consumption, employment, investment and output). Second, we find that inflation declines during a house price boom and increases during a house price burst. Third, we find that monetary policy that reacts to household credit growth reduces the magnitude of boom-bust cycles and improves household welfare. Fourth, we find that the case for taking into account household credit growth becomes stronger in an economy in which the bank capital to asset ratio requirement is low, interest rates on loans and deposits adjust immediately to changes in the policy rate, or the household sector is highly indebted.

Essay 3: Credit Disruptions and the Spillover Effects between the Household and Business Sectors
This essay examines the effects of credit supply disruptions in a New Keynesian DSGE model with housing collateral and working capital channels. A tightening of business credit conditions creates negative spillovers from the business sector to the household sector through labor income and housing collateral channels. A tightening of household credit conditions has negative spillover effects on the business sector via the housing collateral channel. We find that spillovers are more sensitive to changes in leverage where the shock occurs. A negative business credit shock creates upward pressure on inflation, whereas a negative household credit shock creates downward pressure on inflation. The working capital channel magnifies the response of inflation to a business credit shock, whereas it dampens the response of inflation to a household credit shock.

Keywords: House price expectations, Debt default, Boom-bust cycles, Monetary policy, Inflation, Welfare analysis, Credit supply disruptions, Working capital, DSGE models

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Introduction

The housing market plays an important role in the economy. Iacoviello (2010) finds that U.S. housing wealth is larger than the Gross Domestic Product in the U.S. and that housing wealth accounts for almost half of household wealth. Furthermore, a large share of household debt occurs in the form of home mortgages (Monacelli 2006). Hence, movements in house prices can have profound impacts on the economy.

The U.S. experienced an unprecedented boom from 1996 to 2006 (Towbin and Weber 2015) and the burst of the U.S. house price bubble in late 2006 led to the Great Recession, which was the worst recession since the Great Depression in 1930s. The housing market played a central role in the financial crisis (Bernanke 2008). We saw that after the burst of the U.S. house price bubble, the U.S financial system was on the brink of collapse, which triggered the global financial crisis. Despite the important role of the housing market in the economy, many modern macroeconomic models did not include a housing market. Prior to the housing market crisis, the research on the housing market and the macroeconomy was not part of the research agenda because many academics considered the housing market as unimportant for the macroeconomy (Iacoviello 2010).

A dynamic stochastic general equilibrium (DSGE) model is a micro-founded optimization-based model that incorporates the major sectors of the economy in which the different sectors in the model are intertwined. In recent years, the use of DSGE models has become an important tool for the analysis of business cycles and economic policy (Sbordone et al. 2010). In particular, DSGE models are playing an important role in providing guidance when formulating monetary policy at many of the world’s central banks. Prior to the housing market crisis, many policy-makers underestimated the impacts of house price cycles on the economy and a housing sector was typically not incorporated in DSGE models.

Given the importance of the housing sector and the use of DSGE models in the policy-making process, it is wise to integrate a housing sector into the DSGE framework to better inform us about the effects of house price cycles on the economy and to help us formulate better economic policy.
This thesis adds to the ongoing development of DSGE models that include the role of house price cycles. In this thesis, I examine the role of house price cycles and their implications for the macroeconomy and monetary policy in a DSGE framework. This thesis consists of three essays. In the following sections, I briefly describe the three essays and the main findings.

I. Expectation-Driven House Prices, Debt Default and Inflation Dynamics

House price fluctuations have a large impact on the economy as was demonstrated by the burst of the U.S. house price bubble in 2006. Based on their survey of homebuyers, Shiller (2007) and Case et al. (2012) find that expectations of future house price appreciations played an important role in explaining the U.S. house price boom. Lambertini et al. (2013a) and Towbin and Weber (2015) find that variations in house price expectations in their VAR models play an important role in house price cycles. However, shocks to house price expectations are rarely included in DSGE models with housing collateral. In this essay, we contribute to the literature on DSGE models with housing collateral by including shocks to house price expectations. In particular, households are optimistic about future house prices. We also incorporate endogenous mortgage defaults that are rarely included in DSGE models with housing collateral. Specifically, households default when the value of their houses is lower than the mortgage loan repayment. We use this model to study the effects of variations in house price expectations on macroeconomic dynamics and their implications for monetary policy.

The main findings are as follows. An increase in expected future house prices leads to a decline in mortgage default rate and interest rates on household and business loans, whereas it leads to an increase in house prices, housing demand, household debt, business debt, bank leverage ratio and economic activity. We find that inflation is low during the house price boom. Finally, we find that monetary policy that takes into account household credit growth reduces the volatility of output and dampens a rise in housing demand, household debt and bank leverage ratio, which enhances financial stability. However, a central bank that reacts to household credit growth increases the volatility of inflation.

