Market Power in Auto-Insurance

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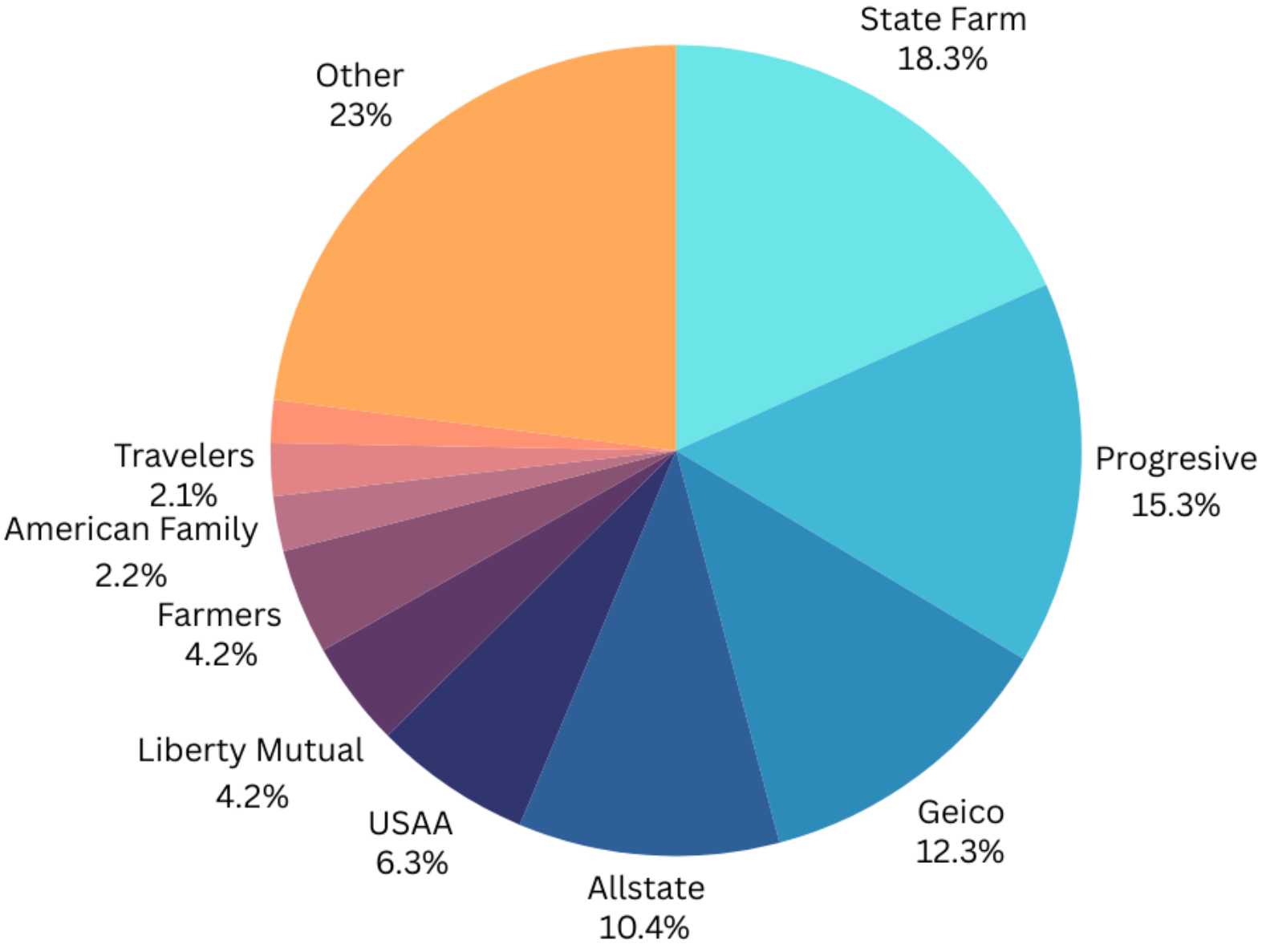
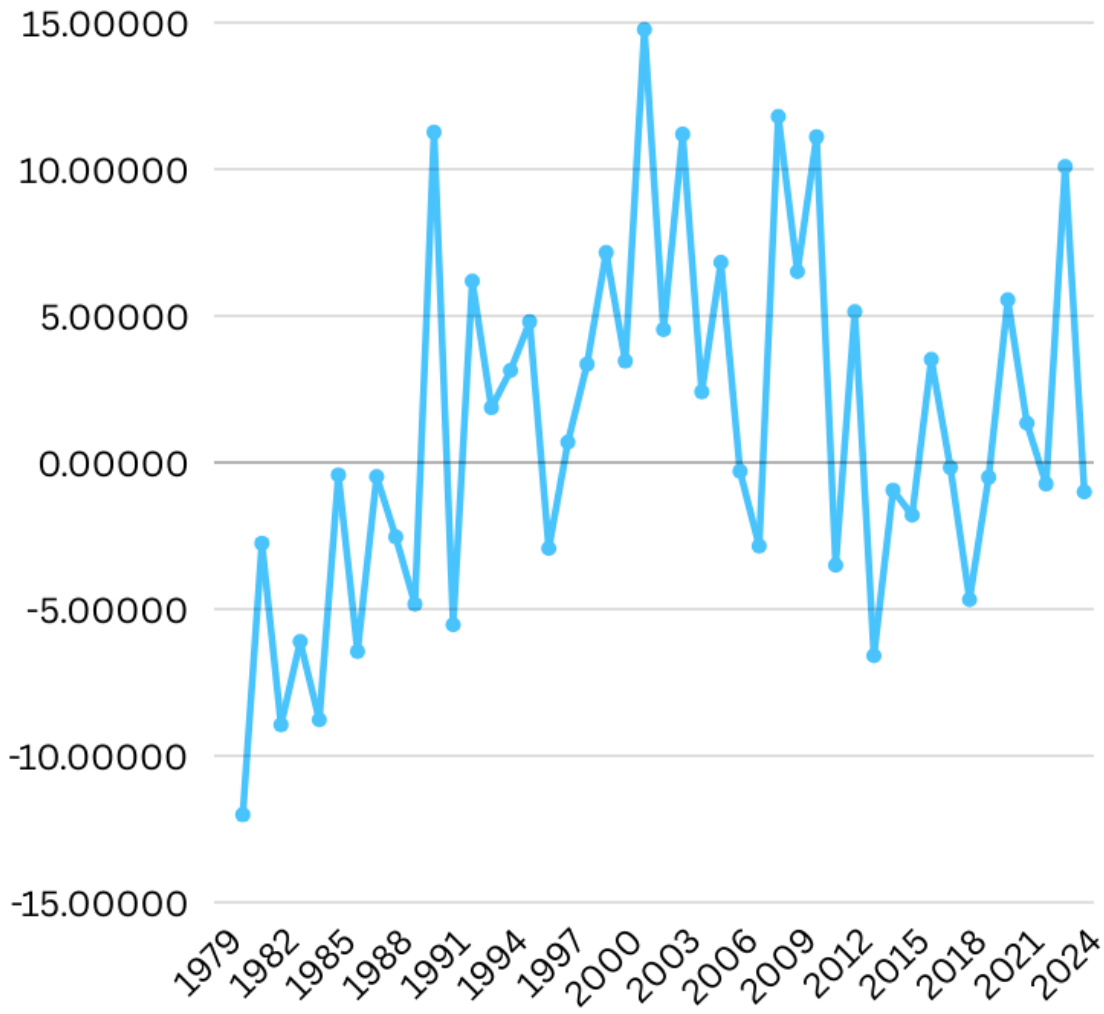
December 2024

