

Lecture 17: Hand-to-Mouth Consumption

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Borrowing constraints

- Have seen: data inconsistent with some basic predictions of the permanent-income model. One possible explanation: **borrowing constraints**.
- Banks might not lend, even if a household has future income. Underlying problems of **incomplete information**.
 - Banks may be unable to distinguish “good” borrowers with high/safe future income from “bad” borrowers with low/risky future income
 - **Adverse selection**, pool of borrowers may skew towards “bad” risks
 - **Moral hazard**, loans may encourage borrowers to take riskier actions

Bottom line, banks respond by denying loans or charging high interest rates.

- These borrowing constraints are a barrier to **consumption smoothing**.
Note: behavioral stories (e.g., imperfect optimization) are another natural story. Not today.

Outline

1. Consumption with Borrowing Constraints
2. Empirical Evidence
3. Application: House Prices & Consumption in the Great Recession

Adding borrowing constraints

- In our two-period model, we can capture such concerns with **borrowing constraints**:

$$a_1 \geq -\bar{b}_1$$

Here $\bar{b}_1$ is an exogenously specified borrowing limit, a parameter.

- If $\bar{b}_1 = 0$, no borrowing is possible.
- If $\bar{b}_1 > 0$, some limited borrowing is possible.
- Note that this is a short cut: can show that adverse selection/moral hazard frictions can end up looking like such simple reduced-form specifications
- We can now state the problem ...

Revising the two-period problem

- Suppose that $r = \rho = 0$, to streamline the problem
- Then, the household's problem with the added borrowing constraint can be written as

$$\max_{c_0, c_1 \geq 0, a_1} u(c_0) + u(c_1)$$

$$\text{s.t. } c_0 + a_1 = a_0 + y_0,$$

$$c_1 = a_1 + y_1,$$

$$\underbrace{a_1 \geq -\bar{b}_1}$$

borrowing constraint

Only change: additional constraint on asset holdings.

- How do we solve this problem?

Does the borrowing constraint bind?

- Solution strategy: first figure out what the household would do if unconstrained, then check if constraint is binding
- Note that permanent income is

$$y^p = \frac{a_0 + y_0 + y_1}{2}$$

and so desired consumption is

$$c_0 = y^p$$

Note that I am taking a shortcut here. You should by now know how to solve the unconstrained problem properly, using the Euler equation.

- We will now consider two cases—a slack borrowing constraint, and a binding borrowing constraint

Does the borrowing constraint bind?

1. Slack constraint

- Suppose that

$$\underbrace{y^p}_{\text{desired consumption}} \leq \underbrace{y_0 + a_0 + \bar{b}_1}_{\text{maximum cash on hand}}$$

- Then the household consumes $c_0 = y^p$ with some $a_1 > -\bar{b}_1$. In this case, the borrowing constraint **does not bind** (is **slack**).

2. Binding constraint

- Suppose that

$$\underbrace{y^p}_{\text{desired consumption}} > \underbrace{y_0 + a_0 + \bar{b}_1}_{\text{maximum cash on hand}}$$

- In this case, the household wants to choose $a_1 < -\bar{b}_1$ but cannot. The best she can do is choose $a_1 = -\bar{b}_1$.
- From the initial budget constraint $c_0 + a_1 = y_0$ this implies

$$c_0 = y_0 + a_0 + \bar{b}_1$$

Model solution

- Collecting the two cases together, we have

$$c_0 = \begin{cases} y^p, & \text{if unconstrained} \quad (y^p \leq y_0 + a_0 + \bar{b}_1) \\ y_0 + a_0 + \bar{b}_1, & \text{if constrained} \quad (y^p > y_0 + a_0 + \bar{b}_1) \end{cases}$$

- So we have new testable predictions for **constrained households**:
 - Consumption now tracks *current income* y_0
 - Consumption also tracks the borrowing limit $\bar{b}_1$
- Note that the borrowing constraint is more likely to bind for ...
 - ... households with growing income profiles, e.g., the young
 - ... households with fewer initial assets, e.g., the poor
- Let's now confront these predictions with some empirical evidence.