Compared with previous studies, the study by Iacoviello (2015) who models mortgage defaults as an exogenous shock, whereas our model includes endogenous default on mortgages. In our model, households default when the
value of their houses is lower than the mortgage loan repayment. Forlati and Lambertini (2011) include endogenous mortgage defaults in which variations in mortgage defaults depend on variations in mortgage risk, whereas in our model, mortgage defaults depend on variations in expected future house prices. We show that an increase in expected future house prices leads to a rise in house prices, which causes a decline in mortgage default rate. Forlati and Lambertini (2011) show that variations in mortgage risk generate a weak persistence in house prices and economic activity. In our essay, a shock to house price expectations generates a strong persistence in house prices and economic activity, which is consistent with the VAR studies by Lambertini et al. (2013a) and Towbin and Weber (2015).

We contribute to the literature by showing that a rise in expected future house prices leads to a fall in inflation and a rise in current house prices at the same time. Bernanke and Gertler (2000) show that stock prices tend to be high during an inflationary period. Forlati and Lambertini (2011), however, show that a drop in mortgage risk entails a rise in house prices and inflation. The findings reported by Bernanke and Gertler (2000) and Forlati and Lambertini (2011) have different ramifications for monetary policy and financial stability than our findings. In the studies by Bernanke and Gertler (2000) and Forlati and Lambertini (2011), the central bank reacts to upward pressure on inflation by raising the policy rate. This reaction may reduce financial instability by dampening an increase in leverage in the economy, meaning that the economy becomes less sensitive to disturbances. Based on our setting, the central bank reacts to downward pressure on inflation by cutting the policy rate. This reaction amplifies the rise in housing demand, household debt and bank leverage ratio, and therefore increases financial instability, meaning that the highly leveraged economy is more vulnerable to a collapse of house prices.

We also examine whether monetary policy that takes into account household credit growth can improve macroeconomic stability and contribute to financial stability. We find that monetary policy that reacts to household credit growth reduces the volatility of output, but it increases the volatility of inflation. Moreover, by reacting to household credit growth, monetary policy dampens the rise in housing demand, household debt and bank leverage ratio. Thus, this reaction may reduce the sensitivity of the economy to shocks to the housing market and may decrease the risk of a financial crisis. Briefly, monetary policy that reacts to household credit growth improves the stability of the real economy and enhances financial stability, but it jeopardizes price stability in the short run as inflation deviates further from the inflation target.
Briefly, the new findings are as follows. A positive shock to house price expectations yields a house price boom, a credit boom and an economic upturn, whereas it leads to a decline in inflation. When the economy is hit by shocks to house price expectations and monetary policy reacts to household credit growth, the stability of the real economy and financial stability are enhanced but at the cost of price stability.

II. House Price Expectations, Boom-Bust Cycles and Implications for Monetary Policy

The purpose of this essay is to investigate the implications of waves of optimism and pessimism about future house prices for boom-bust cycles and monetary policy. Most previous studies on expectation-driven business cycles in a DSGE framework, such as those by Beaudry and Portier (2004, 2006), Jaimovich and Rebelo (2009), Christiano et al. (2008, 2010), Gunn and Johri (2011), and Walentin (2014) examine the effects of expectations about future technology shocks on macroeconomic dynamics and boom-bust cycles. Unlike these studies, we examine the implications of waves of optimism and pessimism about future house prices on macroeconomic dynamics and boom-bust cycles. Shocks to house price expectations capture waves of optimism and pessimism about future house prices. Specifically, households receive a signal that indicates that future house prices will be high, which leads to a house price boom and an expansion in economic activity. When the signal about future house price appreciations turns out to be wrong, households reverse their expectations, which trigger a collapse in house prices and a slump in economic activity. The previous essay discusses the role of house price expectations in a DSGE model, but it does not allow for the reversal of household expectations.

Furthermore, most previous studies on monetary policy in DSGE models with collateral constraints (Monacelli 2006, Rubio 2011, Bofinger et al. 2013, Lambertini et al. 2013b, Gambacorta and Signoretti 2014, Rubio and Carrasco-Gallego 2014 and 2015, Baldi 2014, and Notarpietro and Siviero 2015) do not consider the implications of waves of optimism and pessimism about future house prices for monetary policy. In this essay, we also study the implications of waves of optimism and pessimism about future house prices for monetary policy. In this essay, we also study the implications of waves of optimism and pessimism about future house prices for monetary policy.

We examine the following issues. First, we investigate whether changes in expectations about future house prices can generate boom-bust cycles in house
prices, financial activities (household debt, business debt, bank leverage, interest rates on household and business loans) and the real economy (housing demand, consumption, employment, investment and output). Second, we examine the implications of variations in household price expectations for monetary policy. Specifically, we study whether monetary policy that takes into account household credit growth can reduce the amplitude of boom-bust cycles. Third, we study whether monetary policy that reacts to household credit growth increases household welfare. In particular, we compare household welfare under a standard Taylor rule to an augmented Taylor rule in which the central bank reacts to household credit growth in addition to inflation and output. Fourth, we examine whether the case for monetary policy reacting to credit growth is stronger in an economy that has a low or a high bank capital to asset ratio requirement. Fifth, we study whether the case for taking into account credit growth is stronger in an economy in which interest rates on loans and deposits adjust immediately to changes in the policy rate or if it is stronger in an economy in which interest rates adjust slowly to changes in the policy rate. Finally, we examine whether the case for monetary policy responding to credit growth is more or less pronounced in an economy that has a highly leveraged household sector.

