

The Evolution of Market Power in the US Automobile Industry

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Research Question

What are trends in markups and welfare in the U.S. new car market, and how do they relate to

- industry concentration?
- changing product set?
- changes in technology?



Why are we doing this?

Recent focus on aggregate trends in markups

- Macroeconomists
- Policy makers and competition agencies

Results (largely) employ firm/plant level datasets and use production relationships.

We estimate **demand and supply** from 1980-2018 for a single industry: **new automobiles in the U.S.**

Shift focus away from markups to welfare when product sets are changing.



Our Approach

1. Estimate BLP **random coefficients discrete choice model**, 1980-2018
 - a) Use second choice data [like microBLP] from 1991, 1999, 2005, 2015
 - b) Use microdata on demographics and car choices for the whole sample
 - c) Use real exchange rate as an IV for price
2. Assume **static Nash-Bertrand** conduct to find implied markups/costs
 - a) Explore other conduct assumptions
3. Compute welfare: decompose **demand-year effect** into changes in
 - a) average unobservable quality of cars and
 - b) value of the outside option.
4. Analyze **factors contributing to trends in welfare.**



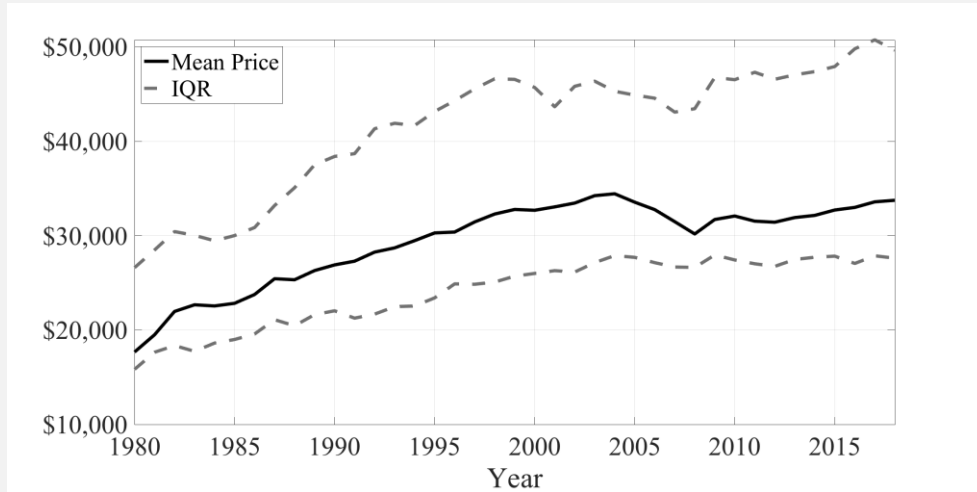
Data

1. Model level sales/attributes/prices(MSRP) 1980-2018
 - Wards Automotive
 - Light trucks, SUVs, vans, sedans and other body-types
2. Second choice survey data from Maritz
 - ~50,000 responses each for 1993, 1999, 2005, 2015
3. Demographic info and purchase choices from CEX/MRI
4. Real exchange rates from Penn World Table