Introduction



FTC Funding (Inflation Adjusted)



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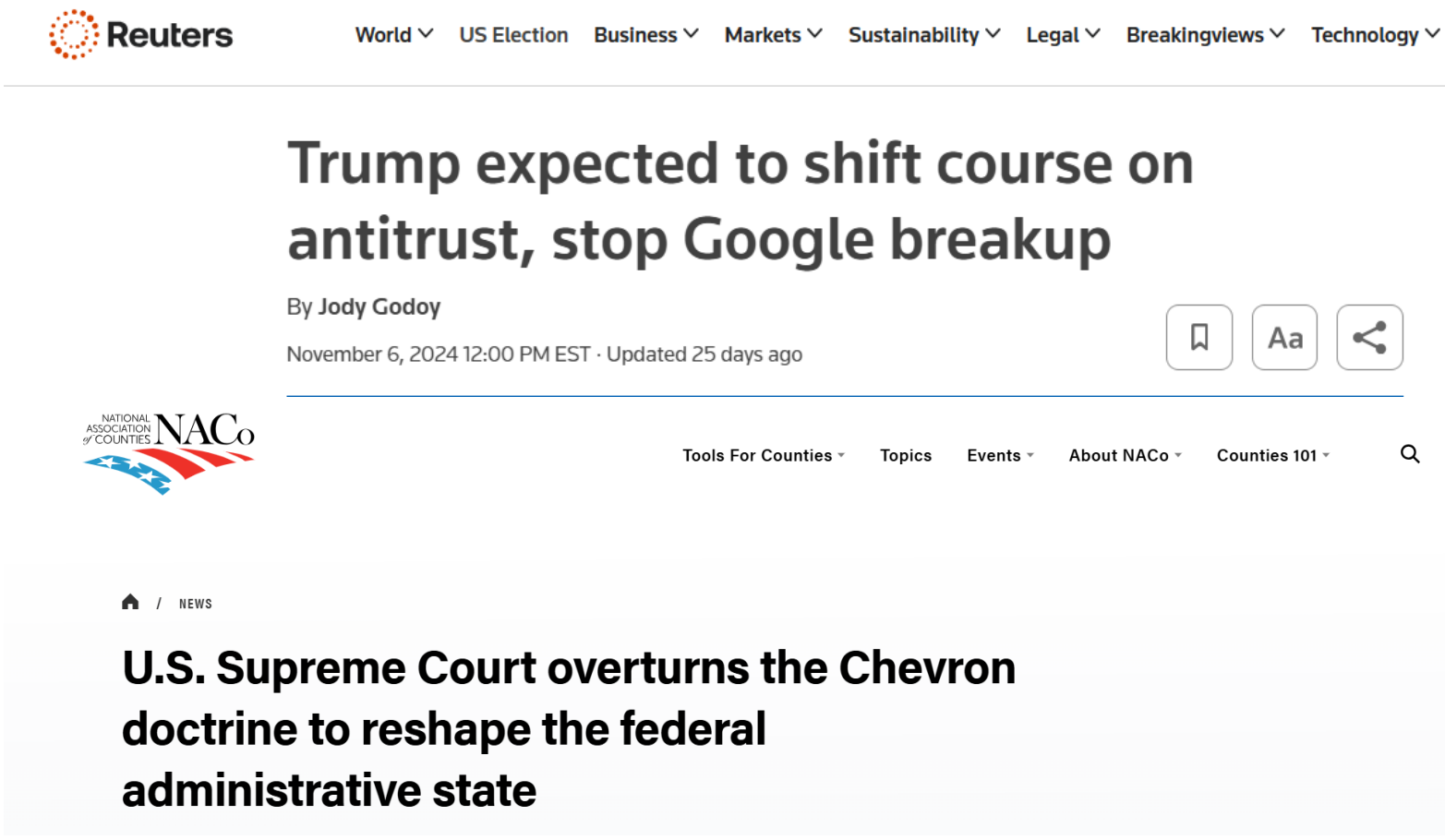

