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Land prices and unemployment ☆

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ABSTRACT

We integrate the housing market and the labor market in a dynamic general equilibrium model with credit and search frictions. We argue that the labor channel, combined with the standard credit channel, provides a strong transmission mechanism that can deliver a potential solution to the Shimer (2005) puzzle. The model is confronted with U.S. macroeconomic time series. The estimation results account for two prominent facts observed in the data. First, land prices and unemployment move in opposite directions over the business cycle. Second, a shock that moves land prices also generates the observed large volatility of unemployment.

1. Introduction

A striking feature of business cycles is that land prices and unemployment comove (Fig. 1). Never is this feature more true than in the Great Recession, when the collapse in the housing market was followed by a sharp rise of unemployment. We use a Bayesian vector autoregressions (BVARs) model to quantify the comovements between land prices and unemployment, along with other key macroeconomic variables. As shown in the left column of Fig. 2 (solid lines and shaded areas), a negative shock to the land price leads to a simultaneous rise in unemployment and a decline in the land price and total hours, whereas the real wage responses are relatively weak.[1] A structural analysis of these stylized facts is essential for policy analysis as well as for understanding business cycles in general.

The goal of this paper is to deliver a structural analysis of dynamic links between land prices and unemployment and to establish the empirical relevance of this analysis. We focus on land prices because fluctuations of house prices are mostly driven by those of land prices (Davis and Heathcote, 2007; Nichols et al., 2013). To establish the link between the land price

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[1] A complete set of impulse responses to a land price shock in the BVAR with seven variables is presented in Fig. 1 of Supplemental Appendix A. The seven variables are consumption, investment, job vacancies, unemployment, total hours, real wages, and land prices. As a comparison, the same figure displays the estimated impulse responses of these variables following a negative housing demand shock in our DSGE model. In Supplemental Appendix A, we provide a full description of the BVAR, our treatment of possible cointegration, and our recursive identification assumptions (see also Section 5).

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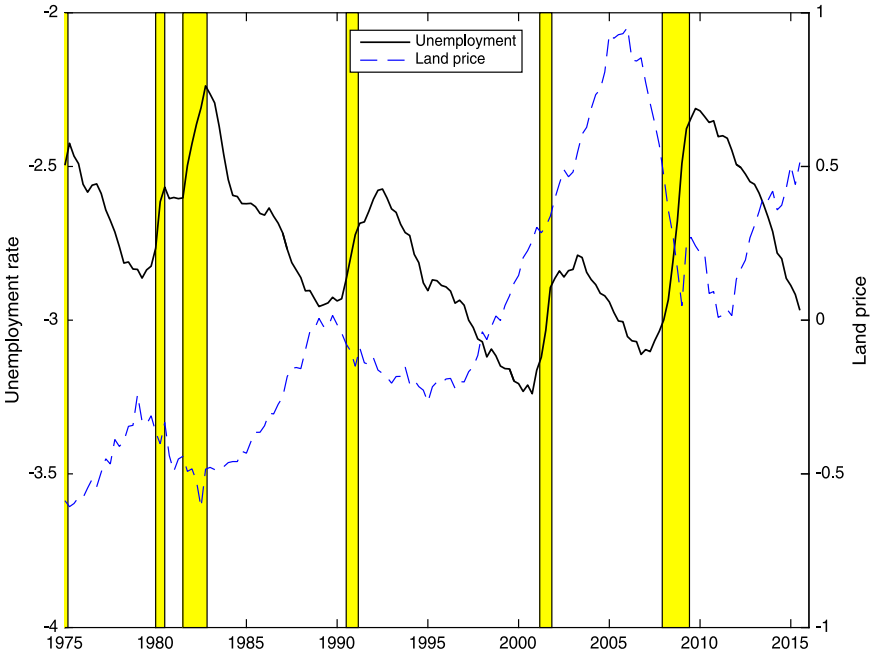

Fig. 1. Log unemployment rate (left scale) and log real land price (right scale). The shaded bars mark the NBER recession dates.

and the unemployment rate, we combine the housing market and the labor market in one unified dynamic stochastic general equilibrium (DSGE) framework. To fit U.S. macroeconomic time series, we introduce both financial and search-matching frictions in the model.

The model consists of three types of agents: households, capitalists, and firms. The representative household consists of a continuum of workers—some are employed and others are not. All workers consume the same amount of goods and housing services, so that unemployment risks are pooled within the household. The representative capitalist owns all firms, each of which employs one worker and operates a constant-returns-to-scale technology that transforms labor, land, and capital into final consumption goods.

The representative capitalist's consumption, investment, and land acquisition require external financing. Since contract enforcement is imperfect, the borrowing capacity of the capitalist is limited by the values of collateral assets, which include the capitalist's holdings of capital and land (Kiyotaki and Moore, 1997; Iacoviello, 2005; Liu et al., 2013). We model the labor market within the framework of Diamond (1982); Mortensen (1982), and Pissarides (1985) (DMP hereafter).

Econometric estimation of our structural model shows that a negative housing demand shock generates small and sluggish responses of real wages but large and persistent comovements among the land price, the unemployment rate, consumption, investment, job vacancies, and total hours, consistent with the styled facts produced by the BVAR in Fig. 2. Moreover, a shock that moves the land price is capable of generating large volatility of unemployment, as we observe in the data. These empirical results suggest that our model contains an economically substantive transmission mechanism.

Davis and Heathcote (2007) emphasize the importance of housing demand in their land-price regression exercises. We make their concept of housing demand more concrete by specifying a housing demand shock as a preference shock in the household's utility function of housing services. Such a preference shock, like other shocks in all DSGE models, is a reduced-form representation of an exogenous disturbance at a micro level. Liu et al. (2009) present one interpretation by studying an economy with heterogeneous households that experience idiosyncratic and uninsurable liquidity shocks and face collateral constraints. In the aggregated version of that model, there is a term in the housing Euler equation that corresponds to a preference shock in our model's household utility function. As a result, financial innovations or deregulations that relax households' collateral constraints and expand their borrowing capacity in the *disaggregated* model would translate into a positive housing demand shock at the *aggregate* level.

The transmission from housing demand shocks to fluctuations in the land price and the unemployment rate works through both the credit channel and the labor channel. The credit channel is similar to the standard financial multiplier; it embodies the dynamic interactions between the collateral value and the value of a new employment match. A decline in housing demand lowers the equilibrium land price and thus the collateral value of land. As the borrowing capacity for the capitalist shrinks, investment spending falls. The decline in investment lowers future capital stocks. Since capital and labor are complementary factors of production, a decrease in future capital stocks lowers future marginal productivity of each