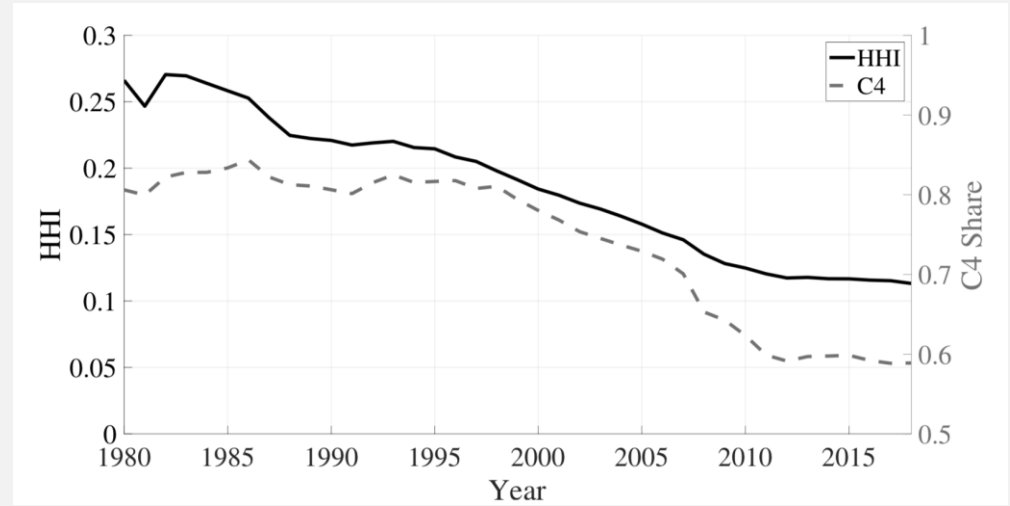
Key Data Patterns



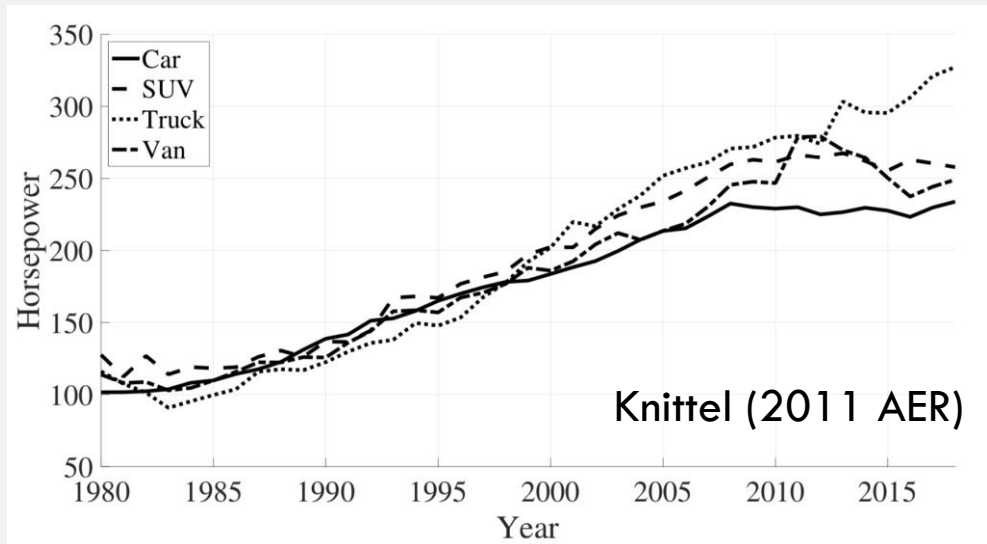
Prices Rising



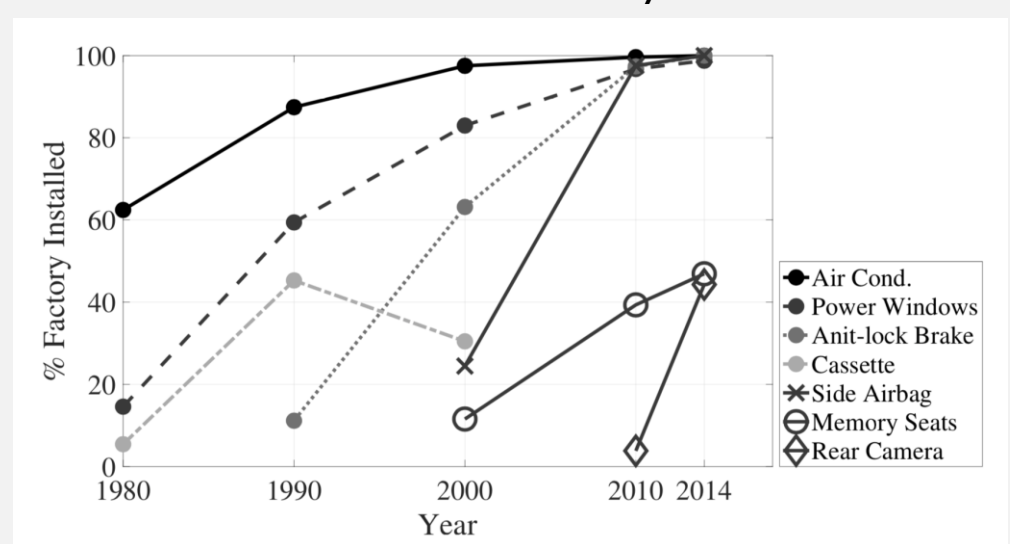
Concentration Falling



Vehicles Getting Faster/Bigger



Tech and Safety





Are markups rising?

Difficult to interpret industry trends.

1. Prices are rising,
2. but, industry less concentrated. [something is causing rise in prices that isn't market power.]
3. Consumers are wealthier.
4. What is happening with costs?



Are consumers better off?

Difficult to interpreting industry trends.

1. Higher prices.
2. More vehicles to choose from.
 - Particularly, rise of the SUV.
3. Bigger, faster, fancier vehicles.
 - higher quality and costlier to produce



Demand Specification

Random coefficients static discrete choice.

Unobserved heterogeneity

- Van dummy
- SUV dummy
- Truck dummy
- Vehicle footprint
- Horsepower
- Miles per gallon
- Luxury classification
- Sports car classification
- Electric vehicle
- European brand
- US brand

Demographic driven heterogeneity

- Price: income, income-squared, age of HoH
- Van: family size categories
- SUV: family size categories
- Truck: rural HH
- Footprint: family size categories



Identification Overview

1. Price elasticity: real exchange rate IV.
 - BMW production in USA
 - Swedish Krona devaluation.
2. Observed heterogeneity: CEX/MRI microdata moments, e.g.,

$$E[Size_{j(i)} | FamilySize_{j(i)}]$$

3. Unobserved heterogeneity: Maritz second choice moments, e.g.,

$$Corr[Size_{j(i,1)}, Size_{j(i,2)}]$$



Demand Results

Average Own Price Elasticities by Income Quintile

Year	Income Quintile				
	1	2	3	4	5
1980	-5.90	-5.69	-5.92	-5.97	-5.69
2000	-8.19	-8.20	-8.12	-8.22	-8.30
2018	-9.08	-9.02	-8.66	-8.65	-8.66

Correlations in attributes between 1st and 2nd choices

	Data	Model	Alternative Specifications	
			Logit	Only Demographics
Van	0.71	0.71	-0.01	0.02
SUV	0.64	0.64	-0.01	0.03
Truck	0.84	0.80	-0.02	0.58
logSizeLW	0.71	0.69	-0.02	0.18
Horsepower	0.60	0.59	-0.01	0.07
MilesPerGallon	0.65	0.65	-0.01	0.08
Luxury	0.48	0.49	-0.01	0.02
Sport	0.28	0.28	-0.00	0.00
Electric	0.37	0.19	-0.00	0.00
EuroBrand	0.34	0.34	-0.00	0.01
USBrand	0.48	0.47	-0.01	0.02



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Demand Results

Add boxes and action.

