

# Credit Shocks and Equilibrium Dynamics in Consumer Durable Goods Markets

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## **Facts:** During the great recession

1. Vehicle scrappage decreased
2. The cost of replacing a used vehicle with a new one increased
3. Replacement of used-by-new cars decreased

## **Model:** Key ingredients

- Incomplete markets with borrowing constraints
- Transaction costs for buying cars
- Equilibrium prices: interest rate and price of **used** cars

## **Main mechanism:** Tightening of borrowing limit

1. Low-wealth postpone scrapping of old, low-quality cars  
→ Mid-quality cars: less demand & lower prices
2. High-wealth suffer an increase in the replacement cost of their vehicles  
→ delay replacement by new ones  
which accounts for the three empirical facts!

## Key contribution

- Solve for endogenous prices of new and old cars (many equilibrium prices!)
- Main (and important) difference with contemporaneous paper by Dupor, Li, Mehkari and Tsai (2018)

## Some comments

1. Empirics: Measurement of the price of new cars
2. Model: Production of new cars
3. Model: Transaction costs and downgrading
4. Calibration targets: Aggregate credit vs car loans
5. Main aggregate shock: Credit vs Income

## Comment 1: Cost of Replacing a Used Vehicle

**Fact 2: The cost of replacing a used vehicle with a new one increased**

- Price of new cars constant & price of used car decreased

**How are you measuring the price of new cars?**

- **Promotions**

- Is it final price (including discounts from the dealer)?  
In the car industry promotions play a big role on the volatility of car prices,  
How do you take this into account?
- My hunch is that during the GD car dealers were surprised by a large  
inventory of new cars and offered large promotions to sell them before the  
end of '08

- **“No-price components” or “Incentives”**

- Promotions not captured by the price
- E.g. extended warranty, free annual service, financing terms, etc.

- **Financing**

- Does it include the financial cost?
- What fraction of cars are bought by credit and what happened with interest  
rates and share financed?

### Anecdotal evidence

- Time, April 16, 2009:  
*“Vehicle prices have been slashed to well below the suggested retail price. Top deals now, according to TrueCar.com, include the Mercury Mountaineer SUV at a discount of **19.3%**; the Porche 911 (-10.6%) at the high end; Toyota’s Camry Hybrid (-9.4%) and Highlander Hybrid (-8.7%); and among compacts the Kia Optima (-30.8%) and Ford Fusion (-23.5%).”*
- The New York Times, November 14, 2008  
*“The **drop-off in sales** across the industry occurred **despite a nearly 19 percent increase in incentives** from a year earlier.”*

### Resolution: Composition story

- The cash price decreased while the financing cost increased, so the final price was constant (as in the model)
- Can test on the cross-section:
  - *Wealthy & liquid* household (can buy cash) increased the replacement
  - *wealthy & illiquid* hold on the replacement

### Assumption: Constant marginal cost of production

- With curvature on the supply of new cars  
→ Price of new cars react to demand
- Do we know the elasticity of supply of new cars?
- Important: the story needs that prices of new cars not respond to demand

- Transaction cost: Pay  $\lambda(p)$  when selling used car
  - Transaction cost  $\lambda(p) = 0.03 + 0.15p$
  - New car  $p_1 = 0.45$  so  $\lambda(p_1)/p_1 = 22\%$
  - Calibration target: difference between retail and trade-in prices
  - But, when trade-in and buying a new car dealers can offer better buy prices
- Sellers of new cars might adjust this margin to stimulate sales



### Why do you need transaction costs?

- Answer: To prevent downgrading of high to low quality cars

### What is the evidence on no downgrading?

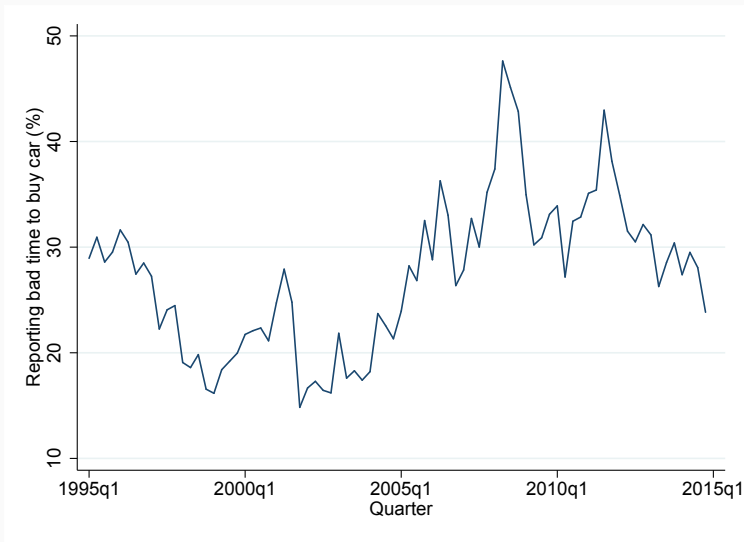
- Seems a reasonable mechanism
- Bilal and Rossi-Hansberg (2018) “Location as an asset”
- Evidence of downgrading on housing, despite large transaction costs
  
- Maybe with curvature on the production of cars (a positive markup) you don't need the transaction costs. But then, the response of the shock may be different as markups can adjust as well to demand shocks ...

