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Housing and debt over the life cycle and over the business cycle

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ABSTRACT

Housing and mortgage debt are studied in a quantitative general equilibrium model. The model matches wealth distribution, age profiles of homeownership and debt, and frequency of housing adjustment. Over the cycle, the model matches the cyclicality and volatility of housing investment, and the procyclicality of debt. Higher individual income risk and lower downpayments can explain the reduced volatility of housing investment, the reduced procyclicality of debt, and part of the reduced volatility of GDP. In an experiment that mimics the Great Recession, countercyclical financial conditions can account for large drops in housing activity and debt following large negative shocks.

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1. Introduction

What are the business cycle and the life-cycle properties of housing and debt? To answer this question, this paper introduces housing in an equilibrium business cycle model where a house is a lumpy item, can be owned or rented, and can be used as collateral for loans. At the cross-sectional level, the model reproduces the wealth distribution, and replicates the life-cycle profiles of housing and nonhousing wealth. The young, the old and the poor are renters and hold few assets; the middle-aged and the wealth-rich are homeowners. For a typical household, the asset portfolio consists of a house and a large mortgage. The model also reproduces the microeconomic evidence on housing adjustment: homeowners change house size infrequently but in large amounts when they do so; renters change house size often, but in smaller amounts. Over the business cycle, the model replicates two empirical characteristics of housing investment: its procyclicality and its high volatility. In addition, the model matches the procyclicality of mortgage debt. To our knowledge, no previous model with rigorous micro-foundations for housing demand has reproduced these regularities in general equilibrium.

We use the model to look at the role of the housing market in two events of the recent U.S. macroeconomic history: the Great Moderation and the Great Recession. Our choice is motivated by two sets of observations: the reduction in aggregate volatility of the early 1980s occurred when idiosyncratic volatility began to rise and when downpayment requirements were relaxed.[1] The sharp decline in housing investment in the 2007–2009 period occurred when, for a variety of causes, financial conditions became very tight.

Debt and housing in the great moderation. Higher risk and lower downpayments are potentially important determinants of housing demand and housing tenure: higher risk should make individuals reluctant to buy large items that are costly to sell in bad times; lower downpayments should encourage and smooth housing demand. Their role could be relevant given two observations on the post-1980 s period (Fig. 1 and Table 1). First, the volatility of housing investment has fallen more

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[1] Campbell and Hercowitz (2005) and Gerardi et al. (2010) discuss the role of financial reforms, and Dynan et al. (2007) discuss the evolution of household income volatility.

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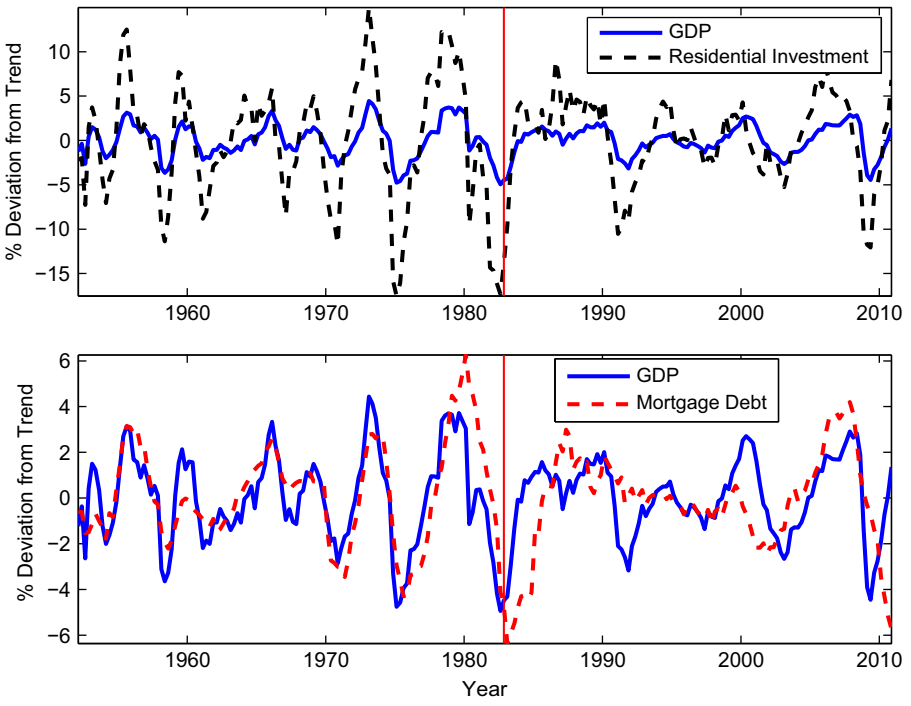

Fig. 1. Mortgage debt, housing investment and GDP. *Note*: Variables are inflation-adjusted, HP-filtered ($\lambda = 1600$).

Table 1
U.S. Economy. Cyclical statistics and housing market facts.

	Early period 1952.I–1982.IV	Late period 1983.I–2010.IV	Whole sample 1952.I–2010.IV
Standard deviation			
GDP	2.09	1.62	1.88
C	0.93	0.83	0.88
IH	7.12	4.45	6.00
IK	4.90	5.36	5.11
Debt	2.23	2.20	2.21
Hours	1.60	1.37	1.49
Housing turnover	0.54 (68.I-82.IV)	0.29	0.40
Correlations			
IH, GDP	0.89	0.75	0.84
Debt, GDP	0.78	0.43	0.63
Hours, GDP	0.82	0.86	0.83
Turnover, GDP	0.69	0.10	0.46
IH, IK	0.36	0.40	0.36
Debt, *C*	0.72	0.37	0.56
Averages			
Homeownership (%)	64	66	65
Debt to GDP (%)	34	59	46
Housing turnover (%)	3.9	4.3	3.2
Gini wealth	0.79	0.83	0.81
Gini labor income	0.40	0.46	0.83
Gini consumption	0.23	0.26	0.25

Notes: *C*, IH and IK are consumption, residential fixed investment and business fixed investment respectively, divided by the GDP deflator (sources: BEA). *GDP* is the sum of the three series. Durables expenditures are included in *IH. Debt* is the stock of Home mortgages held by households and nonprofit organizations (source: Flow of Funds Accounts), divided by the GDP deflator. *Hours* are total hours worked for the entire economy from Francis and Ramey (2009). Cyclical statistics (standard deviations and correlations) for all series refer to the series logged and detrended with HP-filter (smoothing parameter 1600). Data on inequality are from Wolff, 2010 (wealth); http://www.census.gov/hhes/www/income/data/ (income); and from Krueger and Perri, 2006 (consumption). Housing turnover is the ratio of total home sales divided by the existing housing stock (see text for the source).

than proportionally relative to GDP; second, the correlations between mortgage debt and GDP and mortgage debt and aggregate consumption have roughly halved, from 0.78 to 0.43 and from 0.72 to 0.37 respectively. In line with the data, lower downpayments and larger idiosyncratic risk reduce the volatility of housing investment, and reduce the correlation

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