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Are people constrained in practice?

- Before we test the predictions on consumption, it might be useful to see first if people in practice appear to be constrained.
- Note that the people who are constrained have $a_1 = -\bar{b}_1 \leq 0$, i.e., they have no net assets, and have net debt if $\bar{b}_1 > 0$.
- So we can look at assets a_1 in the data to see whether and how many people are likely to be constrained ...

Carroll-Summers (1989)

Table 10.3 The Incidence of Liquidity Constraints

Number of Years with < \$100 in Interest and Dividend Income	Fraction of the Population Falling in This Category	Fraction of Total Labor Income That Goes to People in This Category	Fraction of Total Income That Goes to People Who Fall in This Category	Fraction of Total Capital Income That Goes to People in This Category
A. Total population:				
0	27.6	37.3	41.4	90.4
1	6.5	8.0	7.7	4.5
2	5.5	6.0	5.7	2.0
3	5.9	7.0	6.5	1.6
4	6.9	7.0	6.6	0.9
5	8.8	8.3	7.6	0.5
6	38.7	26.7	24.5	0.2
B. Population under age 65:				
0	35.2	39.7	47.4	92.8
1	6.2	7.8	7.1	2.8
2	5.2	6.0	5.3	1.7
3	5.3	6.3	5.8	1.0
4	6.1	6.7	5.9	.7
5	7.8	7.9	6.7	.4
6	34.2	25.6	21.8	.3

Incidence of liquidity constraints

- Carroll-Summers (1989): evidence from tax returns for 1979-84.
- About 40% of people earn no interest or dividend income.
- Suggests they have no liquid assets at all (no savings in banks or money markets, no stocks, no bonds).
- About 90% of capital income received by about 28% of population.

Kaplan-Violante (2012)

Table 2: Household Portfolio Composition

	Median (\$2001)	Mean (\$2001)	Fraction Positive	After-Tax Real Return (%)
Earnings plus benefits (age 22-59)	41,000	52,696	–	–
Net worth	77,100	164,463	0.95	5.5
Net liquid wealth	2,700	30,531	0.77	-1.1
Cash, checking, saving, MM accounts	1,880	12,026	0.87	-2.0
Directly held MF, stocks, bonds, T-Bills	0	19,920	0.28	4.1
Revolving credit card debt	0	1,415	0.33	–
Net illiquid wealth	70,000	133,932	0.93	6.2
Housing net of mortgages	31,000	72,585	0.68	7.1
Vehicles net of installment loans	11,000	14,562	0.86	5.8
Retirement accounts	950	34,431	0.53	4.5×1.35*
Life insurance	0	7,734	0.27	0.5
Certificates of deposit	0	3,805	0.14	1.3
Saving bonds	0	815	0.17	0.5

Source: Authors' calculations based on the 2001 Survey of Consumer Finances (SCF).

*The return on retirement assets is multiplied by a factor of 1.35 to account for the employer contribution. See the main text for details

Kaplan-Violante (2012)

- Kaplan-Violante (2012) do a similar exercise with more recent, detailed micro data.
- The median household in the U.S. has almost no liquid assets! But do have some assets, notably cars and often a house.
- Kaplan-Violante argue that the key distinction is between **liquid** and **illiquid** assets.
 - Intuition: you can be wealthy, but still be borrowing-constrained, if almost all of your assets are illiquid and thus not easily liquidated
 - Terminology: “wealthy hand-to-mouth”

Liquidity constraints and collateral

- Cars and houses are *illiquid assets*—you cannot quickly convert to cash without a big impact on the price you receive (like a “fire sale”).
- By contrast, publicly traded stocks or bonds are *liquid assets*—you can quickly convert to cash without a big impact on the price you receive.
- So although the median household is not poor per se, might still be constrained in terms of liquid assets: “wealthy hand-to-mouth.”
- Final subtlety: illiquid assets can interact with the borrowing limit through their role as *collateral*
 - Even if you can't or don't want to sell your house in a crisis, may still be able to use it for consumption by borrowing against value of your home
 - Thus, whether a liquidity/borrowing constraint is binding or not may depend on value of illiquid assets you can use as *collateral* for a loan