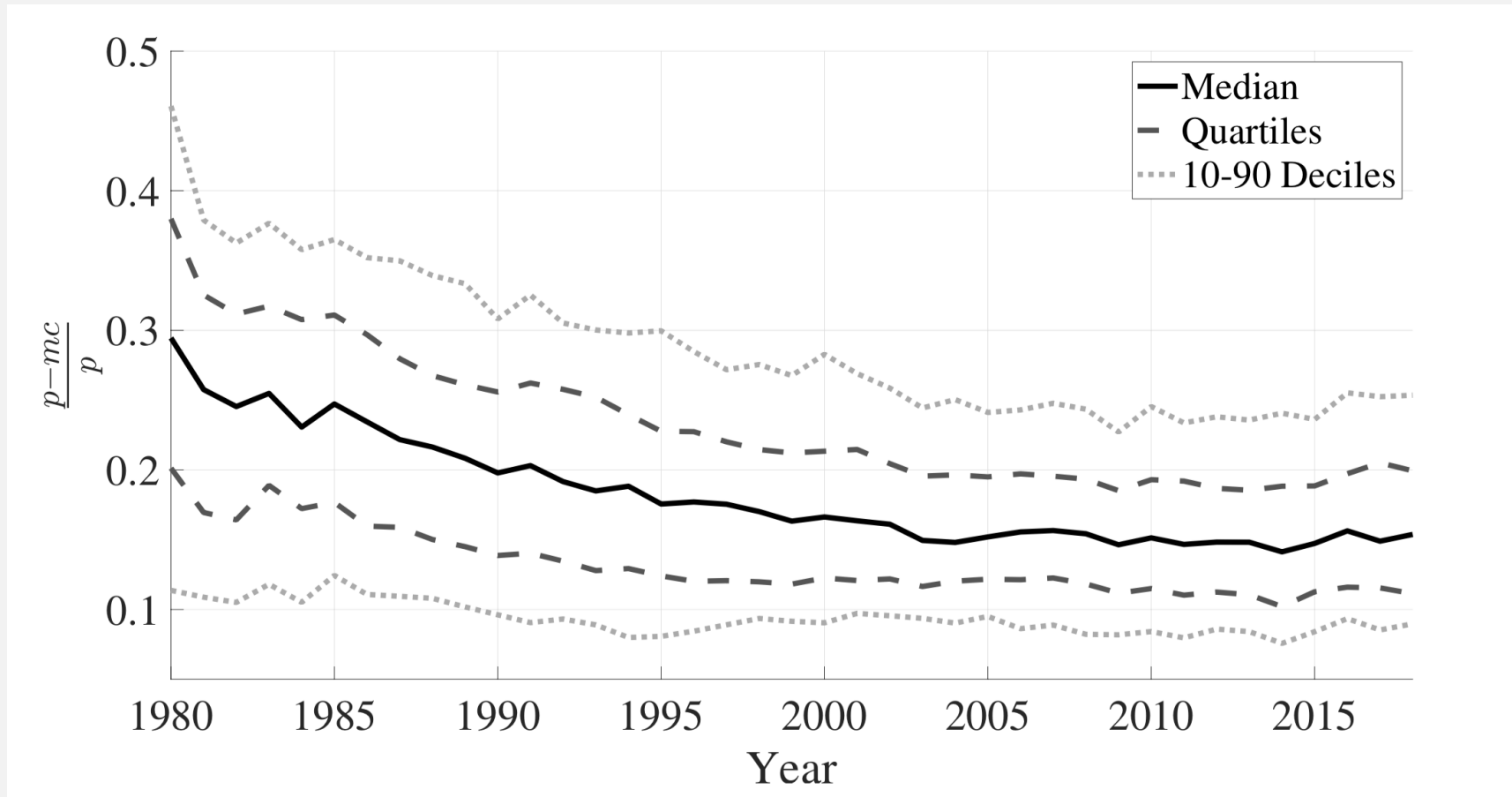
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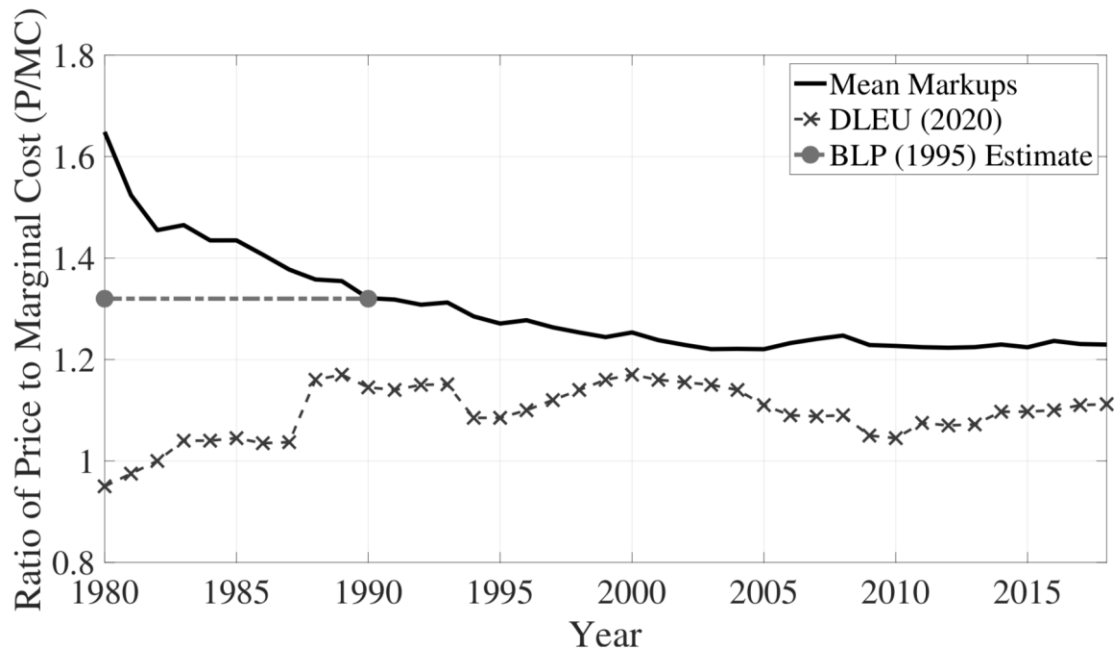
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Horsepower	0.60	0.59	-0.01	0.07
MilesPerGallon	0.65	0.65	-0.01	0.08
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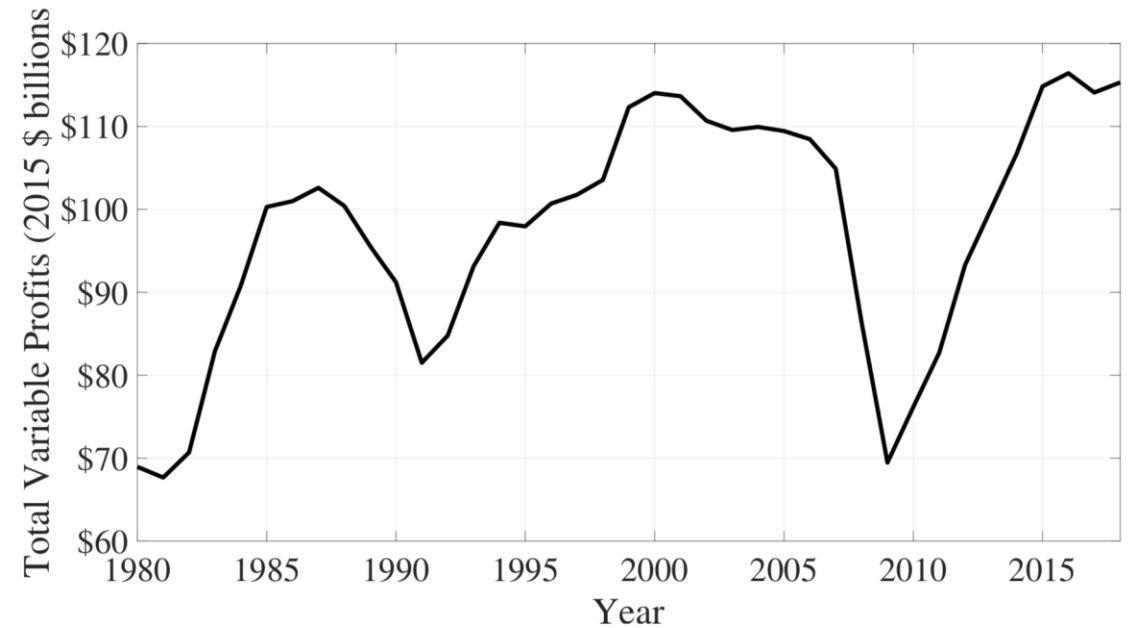
Implied Markups Under Static Nash Bertrand