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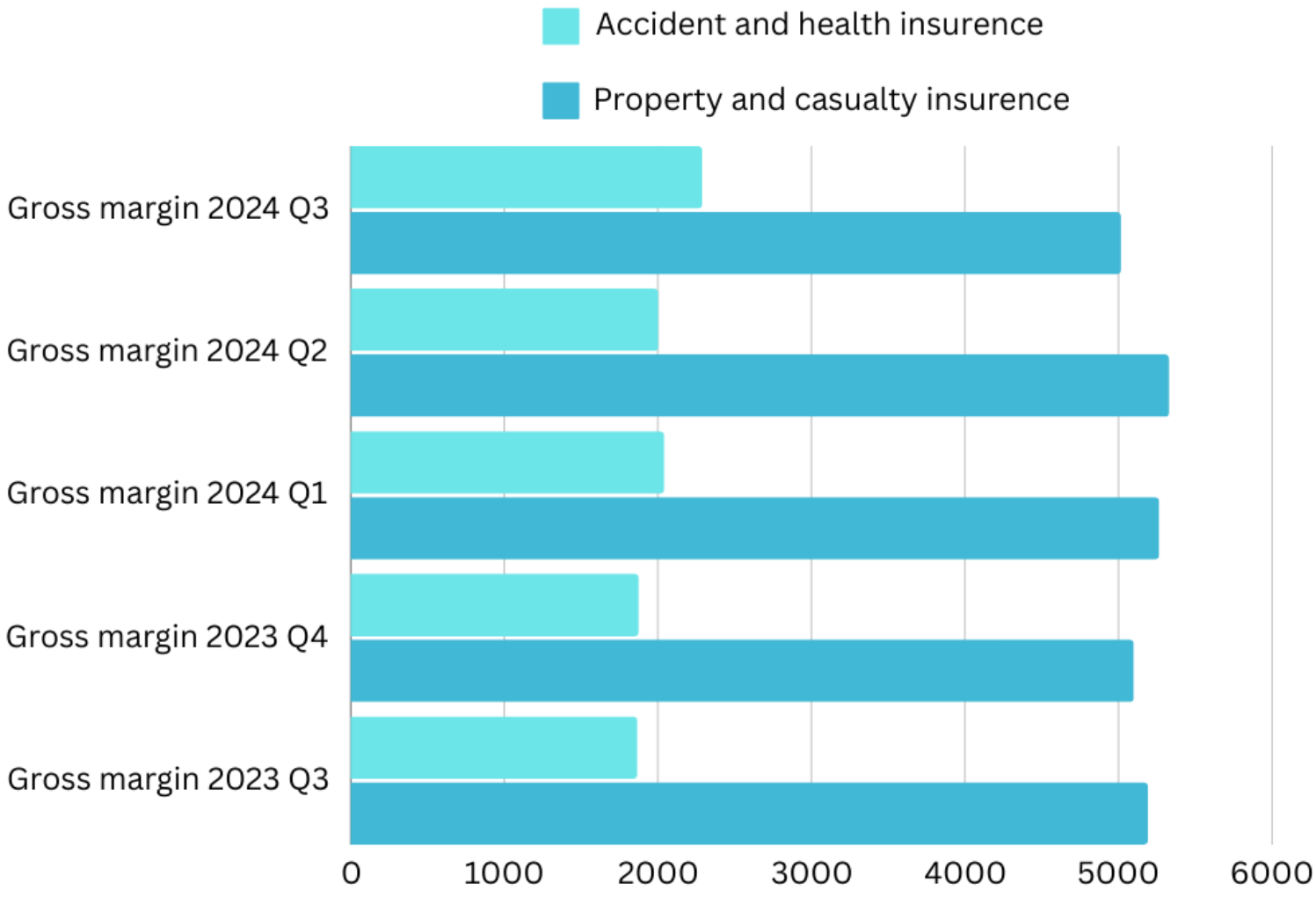
A Presidential Document by the Executive Office of the President on 02/03/2017