Revising the predictions

- We've seen that there is scope for our theory—lots of households seem to have little in the way of liquid assets, and so may be borrowing-constrained
- Recall that consumption of constrained households is given by

$$c_0 = y_0 + a_0 + \bar{b}_1$$

1. c_0 tracks current income y_0 one-for-one, not permanent income y^p
 - This is consistent with the Carroll-Summers and Parker et al. evidence that we discussed in the last lecture
 - It's also consistent with much other empirical work, e.g. on how consumers respond to (small) lottery wins
2. c_0 tracks the borrowing limit $\bar{b}_1$
 - This prediction is also supported by the evidence. Most important case study: borrowing against home equity in the Great Recession. Will study that next.

Summary of theory and evidence

- Key conclusion of Carroll and Summers (1989):

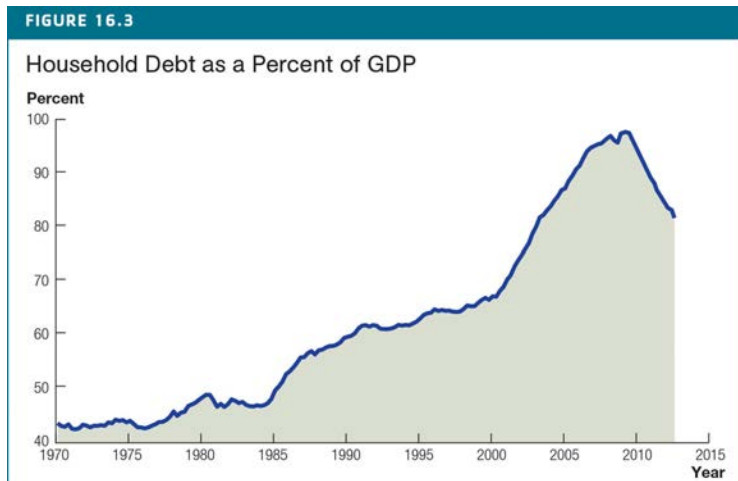
"The broad picture painted above suggests that focusing separately on two different models, one for the liquidity-constrained majority of consumers who save little outside of housing equity and one for the small but wealthy minority who seem to do most of the saving, will yield more empirical success than continuing to work with a single model postulating identical unconstrained consumers ..."

- Better to think of consumption as coming from two groups.
 1. Permanent income matters through the **unconstrained** group.
 2. Current income and borrowing limit matter through the **constrained** group.
- Let's now focus on the role of $\bar{b}_1$, the borrowing limit/borrowing capacity.
- In particular, we'll use the Great Recession to illustrate why $\bar{b}_1$ seems to be influenced by collateral values, such as house prices.

Outline

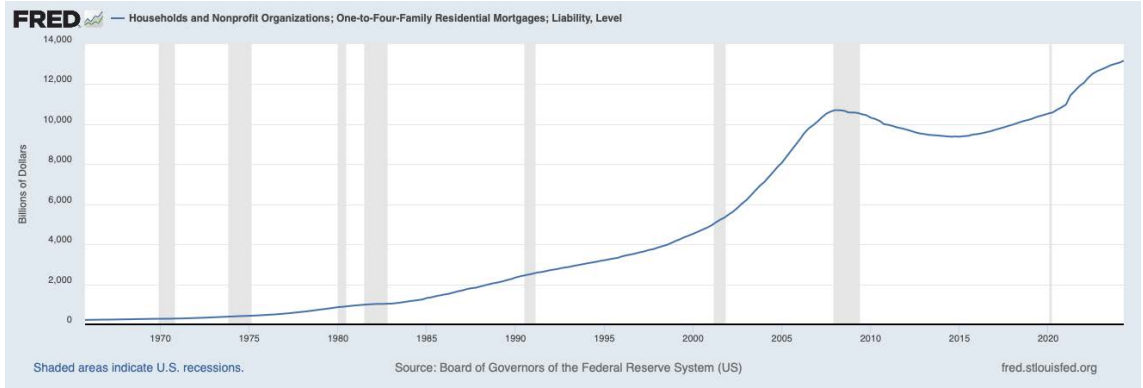
1. Consumption with Borrowing Constraints
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Household debt in the US



Household debt increased dramatically in the run-up to the Great Recession and then fell.