Comparison to Other Estimates



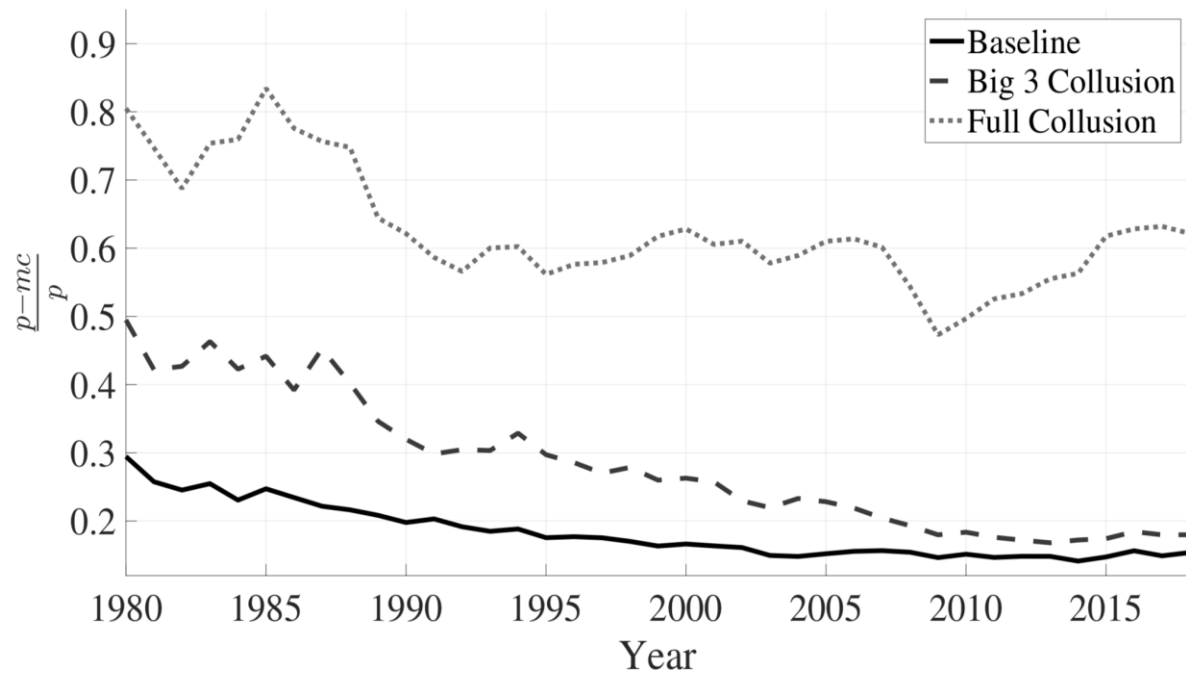
(a) Price over Marginal Cost



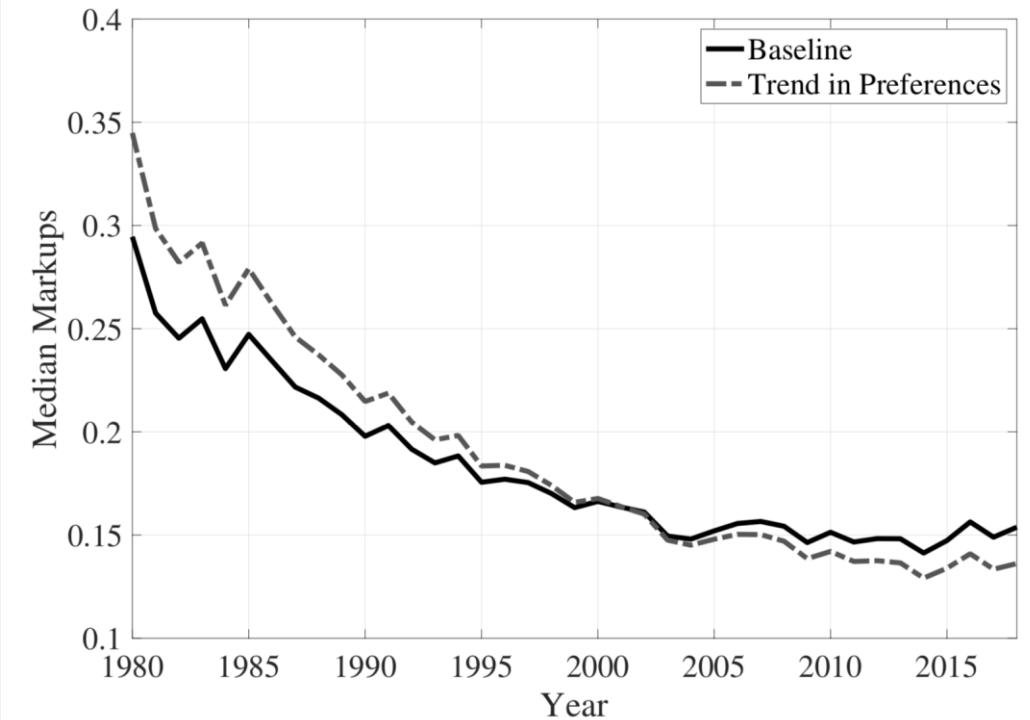
(b) Total Variable Profits

Markups: Sensitivity / Robustness

Alternative conduct assumptions

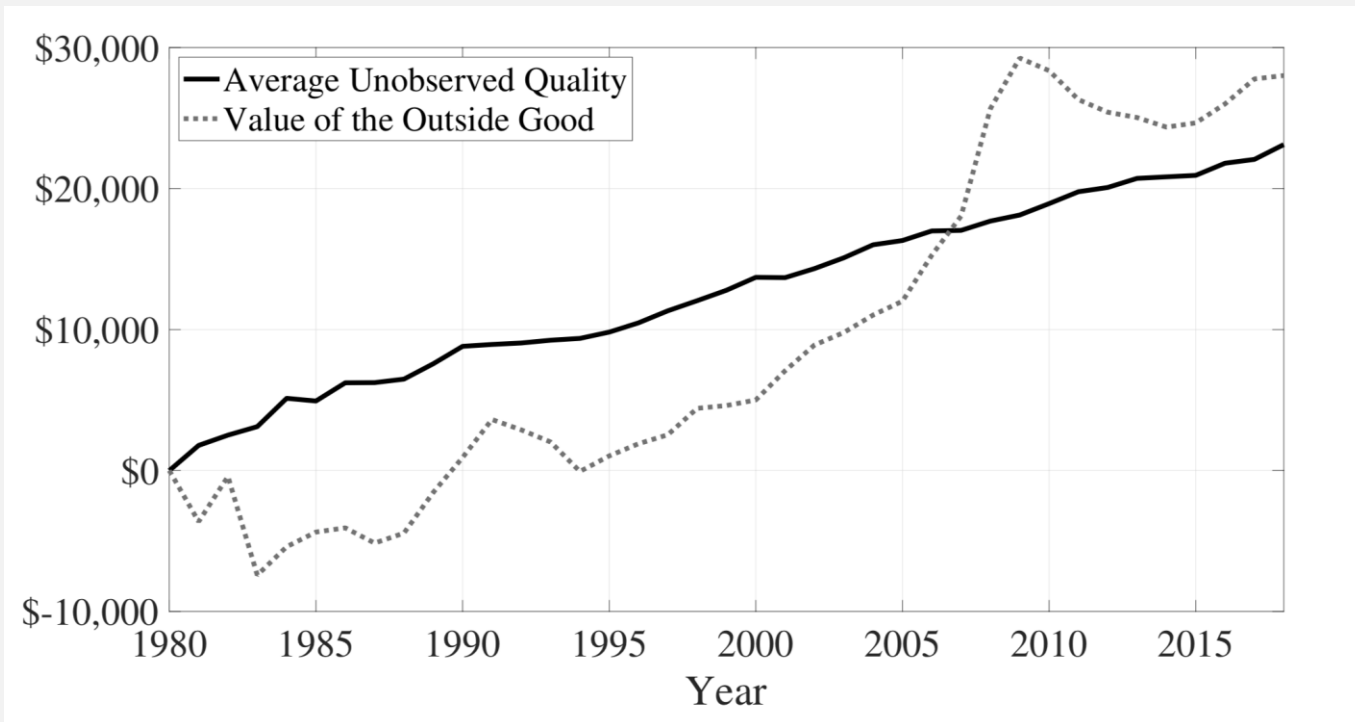


Allow price/other parameters to change over time.