### Targets: Interest rate, borrowing limit and credit shock to the aggregate economy

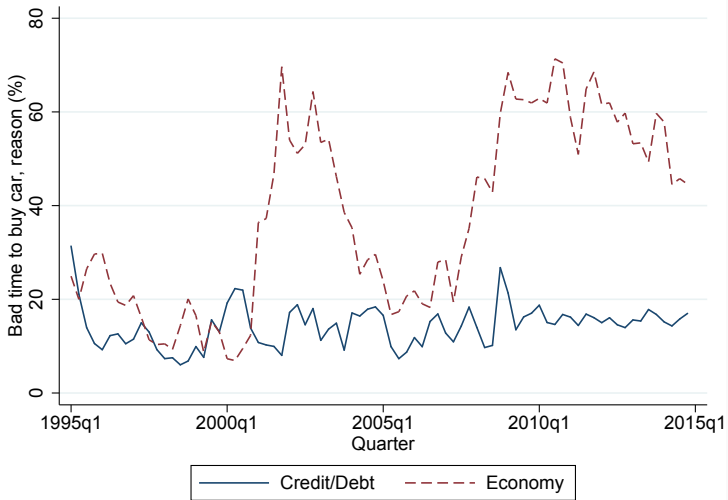
- Why not specific to the car industry?
- It will be a nice contribution to bring data on car loans
- What is the evidence on:
  1. Share of new and use cars financed/leased?
  2. Interest rate and other terms of the contract (maturity, etc)
  3. Shocks during the Great Recession to this financial market

## Comment V: What Aggregate Shock?

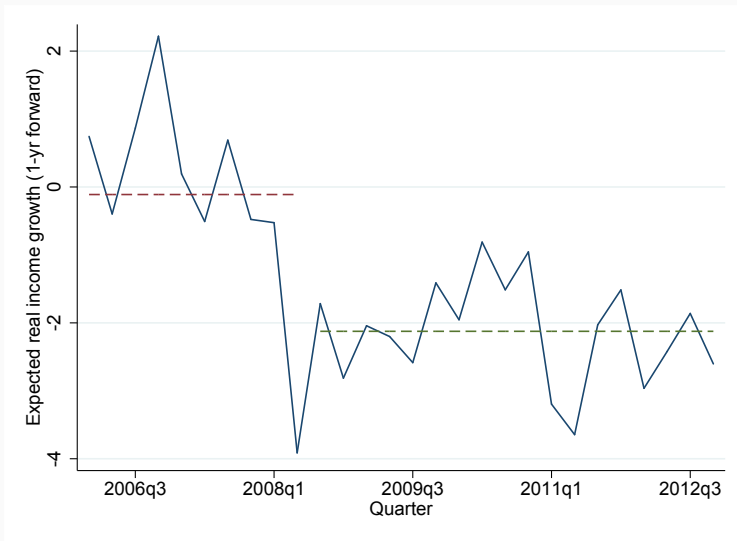
- What is the main aggregate shock in 2008 relevant for car industry?
- Michigan Survey of Consumers: Likelihood of buying a car and reasons
- See Dupor Li Mehkari Tsai (2018)



2008-09: Bad time to buy a car



**Economy:** Either bad time or bad times ahead (See Dupor et. al. 2018)



Aggregate shock in Dupor et. al. (2018): **Income Shock**

### Income shock in the model

- Exogenous unexpected drop of income of 2% in 2008 and 2009 + credit tightening
- It does not work to have only income shock:
  1. Expected mean reversion. What if it is more persistent/uncertainty about recovery
  2. Drop of demand and supply of used cars so price does not adjust. But if you fix 1. maybe 2. can also be fixed

### Policy

- Is the model constrained efficient? If not, what are the inefficiencies that this policy is trying to correct?
- What are the welfare effects of the policy?
- Maybe propose alternative policy based on your framework and the inefficiencies identified in the theory?

### Application to housing?

- Can we use the idea for new vs old housing?
- Price of construction might affect the price of old houses