Motivation - McCarran Ferguson Act of 1945

- Born from the debate between Federalist and Anti-Federalist powers
- Gives state laws precedent over federal laws concerning "the business of insurance"
- Notably this excepts insurance from:
  - The Federal Trade Comission Act of 1914
  - The Sherman (Anti-Trust) Act of 1890
  - Robinson-Patman Antidiscrimination Act of 1936
- Exceptions to the McCarran-Ferguson Act include
  - Protections for boycotts
  - Health insurance

Motivation - Gross Margins in 100ths of Percentage Points



Setting and Literature - Berry, Levinsohn and Pakes (1995)

- Demand estimation by random coefficients
- Car insurance has many discrete and continuous characteristics such as
  - Coverage
  - Deductible
  - Gap insurance
  - Under-insured motorist coverage
  - Time to process claims
  - No-fault coverage
  - etc.
- Not every coverage plan would be equally substitutable
- Buyers are also likely to be distributed by characteristics (car value, location, how often they drive)

Setting and Literature - Nevo (2001)

- Producer estimation by IV and some assumption about competition
- Insurance firms charge some markup over the expected outcome of the insured
- Insurance products compete with one another for a limited, car owning market
- Car insurance, like cereal, is sold in different markets (states) and data is in panel
- Parameter of interest, like Nevo, is how well different forms of competition/market power fits the gross margin of insurance companies

Setting and Literature - Coccorese (2010)

- Antitrust authority fines 36 Italian auto insurance agency's for illegally colluding
- However the question remains how much is each firm colluding
- This paper fits the notion of the H-statistic to the auto insurance market to show the amount of collusion present.
- There result supports the fine given by the regulator

(Minimum Desired) Data

- Profitability of the auto-insurance business of the 10 largest players
  - Ideally from official reports such as 10Ks - but only some firms are publicly traded and not all of them break down earnings by operation
  - Total insurance premiums received broken down by product offerings
  - Total claim payout by product offerings
- Data can likely be sourced from consulting firms and open source aggregation
  - There are aggregation websites that indicate how long and how much each firm pays out (at the firm level) in premiums
  - Consulting firms aggregate market size and profitability data in auto-insurance

(Ideal Desired) Data

- Survey of individuals and their characteristics that buy each auto-insurance product
- Insurance premium and payout data broken down by state, along with bottom line profits for each firm in each state
- Survey data would need to be sourced either from some major polling agency or generated by performing the survey
- Insurance specific data is likely only to be available to the insurance firms in question (and is, thus, unlikely to be available)

Model - Demand Side

- Each individual maximizes their own utility which depends on the cost of the policy, the characteristics of the policy, and some unobservable characteristics
  - The price of the insurance is in terms of premium per dollar of coverage

$$U(x_j, p_j, \xi_j, \Delta\xi_j) = x_j\beta_i + p_{jt}\alpha_i + \xi_j + \Delta\xi_{jt} + \epsilon_{itj}$$

- Taking heavy inspiration from Nevo (2001) and Berry, Levinsohn and Pakes (1995)
- We use no insurance (ie driving, likely illegally, without insurance or choosing not to drive) as the outside option

Model - Supply Side

- Firms charge markup based on form of competition and demand estimates
- We want to find what type of competition best fits our data
- Look at four different forms of competition:
  - Each insurance product as a separate firm
  - The present market firms
  - All firms colluding in a grim-trigger SPNE
  - All firms in perfect collusion (operating as one)
- Use US prime rate as discount rate

Model - Supply Side a la Nevo

- Firms profit maximize over their products:

$$\Pi_f = \sum_{j \in F_f} (p_j - mc_j) Ms_j(p) - C_f$$

  - p_j is the price of the insurance
  - mc_j is the expected payout of the insurance
  - M is the an estimate of the market size (all car owners)
  - s_j is the share of the market held by each product
- We manipulate the subset F_f to include either just the product, all products owned by a given firm in the current market, or all firms

Model - Supply Side a la Nevo

- The FOC for profit maximization is, thus,

$$s_j(p) + \sum_{x \in F_f} (p_j - mc_x) \frac{\partial s_x(p)}{\partial p_j} = 0$$