Household debt in the US



Most of the increase during the run up was in mortgages (as was the decrease during and after the Great Recession).

Most household debt is collateralized

- Most household debt is **secured by collateral**.

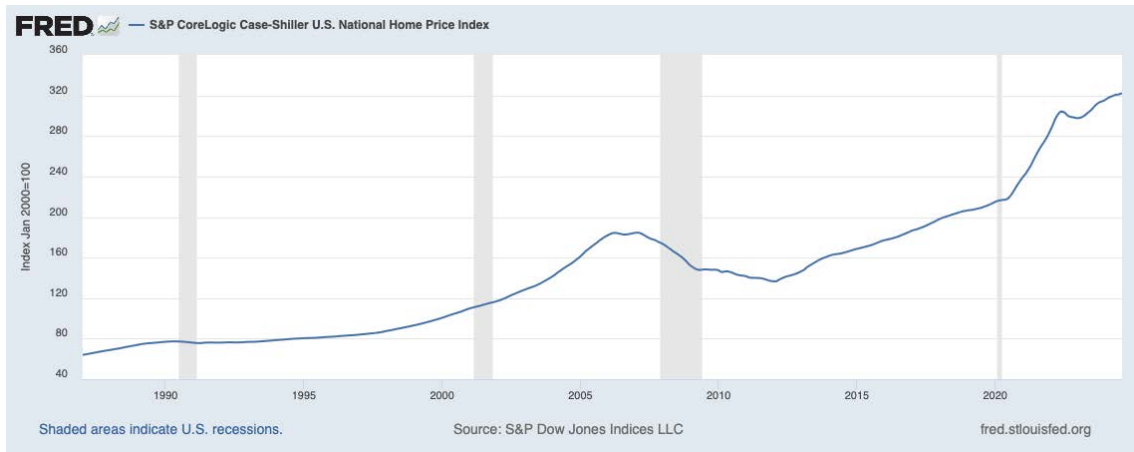
This is especially true for loans to buy durable goods, like cars or houses.

- If the household defaults, the bank can seize the collateral, thereby limiting its losses.
- By contrast credit card debt is not secured by collateral.

The market value of the collateral affects how much households can borrow.

- In short, borrowing limits $\bar{b}_1$ depend on **house prices**
 - Higher house prices relax borrowing constraints
 - Lower house prices tighten borrowing constraints

House prices: boom and bust



The Great Recession was preceded by a large build up in house prices, which came to sudden halt in 2006.

House prices and household debt

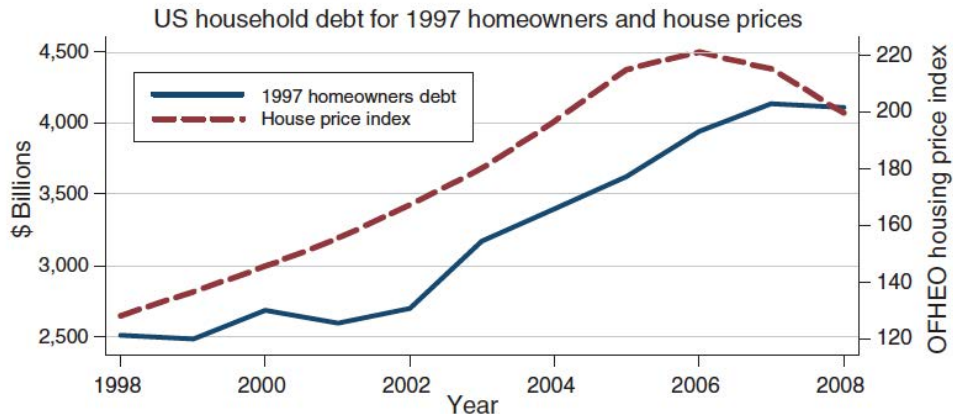


FIGURE 1. AGGREGATE US LEVERAGE AND HOUSE PRICE PATTERNS

Household debt moved in tandem with house prices.

