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The economic effects of a central bank reacting to house price inflation ☆

Guido Baldi *

University of Bern, Department of Economics, Schanzeneckstr. 1, CH-3000 Bern, Switzerland
German Institute for Economic Research, Mohrenstr. 58, D-10117 Berlin, Germany

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ABSTRACT

What are the economic effects of a central bank that takes the evolution of house prices into account? In an attempt to answer this question, we use a New Keynesian dynamic stochastic general equilibrium model with a housing sector to explore the economic impacts of a central bank reacting to house price inflation. We examine this in the context of two different shocks that are associated with two factors cited as possible underlying sources of the recent bubble in the housing market and the ensuing financial crisis. First, we allow for a positive shock to the household borrowing constraint. Second, we analyze the effects of a preference shock to housing. Our results indicate that these two shocks lead to a more pronounced increase in house prices and an expansion of the housing sector if the central bank does not react to house prices. If the central bank reacts to house price increases, it must accept lower output growth rates over the business cycle. We also show that welfare decreases if a central bank reacts to house price inflation. Because of these effects, a central bank may be reluctant to react to house price inflation.

1. Introduction

The recent economic crisis has led to a debate on whether central banks should assign greater weight to asset prices and, in particular, to house prices. Although it is difficult to empirically assess whether central banks have reacted to house prices in the past, there is some evidence that this might have been the case (see Finocchiaro and Heideken, 2013). In this paper, we apply a New Keynesian dynamic stochastic general equilibrium (DSGE) model with housing and banking sectors to assess the economic impacts of a central bank that reacts to the evolution of property prices. To this end, we will augment the standard Taylor rule by a term that determines the central bank's reaction to house price inflation. We analyze the impacts of such an augmented Taylor rule in the context of shocks to two factors that have been suggested as possible drivers of the recent housing boom in countries such as the United States, the United Kingdom and Spain. Our analysis focuses on temporary - though persistent - shocks and not on permanent changes to the equilibrium. We abstract from long-run housing price dynamics that may be related to long-run income and population growth.

The factors we consider include the following: The first is a temporary shock to the household borrowing constraint. This is included because, since the late 1990s, many homeowners in the United States and other countries were allowed to borrow a larger fraction of the values of their properties than before. In general, one can expect this to lead to a boom and

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* Address: University of Bern, Department of Economics, Schanzeneckstr. 1, CH-3000 Bern, Switzerland.

E-mail address: guido.a.baldi@gmail.com

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higher prices in the housing sector that could spill over to the rest of the economy. The second shock is a temporary housing preference shock similar to that in Iacoviello and Neri (2010). Such a preference shock is, of course, difficult to identify in reality. We interpret a preference shock as the result of changes in the political and social environments that encourages an increase in home-ownership.

In a calibrated DSGE model, we illustrate how these two factors can contribute to higher house prices over the business cycle. We then investigate how a central bank reacting to price increases in the housing market affects macroeconomic variables. To this end, we develop a model that reflects the most important empirical findings regarding the effects of monetary policy on housing (see, for instance, Iacoviello, 2005; Monacelli, 2009; Carlstrom, 2006). According to these results, a tightening of monetary policy leads to a decrease in spending on both housing and consumer goods. Thus, there is a positive co-movement between these two spending categories. In addition, spending on housing is more volatile than spending on consumer goods. Borrowing that is tied to property values represents a further monetary policy transmission channel. In the presence of borrowing constraints, an increase in interest rates leads to higher borrowing costs for households. In addition, the price of housing decreases, which lowers the amount that households can borrow. This, in turn, will reduce their desired level of consumption. We also incorporate a cost channel into the monetary transmission mechanism, similar to Ravenna and Walsh (2006).

We show that a central bank reacting to house price inflation will have to accept economic growth rates that are below potential or even a recession. In addition, the reaction to house price inflation will also lead to lower welfare than under a conventional interest rate rule that does not include house prices. Because, in this paper, monetary policy reacts to house prices mechanically, the decisions made by the central bank will be independent of the type of shock. However, one should bear in mind that in practice central banks may attempt to identify the types of shocks affecting the business cycle, which involves a considerable degree of uncertainty.

