Literature review on mortgage default

Literature review

The evolution of mortgage default studies is characterized by Quercia and Stegman (1992) into three types of studies. The earliest work dating back to the 1970s focuses from a lender’s perspective on simple correlations and regression models capturing important borrower characteristics that can forecast bankruptcy. Home equity, income variability, loss of employment, death, and divorce are found to be the most important predictors of default risk (Von Furstenberg, 1969; Herzog and Early, 1970; Vandell, 1978).

The second generation of default research, rooted in consumer behavior theory, models the behavior of households, who rationally decide to default, in a more structural way. Papers by Jackson and Kasserman (1980), Campbell and Dietrich (1983), and Foster and Van Order (1984) explicitly formulate net-equity maximization models of default. Such `ruthless default models’ predict immediate default if a property’s value drops a small margin below the level of the mortgage. These models emphasize the financial aspects of the mortgage default decision, ignoring borrowers’ characteristics.

Towards the start of the 1990s, several models began examining transaction costs and crisis events that may delay, expedite, or eliminate the need to default. Quigley and Van Order (1992) find that transaction and reputation costs make the default option on mortgages less ruthless than in other frictionless financial markets. While transaction costs by themselves do not explain observed behavior, reputation costs in particular are consistent with observed default behavior. These second-generation studies constitute the basis for the current state of the theory. The examination of the default

decision as an option and the central role of net equity constitute the dominant view in studies of default. Conceptually, the basic theory postulated by second-generation studies has not been revised since.

The recent financial crisis has stimulated a revival of the academic interest in mortgage default, and the birth of a third generation of research models. Specifically, there have been attempts to integrate mortgage default into more general equilibrium models of consumer behavior. Campbell and Cocco (2014) model mortgage foreclosures structurally and find negative equity, borrowing constraints, high debt-to-income ratios and income growth as important determinants of foreclosure. Goodhart et al. (2011) and Foote et al. (2008) use a two-period model to show that households choose to default and lose their homes to foreclosure, if the net implicit rents from owning plus the expected net equity position over their tenure horizon is negative. They find that expected house price appreciation, and the size of the mortgage payment are the main factors in determining default. Corradin (2012) builds a life-cycle continuous-time model of household leverage and default in which the agents optimally choose the down-payment, abstracting from inflation and interest rate risk. Garriga and Schlagenhauf (2009) also solve an equilibrium model of long-term mortgage choice and default to understand how leverage affects the default decision.

Forlati and Lambertini (2011), the closest paper to this thesis, builds an infinite-horizon DSGE model with housing, risky mortgages and endogenous default. They introduce idiosyncratic risk in housing investment and the possibility for loans to be defaulted on, which results in an endogenous borrowing constraint exactly as the one for firms in Bernanke, Gertler, and

Gilchrist (1999). Their model does not feature any penalties for the households that choose to default. This assumption is unrealistic, as in the United States as well as in other countries, defaulters incur reputation and credit score penalties which affect their possibility to borrow in the future, in addition to collateral losses. Hence, introducing non-pecuniary default penalties is useful when thinking about an equilibrium with default. The Forlati and Lambertini (2011) model also does not include a financial sector, therefore the financial accelerator mechanism is absent, in particular the banking side. There is no role for negative feedback loops operating through the banking sector as rising bad loan books and bank insolvencies, amplified by a liquidity crisis, can lead to a sharp credit contraction. This thesis builds a model incorporating some of these missing links.

The literature review indicates a continued interest in mortgage default. While most empirical studies are well-advanced in their discoveries of the determinants of default, the theoretical literature is lagging behind developing models able to capture these determinants. I attempt to bridge the gap between the empirical determinants of default and the theory, by constructing a dynamic optimization model of borrower choice with housing market frictions and endogenous mortgage default, that will feature default centered around negative net equity, reputation penalties, and house valuation shocks. Refining the current DSGE models with the introduction of financial and micro-founded consumer behavior frictions is essential for the study of business cycles and financial stability.

Theoretical Model

This thesis builds a DSGE model drawing on a number of contributions in the literature on credit markets, housing markets, and debt default. The starting point is a model with financial frictions on the demand-side for credit (i. e. Kiyotaki and Moore, 1997; Iacoviello and Neri, 2010), to which I add a housing sector, a financial sector and endogenous debt default. The idea of default comes from the asset pricing literature, which allows for the existence of default as an equilibrium phenomenon (Dubey et al., 2005; Geanakoplos and Zame, 2013). A stylized representation of the model is depicted in Figure ref{fig8}. The economy operates in discrete time over an infinite horizon and combines five elements: 1) two types of households, namely textit{savers} and textit{borrowers}, who consume manufactured goods, accumulate housing, and work; 2) a financial sector collecting deposits and extending collateralized mortgages; 3) a large set of real (consumption habits, adjustment costs) and nominal (price and wage) rigidities; 4) financing frictions in the housing and financial sector; and 5) a rich set of shocks, essential in taking the model to the data.

The economy is populated by patient (savers) and impatient (borrowers) households. Patient households consume, accumulate housing stock, save, and work. They own the productive capital of the economy, and supply capital funds to firms on the one hand, and deposits to banks on the other. Impatient households consume, accumulate housing stock, borrow from banks, and work. Both patient and impatient households supply labor services through labor unions, which set their wages subject to a Calvo scheme. On the supply side, the non-housing sector combines labor and capital to produce consumption and business capital for both sectors. The

construction sector produces new homes combining labor and land with business capital.

The two groups of households have different discount factors. Discount factor heterogeneity between households induces heterogeneity in the marginal utility of saving across households. All else equal, borrowers have a lower $beta^*$ and a higher marginal utility of immediate consumption relative to savers, inducing a desire to trade inter-temporally. Borrowers obtain collateralized mortgages from banks, while savers have a high discount factor $beta$ and invest their resources into bank deposits. The availability of loans to borrowers is subject to a borrowing constraint linked to the market value of their housing stock and the ability of the lending banks to extend credit. Borrowers can experience negative housing value shocks that are only observed by the households themselves. When the value of their house falls below the value of their loan repayment, they choose to default on part of their mortgage. Default on secured debt is modeled through the partial loss of collateral and a non-pecuniary default penalty that enters the utility function of the households directly. In case of default, borrowers lose some of their housing stock which is repossessed by the bank, suffer a non-pecuniary default penalty, and re-enter the housing market in the next period as buyers again. Default is endogenously determined and, consistent with the literature on second-generation default models, triggered by shocks that are large enough to cause leveraged households to owe on their house more than the house is worth.

Borrowers and savers are unable to directly write financial contracts. They do so through financial intermediaries. The financial sector is simply “

market-based”: banks borrow from savers in order to give loans to borrowers. In this way, I layer two sets of financial frictions that interact in equilibrium: first, banks are constrained in how much they can borrow from ultimate savers, and second ultimate borrowers are constrained in how much they can borrow from the banks. Monetary policy is conducted by a central bank which faces a trade-off between output gap and inflation stabilization.

The model provides a framework to understand the impact of house price fluctuations, monetary policy, demand shocks, and credit availability on the economy and the ways in which financial regulation can dampen boom and bust cycles in the housing market.