Did rising house prices cause the rise in debt?

- Suggests changes in house prices change borrowing limits $\bar{b}_1$ and hence household debt.
 - In particular, existing homeowners could take on more debt via home equity loans in the run up to the Great Recession.
 - And likewise the sudden drop in house prices in 2006-2009 may have triggered a sudden “credit crunch” — a tightening of borrowing limits.
- But, as usual, time series correlations like this are merely suggestive. Maybe both are trending together for unrelated reasons.
- Research by Mian and Sufi (2011) makes a more convincing case for the effect of house prices on household debt using micro and regional data.

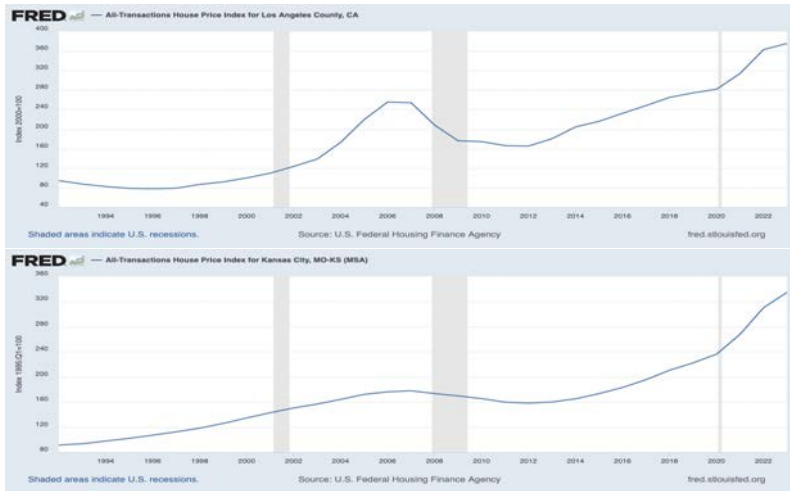
Did rising house prices cause the rise in debt?

- Mian-Sufi (2011) have data for individual households: random anonymous sample of 74,000 US homeowners (who owned their home as of 1997).

Their data comes from a credit report agency, Equifax.

- They combine this data with regional house price changes that were driven largely by the geography of the region.
- Geographic differences in house price growth are key to their approach.

Geographic differences in house price growth

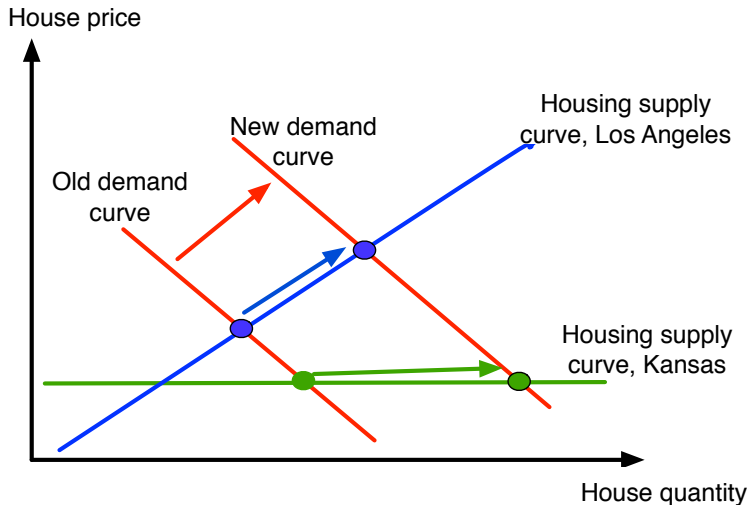


Much more dramatic house price growth in some regions (e.g., Los Angeles) than in others (e.g., Kansas City).

