

Research Statement

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The U.S. economy during the 2000s has showed that the imperfections in the financial markets can cause wide spread economic booms and busts. There are two important observations in the Great Recession that do not have satisfactory explanations in the literature. Firstly, housing and housing finance have played a key role in precipitating the financial crisis, but the interactions between the housing market, housing finance and aggregate fluctuations are not fully understood. Secondly, the 2007-2009 financial crisis also has been characterized by the significant movements of the aggregate wedges and the increase in the dispersion of firm growth rates. On the one hand, the Solow Residual declined 1.9% from 2007Q4 to 2009Q1. The labor wedge which is the ratio of the marginal rate of substitution (MRS) to the marginal product of labor (MPL) increases 9% from 2007Q4 to 2009Q3. On the other hand, there is a 152% increase in the dispersion of firm growth rates as documented by Bloom, Floetotto, Jaimovich, Saporta-Eksten and Terry (2012).

I develop dynamic stochastic general equilibrium (DSGE) models where financial frictions interact with rich household heterogeneity to study the implication of financial shocks for aggregate fluctuations that can explain these two observations. Since changes in the financial markets affect different demographic groups (such as the rich and the poor) differently, the heterogeneous agent framework is necessary to study important distributional effects that cannot be accurately addressed by the representative agent model.

My job market paper “Heterogeneous Households, Mortgage Debt and House Prices over the Great Recession” studies the U.S. housing market in the recent financial crisis. In the data, there are severe contractions in both the real economy and the housing market, but existing literature either only explain the real economic recession or study some specific targets in the housing market. For example, Iacoviello and Pavan (2013) studies the decline of mortgage debt with fixed housing price. Gervais (2002) studies the distortions of housing taxation on the composition of aggregate capital. This paper is the first to research the housing market with endogenous house prices and mortgage default option in a heterogeneous agent framework. Specifically, I build a quantitative model with infinitely lived heterogeneous households, incomplete financial markets and productions in both consumption good and housing good sectors. Households face portfolio problems which involve selecting the stock of housing, mortgage debts, and non-housing/financial assets. Houses can serve as collateral to take out mortgages but are subject to idiosyncratic depreciation shocks. Households can default on their mortgage debts. Financial intermediaries issue mortgages and price them in the way such that household default risk is fully reflected. I calibrate the model to reproduce the cross sectional distribution of housing and non-housing wealth in the data. The steady state of the resulting economy is characterized by the household behavior of saving using risk free financial assets, risky housing assets as well as borrowing with mortgages at the same time.

By conducting two experiments, I find that the decline of aggregate productivity across the two sectors is responsible for the real economic recession and the reduction in housing construction. Housing wealth shrinks as real house prices decrease and households who experience large declines in their labor income demand less housing assets. Secondly, both the decrease in aggregate productivity and the tighter financial markets contributes to the decline in real house prices. On the one hand, the falling productivity in both consumption and housing good sectors leads to a larger reduction in the output of consumption good so that the real house price decreases as consumption good becomes more valuable. On the other hand, the decreased productivity in the mortgage issuance sector makes households demand smaller mortgage debts as it is more costly to use mortgage as a means of financing their savings in risk free financial assets. Consequently, the equilibrium interest rate falls. With smaller capital rental price in the housing sector, the real housing price declines further.

Thirdly, the tightening of the financial condition is fully responsible for the substantial decrease of mortgage debt as the cost of borrowing mortgage to save financial assets have greatly increased. Under normal financial conditions, households take large mortgage debts to take advantage of the high housing return and insure themselves against high default risk by holding financial assets to smooth consumption. When the financial condition is tighter so that the cost of borrowing mortgage to save financial asset increases, households sharply decrease leverage and mortgage debts to avoid large interest payments and default risk.

Quantitatively, the model can explain about 70% of the drop in real output, 44% of the reduction in consumption, 10% of the decline in labor hour, 90% of the drop in mortgage debts, 25% of the decrease in housing investment, 43% of the decrease in housing capital and 1.3% of the decline in real house price in the Great Recession.¹ The decline in the real house prices in the model is comparable to the reductions of real house prices in most U.S. post war recessions, but the decrease is relatively shallow compares to the collapse of the house prices in the Great Recession. A potential way of fitting the substantial decrease of real house prices is to generate a housing price bubble in the steady state. In addition, housing inventories grows fast from 2004 to 2008 and gradually declines thereafter according to the data. However, housing inventories are not considered in the paper. Adding inventory in the model might give larger explanatory power to the model results over the big slump in residential construction. Considering the complexity of the current model, I leave these to future research.

In “Credit Shocks, Variable Employment and Entrepreneurship”, I explore the impact of credit shocks on the dispersion of firm growth rates and the countercyclicality of the labor wedge. To achieve these goals, I build a quantitative model with heterogeneous entrepreneurs and incomplete financial markets in which entrepreneurs are subject to collateralized borrowing constraints. I find that in the presence of heterogeneity in both individual assets and abilities, a negative temporary credit shock can generate large and persistent contractions in output and consumption. The credit shock gives rise to movements in the labor wedge that can explain about 35% of the fluctuations of the labor wedge in the data. The labor wedge arises in the credit shock because the MPL is distorted downwardly as tighter borrowing constraints limit capital inputs. The model can also explain 50% of the increase in the dispersion of firm production sizes. The reason that the dispersion increases sharply in the credit shock is because the constrained entrepreneurs lose profits with distorted capital inputs while unconstrained entrepreneurs gain profits from lower prices. The dispersion of firm production sizes thus increases as constrained entrepreneurs endogenously exit from and unconstrained entrepreneurs endogenously enter into the production sector.

This paper with heterogeneous entrepreneurs and financial frictions is the first to explain the dispersion of firm growth rates and the movements of the labor wedge at the same time. But the model has the limitation in that the labor hour would bounce back immediately after the financial condition is restored, even though the labor hour remains low throughout the entire time that the borrowing conditions are tightened. Thus, a model with rich household heterogeneity that can generate movements of the labor wedge in the financial shock is not enough to explain the persistent high unemployment in the Great Recession. In the paper, the labor wedge is originated from the distortions in the capital market rather than from the labor market. Therefore, a mechanism that is more relevant with firm’s hiring decision might be helpful to study the labor market distortions in the recent financial crisis. Campello, Graham and Harvey (2009) have done surveys with CFOs from various firms and they find that financially constrained firms tend to cut labor more than unconstrained firms in the recent recession due to precautionary motives. This fact motivates me to consider the importance of liquidity in firms’ hiring decisions, which is a direction for my future research.

¹ The real house prices fluctuate in my model due to the variations in the value of fundamentals.