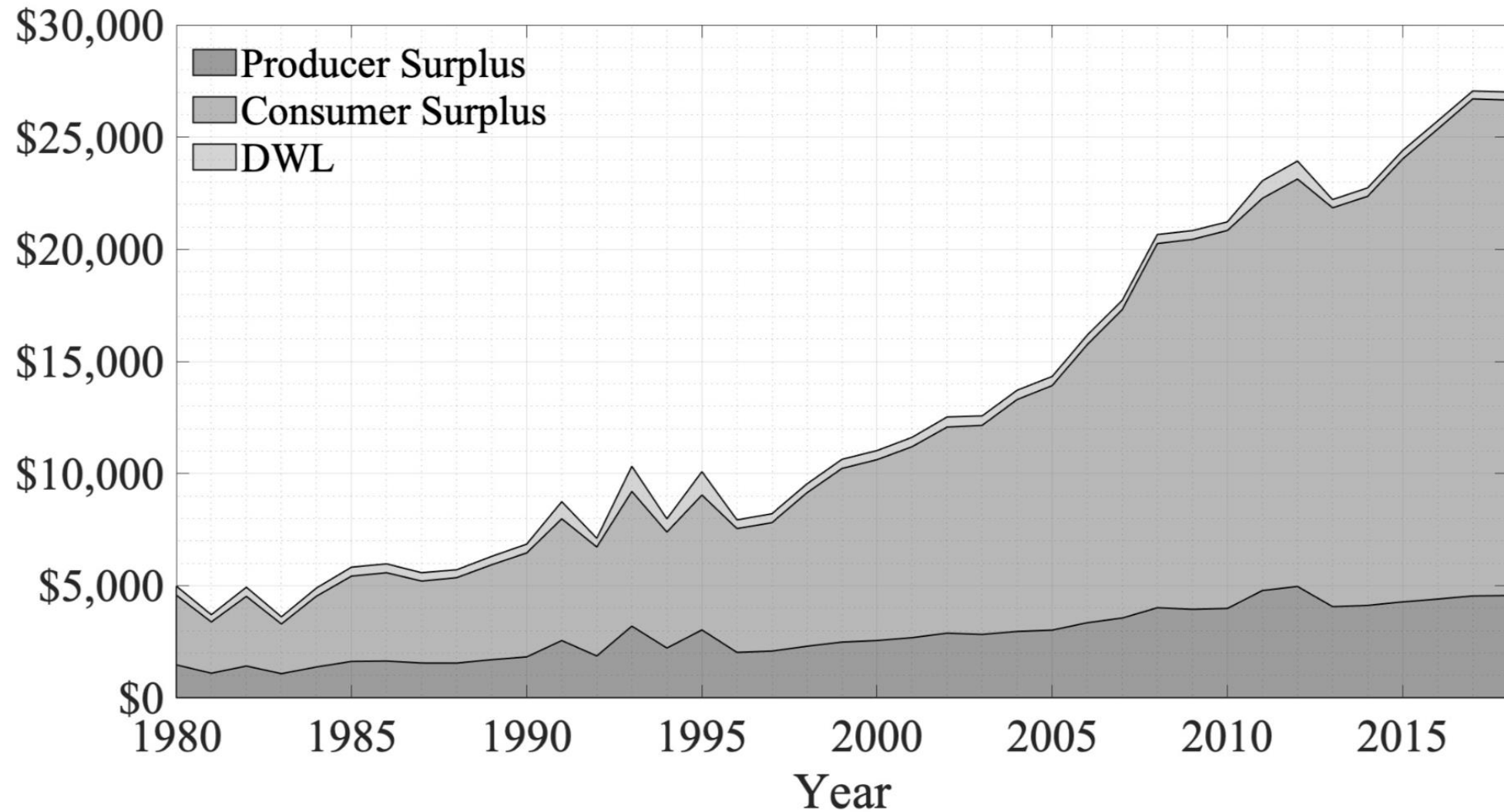
Year Effect Decomposition



Average unobserved quality

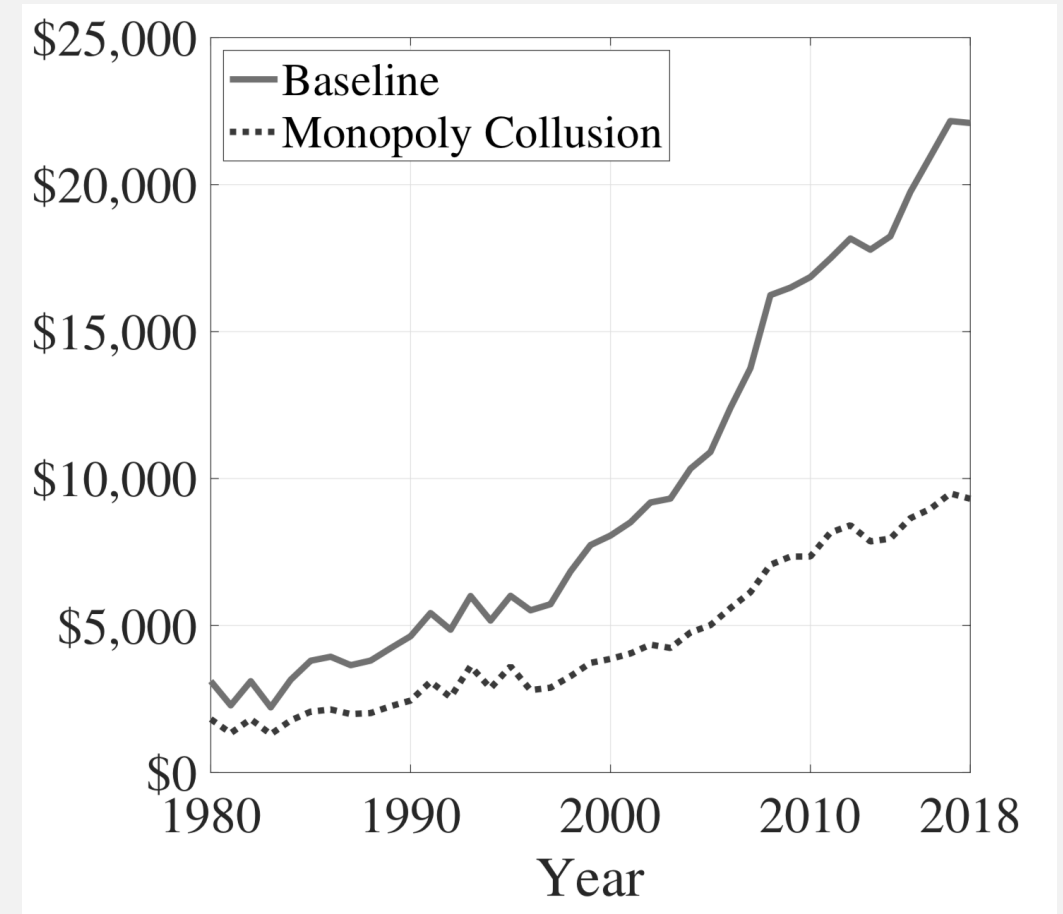
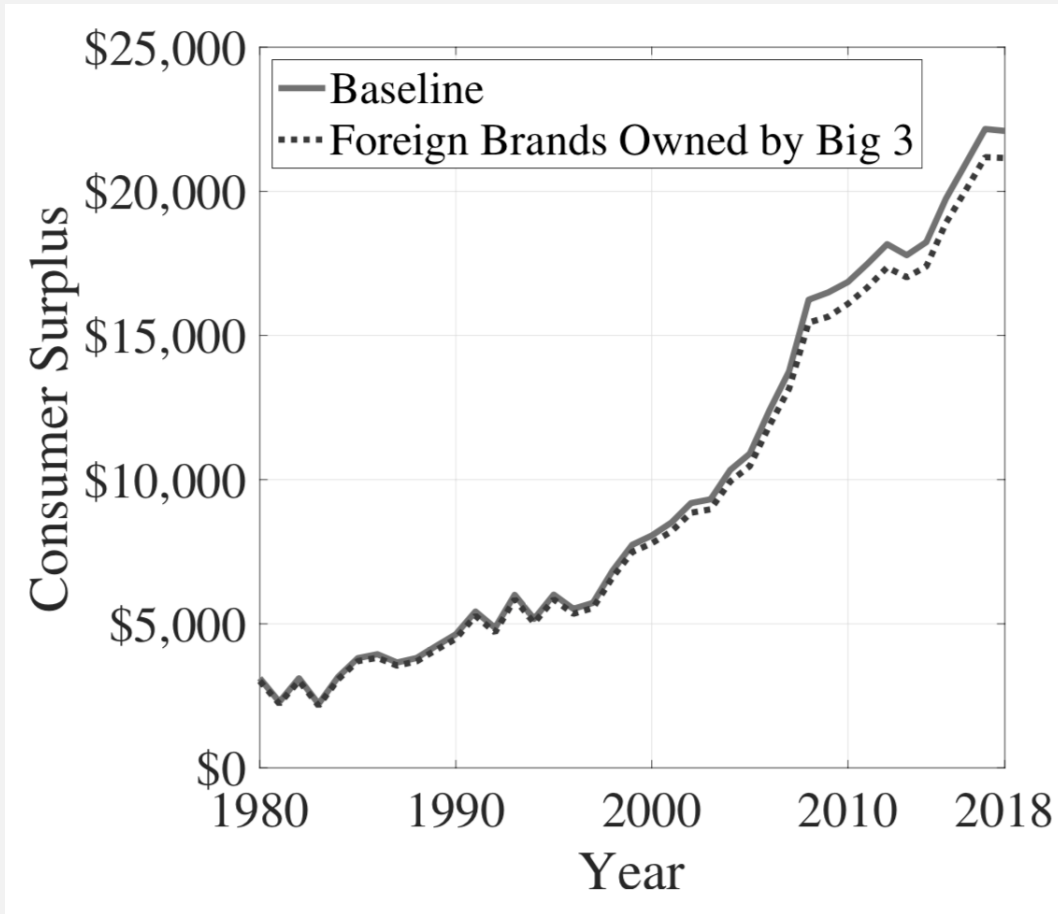
- Improves by over \$20,000
- Validation from regressing prices of mint condition used cars on observable characteristics
- Improvements in
 - safety;
 - durability;
 - comfort.