Why the differential house price growth?

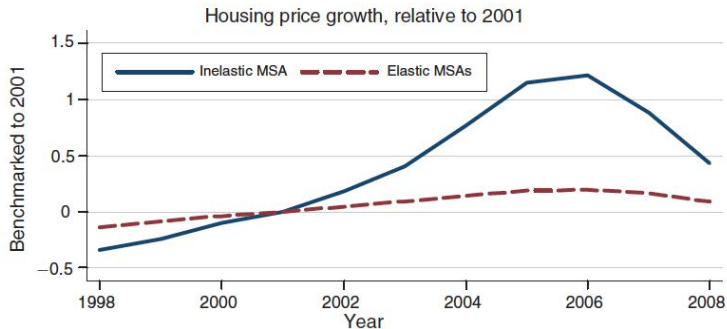
- Different regions have different **housing supply elasticities** due to both differences in geography and differences in regulatory/zoning regimes.
 - In flat/unregulated regions, e.g., Kansas, housing supply is more elastic.
 - In mountainous/regulated areas, e.g., LA, housing supply is less elastic.
- Now suppose there is an economy-wide increase in housing demand.
- What happens to house prices in LA relative to Kansas?

Why the differential house price growth?



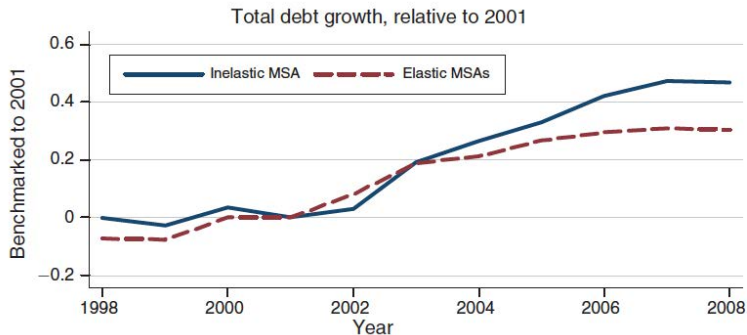
Housing elasticity and house prices

- Theory leads us to expect:
 - In the run up to the crisis, house prices should have increased more sharply in inelastic regions such as LA
 - During the crisis, house prices should have decreased more sharply in those regions
- And this is exactly what happened:



House prices and household debt

- A similar pattern in terms of household debt: regions with inelastic housing supply experienced both ...
 - ... a larger increase in debt in the run up to the crisis, and
 - ... a larger “credit crunch” during the crisis



Implications for business cycles

- Why is this important for our understanding of business cycles?
- It's an explicit example of a “**demand shock**”!
 - Consumer theory: tightening of borrowing limits leads to spending drop
And the data confirm: larger drop in regions that had more inelastic housing supply and that experienced more severe fluctuations in house prices.
 - We thus have something more plausible than our earlier reduced-form “impatience shocks”
- You may even conjecture some further **equilibrium amplification**:
 - House prices $\downarrow \rightarrow$ spending $\downarrow \rightarrow$ income $\downarrow \rightarrow$ house prices even further $\downarrow$
 - But remember: so far we haven't been able to get demand-driven recessions in our models ...
Our models so far at best feature consumer spending going down, but then income going *up*.

Taking stock on consumption

- Theory and evidence are suggestive of an aggregate consumption function of the form

$$c \approx \alpha y_p + \beta y_0 + \delta p - \delta r + \dots$$

- **Permanent income** y_p matters through unconstrained households.
 - **Current income** y_0 matters through constrained households.
 - **House/collateral values** p matter through constrained households.
 - **Interest rates** r matter via the substitution & wealth effects.
- Next steps:
 1. Arrive at an analogous “aggregate investment function”
 2. Adjust the supply side so that aggregate demand matters
 3. Use the resulting model for initial objectives: business-cycle & policy analysis

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