Our findings are as follows. Waves of optimism and pessimism about future house prices generate boom-bust cycles in house prices, financial activities and the real economy. We find that inflation declines during a house price boom and increases during a house price burst. This finding has implications for monetary policy and financial stability. The central bank reacts to the house price boom and the accompanied decline in inflation by lowering the policy rate. Consequently, monetary policy may amplify the house price boom, the rise in housing demand, household debt and bank leverage, which increase financial instability. The implication of this finding is that a standard monetary policy that only takes into account inflation and output may magnify boom-bust cycles.

We find that monetary policy that considers household credit growth dampens boom-bust cycles in financial activities and the real economy relative to the standard Taylor rule. Monetary policy that reacts to household credit growth also improves financial stability by dampening the rise in housing demand, household debt and bank leverage.

We find that monetary policy that takes into account household credit growth improves household welfare when house price cycles are driven by waves of optimism and pessimism. We conduct a number of sensitivity analyses, and we obtain the following new results. The welfare gains are amplified
in an economy with a low bank capital to asset ratio requirement. The welfare gains are also amplified in an economy in which interest rates on deposits and loans adjust immediately to changes to the policy rate. Finally, the welfare gains are amplified in an economy in which the household sector is highly indebted. These findings are novel because most previous studies do not consider the implications of waves of optimism and pessimism about future house prices for monetary policy and do not conduct the same set of sensitivity analyses as in our study.

III. Credit Disruptions and the Spillover Effects between the Household and Business Sectors

The purpose of this essay is to investigate and compare the effects of tightening credit conditions in business and household sectors on the real economy and to examine how the tightening of credit conditions in one sector affects the other sector in a DSGE model with collateral constraints. We also compare the effects of different types of credit supply shocks on inflation dynamics.

Jermann and Quadrini (2012) and Liu et al. (2013) study the macroeconomic effects of a tightening of business credit conditions in DSGE models with collateral constraints. The authors do not include household credit shocks in their models, and they do not study the effects of credit supply disruptions on inflation dynamics. Unlike Jermann and Quadrini (2012) and Liu et al. (2013), we include credit disruptions in business and household sectors in our model, and we also examine the effects of credit shocks on inflation.

We embed a working capital channel that is typically absent in a New Keynesian DSGE model with collateral constraints. Previous studies that have incorporated a working capital channel into a DSGE framework includes those of Christiano et al. (2005), Chowdhury et al. (2006), Tillmann (2008), and Christiano et al. (2011). In their models, a rise in the interest rate reduces output and inflation via a fall in aggregate demand. However, with the presence of a working capital channel, a hike in the interest rate directly raises the marginal cost of production, creating upward pressure on inflation. Thus, the working capital channel can dampen the negative response of inflation to a monetary policy tightening. The previous studies do not include household and business credit shocks, and their models do not include collateral constraints.

Our findings are as follows. First, we find that a tightening of business credit conditions has a negative impact on the real economy. A tightening of
business credit conditions creates negative spillovers from the business sector to the household sector through the labor income and housing collateral channels, and it has negative effects on household consumption. The spillover effects on the household sector are more sensitive to changes in leverage in the business sector than changes in leverage in the household sector.

Second, we find that a negative household credit shock yields a negative response in the real economy. A credit disruption in the household sector spills over to the business sector via the housing collateral channel, which has a negative impact on investment and employment. The spillover effects on the business sector are more sensitive to changes in leverage in the household sector than changes in leverage in the business sector.

Third, we find that a negative business credit shock generates a positive response in inflation, whereas a tightening of household credit conditions yields a negative response in inflation. Moreover, the working capital channel magnifies the response of inflation to a business credit shock but dampens the response of inflation to a household credit shock.

The main contributions of this essay to the literature are the following. We show that different credit shocks generate different effects on inflation dynamics. We also show that spillovers are more sensitive to changes in leverage where the credit shock occurs. The working capital channel amplifies or dampens the response of inflation depending on where credit shocks occur.

The implications for monetary policy are as follows. A negative business credit shock generates a positive response in inflation, which creates a dilemma for the central bank because there is a tradeoff between stabilizing output and inflation. If the central bank responds to upward pressure on inflation by raising the policy rate to reduce inflation, even lower output may result. The rise in the policy rate may amplify the working capital channel, hence placing even more upward pressure on inflation, which weakens the ability of the central bank to reduce inflation toward its inflation target. In the case of a negative household credit shock, the central bank does not face a dilemma.

References