Welfare



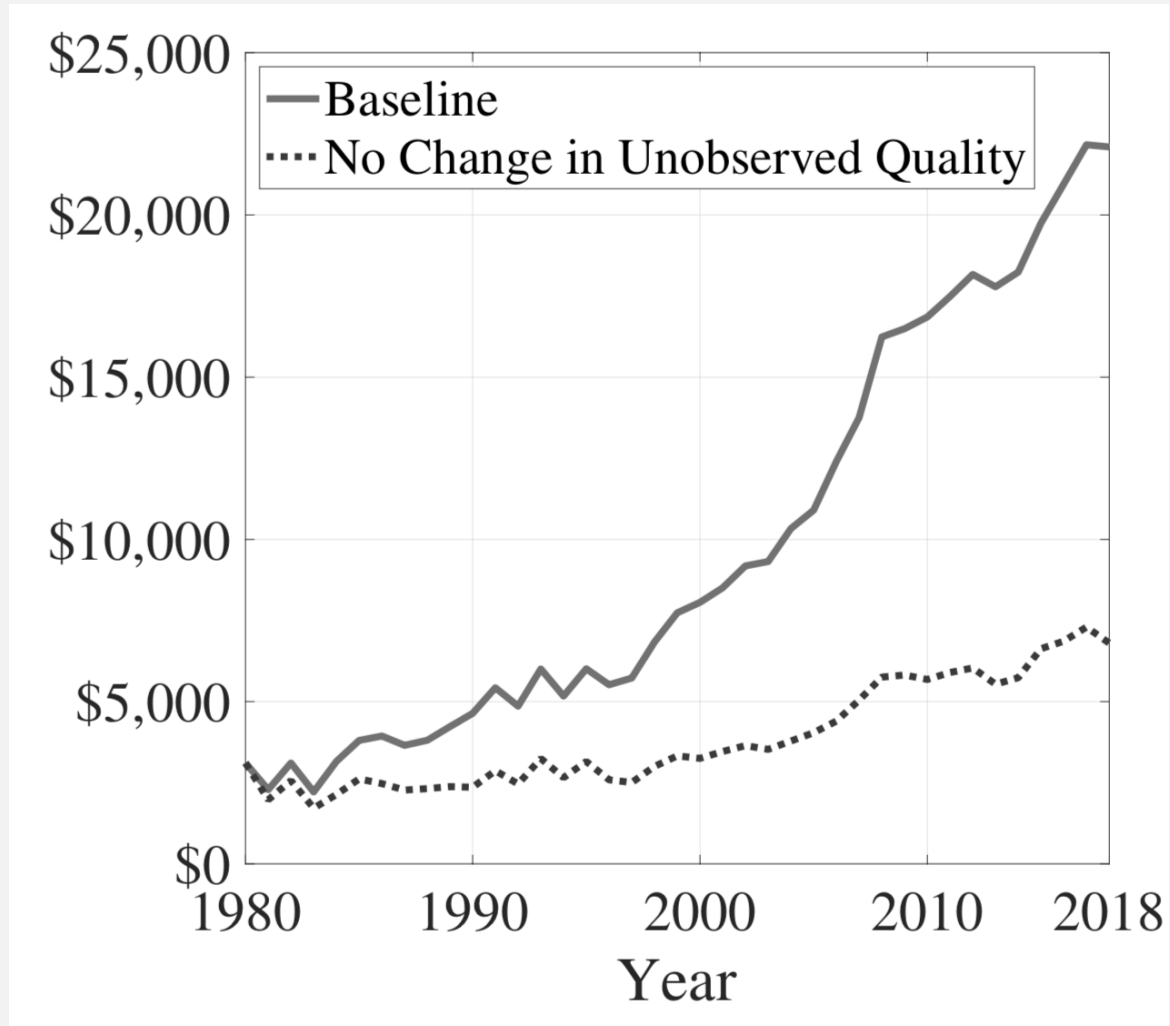


Gain in Consumer Surplus not from Imports





Gain in Consumer Surplus from Quality

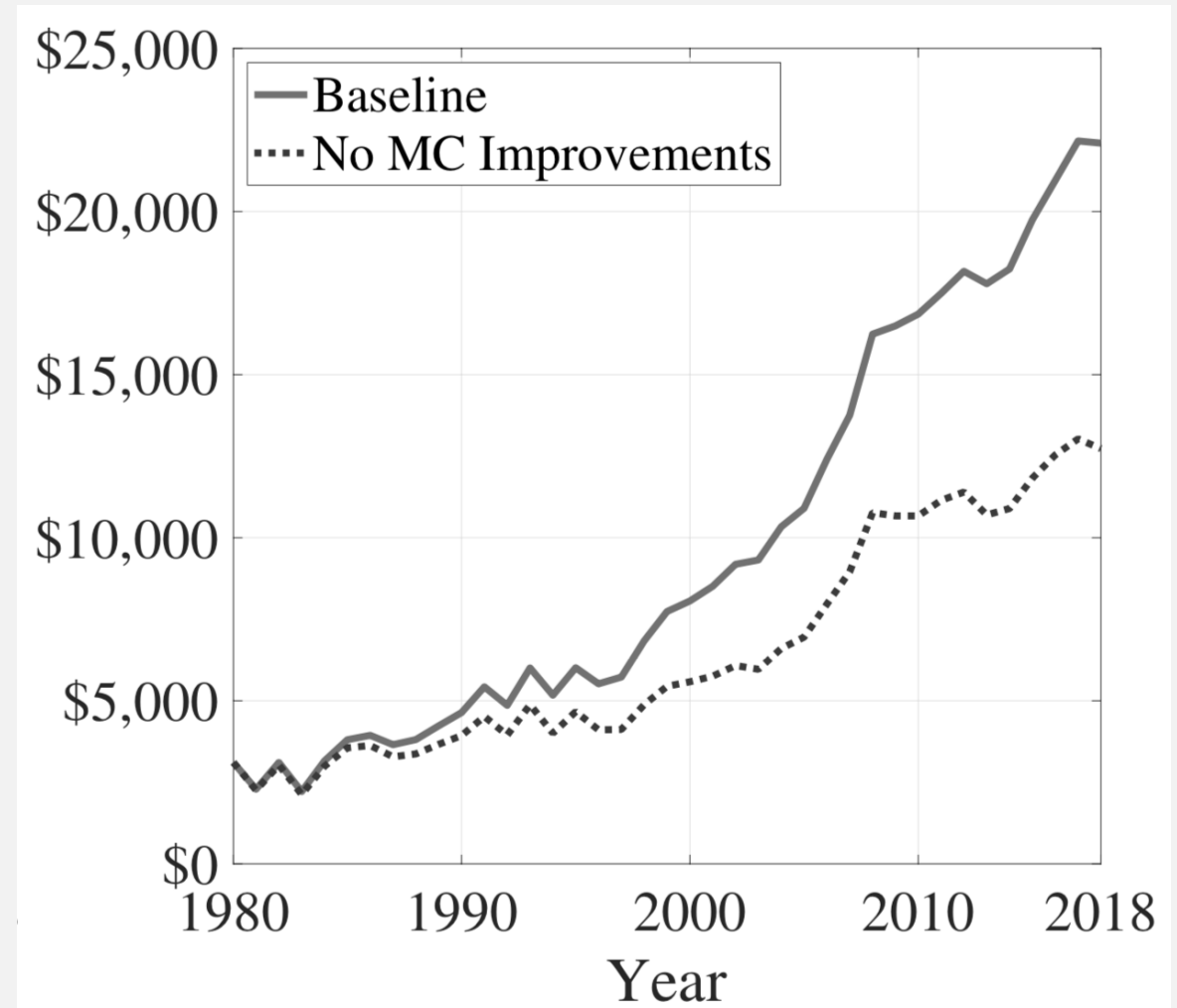




Production technology and Costs

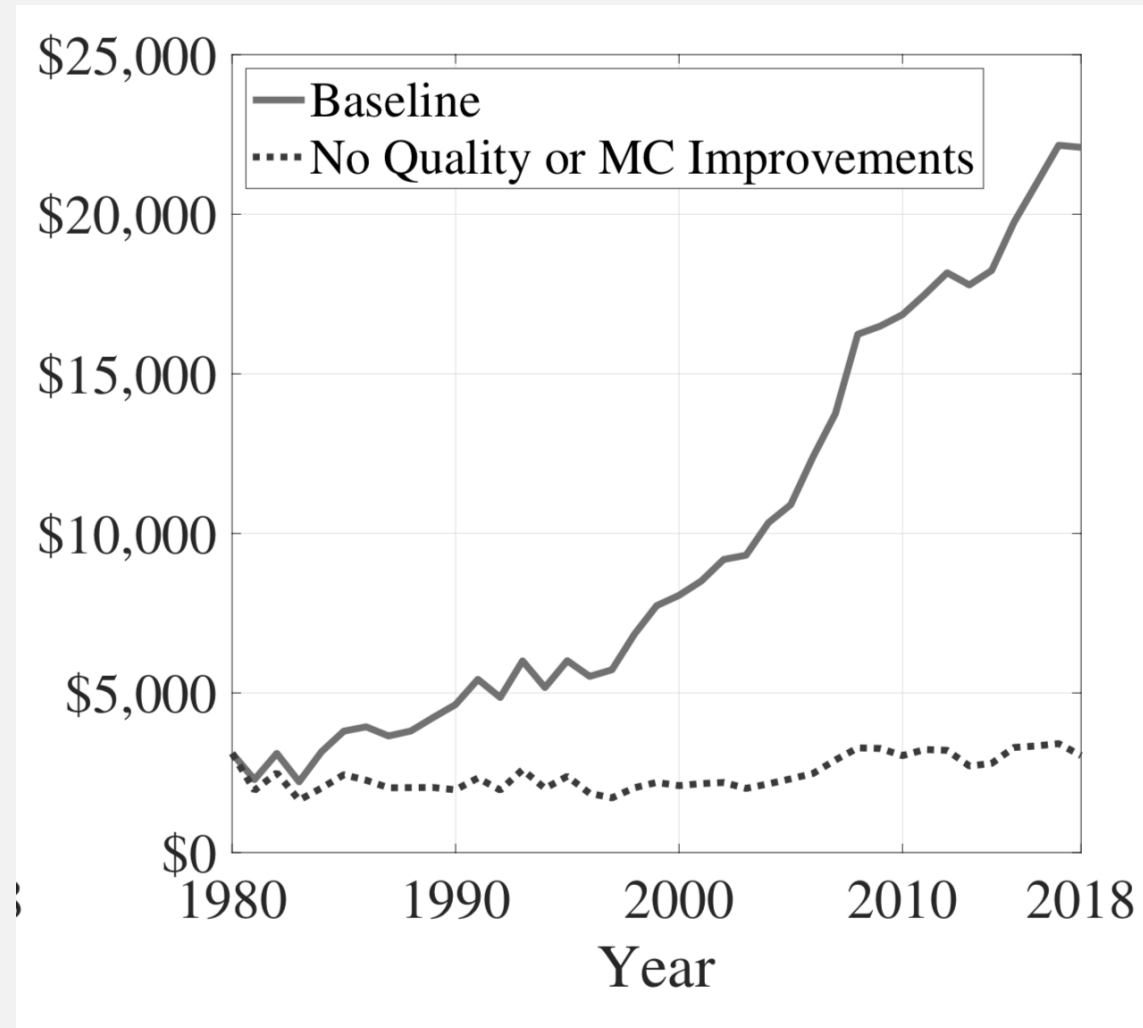
Project recovered costs on vehicle attributes and a time trend.

Estimate 1.5%/yr decrease in marginal costs, conditional on attributes.





Quality + Production Technology





Conclusion

- Demand/supply estimation allows measurement of market efficiency and ability to pinpoint mechanisms.
- Markups will not capture welfare if products are changing. [Demsetz, 1973]
- Advantages over production approach
 - product level markups,
 - quality adjusted,
 - welfare measurement.

U.S. Automobiles

- Prices rising but markups falling. Overall, consumers are much better off.
- Driven by increase in product quality and improvement in production technology.

Additional Slides

Consumer Welfare: Decomposing Year Effects

- Year effects in demand...
 - aggregate effects, eg. biz cycles, used car market;
 - unobserved quality of vehicles.

- How to disentangle?

For continuing products

$$E[\xi_{jt} - \xi_{jt-1}] = E[(\tau_t - \tau_{t-1}) + (\tilde{\xi}_{jt} - \tilde{\xi}_{jt-1})] = 0$$

- ξ : product quality
- τ : yearly average (actual) quality
- $\tilde{\xi}$: residual from estimation (includes total component of year fixed effects).
- Integrate over the “aggregate” part of the year effects.
- Chained quality adjustment, similar to BLP (1993 AER P&P).