This paper is organized as follows. In Section 2, we develop a two-sector New Keynesian DSGE model that contains housing and borrowing constraints. Section 3 describes how the parameter values of the model are selected. In Section 4, we investigate how the variables in our model respond to shocks to preferences and the borrowing constraint. Finally, Section 5 contains the conclusion.

2. The model

2.1. The representative individual

We assume that there is a representative individual in the economy who maximizes the following utility function:

$$E_0\sum_{t=0}^{\infty}\beta^t\left(\frac{C_t^{1-\sigma}}{1-\sigma}+\phi_d\frac{D_t^{1-\theta}}{1-\theta}-\frac{\left(N_t^c+N_t^d\right)^{1+\chi}}{1+\chi}+\frac{\phi_m}{1-\tau}\left(\frac{M_t}{P_t}\right)^{1-\tau}\right) \tag{1}$$

where C_t denotes consumer goods and D_t housing. By including D_t in the utility function in this additive, separable form, we follow, among others, Iacoviello (2005), Monacelli (2009) and Aslam and Santoro (2008). The household provides labor services to the consumer goods sector (N_t^c) and the construction sector (N_t^d). M_t denotes the household's savings deposited at the country's banks and real savings ($\frac{M_t}{P_t}$) enter the utility function. Note that we interpret bank savings in a broad manner that includes all types of savings that a household has on deposit at a bank.

We assume that the housing stock evolves according to the standard process $D_t = I_t + (1-\delta)D_{t-1}$. In addition, we follow the literature (see, for instance, Monacelli, 2009) and assume that individuals can obtain loans L_t^H up to the amount $L_t^H = \mu_H E_t\{Q_{t+1}\}D_t(1-\delta)$ where $E_t\{Q_{t+1}\}$ denotes the expected future price of housing. Thus, loans are a fixed fraction μ_H of the expected future price of the depreciated stock of housing. The individual has to pay the gross nominal interest rate R_t^d on these loans. As we will see below, this interest rate is determined by the banking sector and indirectly influenced by the central bank. In our analysis, the borrowing constraint is considered fixed and exogenous. Thus, we abstract from the occasionally binding borrowing constraints that can be found in Guerrieri and Iacoviello (2013) or Jensen and Ravn (2013). Finally, we assume that bank savings are remunerated at the gross interest rate R_t^m. Our assumption of one representative household implies that it represents the average of all individuals in the economy. In this way, the representative household simultaneously holds savings and debt. This implies that the quantities of savings and debt chosen depend on the values of consumption, income and other aggregate variables for the average individual. Instead of netting them out, the simultaneous holding of savings and debt allows us to treat them as representing two different variables yielding different returns. In total, the parameter value will be chosen such that the representative individual holds more savings than debt. Following this reasoning, the nominal budget constraint is given by:

$$\begin{aligned}&P_tC_t+Q_t(D_t-(1-\delta)D_{t-1})+R_{t-1}^d\mu^H(1-\delta)E_{t-1}\{Q_t\}D_{t-1}+M_t\\&\leqslant\mu^H(1-\delta)E_t\{Q_{t+1}\}D_t+R_{t-1}^mM_{t-1}+W_t^cN_t^c+W_t^dN_t^d\end{aligned} \tag{2}$$

The individual maximizes (1) subject to the budget constraint given in (2). The first-order conditions for $C_t, N_t^c, N_t^d, \frac{M_t}{P_t}, D_t$ are given by:

$$0 = C_t^{-\sigma} - \lambda_t P_t \tag{3}$$

$$0 = -(N_t^c)^{\chi} + \lambda_t W_t^c \tag{4}$$

$$0 = -(N_t^d)^{\chi} + \lambda_t W_t^d \tag{5}$$

$$0 = \phi_m\left(\frac{M_t}{P_t}\right)^{-\tau} - \lambda_t + \frac{E_t\{\lambda_{t+1}\}}{E_t\{\Pi_{t+1}\}}\beta R_t^m \tag{6}$$

$$\begin{aligned}0 &= \phi_d(D_t)^{-\theta} - \lambda_tQ_t + \lambda_t\mu_HE_t\{Q_{t+1}\}(1-\delta)\\&+\beta E_t\{\lambda_{t+1}Q_{t+1}\}(1-\delta)(1-R_t^d\mu_H)\end{aligned} \tag{7}$$