- We can thus replace the sum with a matrix to account for interactions and partials

$$s(p) - \Omega_{jx} S_{jx} (p - mc) = 0$$

- Where $S_{jx} = \frac{\partial s_x(p)}{\partial p_j}$ and

$$\Omega_{jx} = \begin{cases} 1 & \text{Product j and x are in same firm/group} \\ 0 & \text{Otherwise} \end{cases}$$

Model - Panzar-Rosse H-statistic

$$H = \sum_{k=1}^{m} \frac{\delta \ln R_{it}}{\delta \ln W_{itk}}$$

- $H \leq 0$: A perfectly colluding oligopoly
- $0 \leq H \leq 1$: symmetric monopolistic competition
- $H = 1$: perfectly competitive market

Model - Extension

- We want to know more specifically the form of collusion
  - Is collusion rampant in the less regulated auto-insurance market? Can the collusive outcome be supported by just the auto-insurance market?
- Benchmark Grim-Trigger SPNE among all or specific high H-stat firms: Firms select their mark-ups such that

$$\sum_{t=0}^{\infty} \delta^t \pi_c = \pi_d + \sum_{t=1}^{\infty} \delta^t \pi_N$$

- Where π_c is the profit under collusion
- π_d is the profit from deviating in market
- π_n is the profit if firms all go their own way
- We assume δ is the prime borrowing rate

Estimation Method - Demand

- Taking inspiration from Berry, Levinsohn, and Pakes (1995) and Nevo (2001)
- Find a vector of non-price characteristics and price per dollar of coverage
- We assume some distribution of individual specific and market specific characteristics (Type I Extreme Value)
- We also assume some distribution of preference parameters: Normal

Estimation Method - Demand

- Estimate demand by 2-step GMM:
- Instrument for demand in each state with the demand in all other states
- Use other observable controls such as insurance regulation, weather, and average state-wide income
- Estimate once with an identity weighting matrix, then use the variance-covariance matrix to weight the second estimate
- Use estimates to calculate markups

Estimation Method - Extension

- Just as with Nevo, estimate demand by 2-step GMM
- Based on estimated elasticities of demand, iterate the profit and wether any given firm would deviate given a candidate collusion structure (ie how many and which firms collude)
- The grid point with highest profit without deviation is then the candidate collusive equilibrium to be compared
- Further iteration to do finer grids around the earlier selected point may be beneficial

Other Relevant Literature/Sources

- ISIS Database
- Khovidhunkit. P, Temple University ProQuest Dissertations and Theses (2005): Demand for automobile insurance in the United States
- Laura Dragos, S., Mare, C., Mureșan, G. M., Purcel, A. A. (2022). European motor insurance demand: a spatial approach of its effects and key determinants.
- Paha, Johannes (2001): Empirical Methods in the Analysis of Collusion

Other Challenges - Multi-Product Competition

- Many of the largest auto-insurers offer other products such as home insurance
  - It is possible margins could be due to a loss-leader marketing style. I.e. sell profitable car insurance by bundling it with cheap house insurance
  - Multi-product collusive agreements may also play a factor if single-product collusion cannot explain markups
- It may be necessary, then, in case of a result of inexplicably strong collusion to expand the scope of our research
  - We would attempt to gain data on home and other insurance markets and combine them into the supply side of our model

Other Challenges - Multi-Market Competition

- Many insurance firms operate in many states, but not all
  - Potentially, there is a multi-market collusive structure which is significantly more complex than our firm-level collusion analysis
- We would need significantly more specific data about pricing and demand in differing state for each insurance company that operates in the state
- To estimate collusion, we would have to repeat our estimation process for each state and estimate a more flexible collusive model

Other Challenges - Specialized Firms/Market Niches

- Some insurance companies such as USAA target specific subsets of the population (veterans)
  - This richness in competition is not captured in our present model
- We would need more specific demographic details on who buys what insurance and model a more flexible model with considerations to subpopulations
- There is likely to be a significant increase in computational complexity to capture this richness along with data challenges

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