

Consumption and House Prices in the Great Recession: Model Meets Evidence

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Extended Abstract

One of the distinctive features of the Great Recession is that the drop in household consumption expenditures was (i) larger, (ii) broader —i.e., all components of consumption expenditures, not just durables, dropped substantially— and (iii) more persistent than in recent recessions (Petev, Pistaferri, and Saporta-Eksten, 2011).

The leading explanation for these atypical aggregate consumption dynamics is the extraordinary destruction of US housing wealth that occurred between 2006 and 2009. For example, the S&P Case-Shiller Real House Price Index shows a decline of 30 percent in this period, and only a timid recovery since then. In an influential paper, Mian, Rao, and Sufi (2012) have cleverly used an IV technique applied to a combination of various micro data to estimate an aggregate elasticity of nondurable consumption expenditures to housing net worth of 0.4 for the recession period. They have argued that the long-lasting plunge of house prices can explain much of the recent collapse in aggregate consumption expenditure in the US.

In this paper we revisit the consumption-house price nexus both empirically and structurally, with a special focus on the Great Recession. We do so by asking three related questions.

First, we ask: how robust are the Mian, Rao and Sufi (2012) estimates? This is an important question because these estimates are at the upper bound of the range provided by most of the literature, between 0.0 and 0.02 (Case, Quigley, and Shiller, 2005; Carroll,

Otsuka, and Slacalek, 2006; Attanasio, Blow, Hamilton and Leicester, 2009). Moreover, the Mian-Rao-Sufi insight is being incorporated into dynamic equilibrium models of business cycle (Midrigan and Philippon, 2011; Justiniano, Primiceri, and Tambalotti, 2014, Huo and Rios-Rull, 2014) but, these models can be quantitatively successful only if the elasticity of consumption to housing wealth is high enough.

The first contribution of the paper is to provide an alternative set of estimates on the consumption response to the fall in house prices by exploiting a new source of nondurable consumption expenditure data, weekly store-level data from the Kilts-Nielsen Retail Scanner Dataset (KNRS). The dataset is a weekly panel of total sales (quantities and prices) at the UPC (barcode) level for around 40,000 geographically dispersed stores. From this weekly/UPC level data we construct an annual store-level panel of total sales. Since the dataset contains geographic information for each store (county, first 3 digits of zip code), we merge this sales data with county-level information on house prices, household wealth, and labor market variables. In the paper we discuss why our data source is superior to the Mastercard data used by Mian, Rao and Sufi (2012).

We study the effect of changes in these county-level variables on store-level changes in sales. Since the sales of a store in a county are indicative of the expenditure of the households who live in that county, our estimates provide a reliable measure of the effect of county-level changes in house prices and household balance sheets on county-level non-durable expenditure. Our preliminary results broadly confirm the Mian, Rao and Sufi (2012) empirical findings, when replicating their regressions on our data. We also find that about one half of the effect is due to contemporaneous changes in labor market conditions. Given the richness of the data, we are also able to explore the heterogeneity of consumption responses by age, income, leverage ratio, homeownership status, etc.

Second, we ask: can a plausibly parameterized equilibrium structural model replicate these empirical findings on the aggregate elasticity and its heterogeneity across household types? We thus solve a stochastic equilibrium overlapping-generations model where households derive utility from a nondurable consumption good and from housing. They work for a number of years and earn labor income subject to uninsurable idiosyncratic and aggregate fluctuations, then retire, and when they die they bequeath their residual (positive) net worth to their offsprings based on a warm-glow giving motive. Every period, they choose nondurable consumption, saving into a risk-free liquid asset, and their homeownership status.

Households can own or rent. Housing purchases can be financed by taking on mortgages. All mortgages are long-term and amortized over the life of the household. The mortgage price is determined in equilibrium so that banks make zero profit in expectation from a loan. Households have the option to default on their mortgages. If a household defaults on its mortgage it forfeits its house and incurs a utility penalty. We impose a maximum face value

on the loan that can be taken out by a household as a fraction of the value of the home. Households also have the option of taking on home equity lines of credit (HELOC), one-period debt contracts that must be repaid in the subsequent period. Households can also default on their HELOCs, and consistent with a second lien, the HELOC is junior to the primary mortgage in terms of disbursement of funds in default. Further, consistent with mortgage law, if the household is going to default on its debt obligations, it must default on both the HELOC and first mortgage. Households that currently have a mortgage have the option to refinance, by repaying the principal balance remaining and any HELOCs, and originating a new mortgage and possibly a new HELOC. If a household chooses to sell its home, it is also required to pay off its remaining mortgage balance and HELOC.

We close the model with a construction sector and a representative rental company. Their profit-maximizing choices, together with aggregate demand of owner-occupied and rental units, yield equilibrium prices and equilibrium rents that are connected by a no-arbitrage relation.

The economy is subject to four aggregate shocks to (i) housing supply, (ii) preferences for owner-occupied housing, (iii) credit market conditions, and (iv) income. We solve the model with a variant of the Krusell-Smith approach to solving heterogeneous-agents incomplete-market models with aggregate fluctuations. We emphasize that the endogenous price dynamics are key to address our question because different shocks that have the same impact on prices may lead to very different consumption responses. For example, a housing supply or preference shock has no other direct effect on the household budget constraint, whereas both income and credit conditions shocks do.

We parameterize the model to generate plausible lifecycle profiles for all the key endogenous variables, and a realistic consumption response to individual income shocks. We then simulate boom-bust episodes in house prices that are empirically comparable to the 2000s and look at implications for the aggregate consumption response—and its distribution across household types—homeownership, leverage ratios, etc. In preliminary (so far, partial equilibrium) results, the model has sizable elasticities, around $2/3$ of the micro estimates. We note that, in the model, we allow for two groups of households facing different housing supply elasticities. This way we can exactly replicate, within the model, the Mian-Rao-Sufi identifying strategy.

Third, we ask: what accounts for these large consumption elasticities? Broadly speaking, the correlation between housing wealth and consumption may arise from three sources: (i) a wealth, or balance-sheet, effect, (ii) a tightening of credit constraints (forced deleveraging), or (iii) the response of both housing wealth and consumption to common third factors, such as expected future income. Our structural model allows us to decompose the total effect into these three components.

This decomposition also allows us to understand why estimates of the elasticity obtained with data for the Great Recession are significantly higher than other empirical estimates in the literature. Simulations from our structural model will shed some light on this issue, since different sources of house price movements, as well as different macroeconomic conditions, translate into diverse values for the average elasticity. In other words, we will be able to understand what was so special about the Great Recession to imply these unusually high consumption responses to house prices.