

Robustness and measurement issues in merger event and price-concentration studies

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Agenda

- Overview
- Measuring merger effects ex post
- Why traditional regression modeling may not be robust
- Comparison of traditional and “treatment effect” approaches

Overview

Overview

- A robust approach delivers results that are not sensitive to changes in the underlying assumptions or statistical techniques
- Approaches that are not robust do not form a sound basis for policy
- Key issue: robustness of the FTC and GAO studies on petroleum mergers
 - Both studies apply “traditional” dummy variable approaches, but with different explanatory variables
 - This traditional approach can deliver useful estimates of merger effects, but only under stringent conditions
- The traditional approach can be improved by exploiting methods from the treatment effects literature

My recommendation: a treatment effect approach

- The treatment effect approach views a merger as a treatment applied to post-merger observations
 - This is a standard approach to analyzing the effects of treatments in clinical trials, but it can be applied to any “intervention”
- The treatment effect literature provides a robust basis for estimating merger effects
 - Explicitly allows for imperfect data
 - Allows for model misspecification
 - Isolates total effect of merger ex-post

Measuring merger effects ex post

Overview of ex-post merger effects

- The merger effect is the difference between the observed post-merger price and the “but-for” price
 - This effect makes sense period by period
 - The average effect over the post-merger regime is often of primary interest
- The traditional approach estimates the average effect of the merger ex post using a dummy variable regression
 - The regression includes a merger dummy and relevant explanatory variables
- In treatment literature jargon, the average effect of the merger ex post is the “treatment effect on the treated”
 - This effect can be estimated robustly using suitable “covariates”

Why traditional regression modeling may not be robust

The traditional regression approach relies on a ceteris paribus interpretation

The estimated coefficients represent the change in the dependent variable when the corresponding explanatory variable changes, assuming all other variables are held constant

- Examples
 - The merger dummy coefficient represents the effect on price of the merger, holding all other factors constant
 - The HHI coefficient in a price-concentration study represents the effect on price of concentration, holding all other factors constant

The conditions for the traditional regression approach to estimate the ex-post merger effect consistently are stringent

- The regression equation must be a truly causal relation
- All relevant variables must be included and measured accurately—no proxies
- The functional form must be correct
 - The effect of the merger must be identical in each period and invariant to market conditions
 - The effects of all other variables must be precisely as specified by the model
- Other requirements

Consequences of the failure of the ideal conditions

- Estimated coefficients no longer measure ceteris paribus effects
 - The estimated “merger effect” is misleading
 - The other estimated effects are also misleading
- Results can be highly sensitive to inclusion or exclusion of particular variables
- Researchers can arrive at different results—not robust

Comparison of traditional and treatment effect approaches

Ingredients of the treatment effect approach

- List of observable determining variables
 - Observable true cost and demand shifters
- List of observable proxies for unobservable determining variables
 - Error-laden measures of otherwise unobservable cost and demand shifters
- Observables (X) act jointly as *predictive proxies* for unobservable determining variables
 - In the treatment literature, X is the set of covariates
- Key requirements
 - Predictive proxies must not be causally impacted by merger (treatment)
 - Proxies *must* be included for any unobservable whose behavior changes pre- and post-merger

Treatment effect regression

- Regress dependent variable (e.g., price) on:
 - Merger dummy
 - Flexible transformations of X
 - Product of merger dummy and flexible transformations of X (interactions)
- Flexible transformations of X and interactions circumvent misspecification

Treatment effect approach regression results

- Merger dummy coefficient consistently estimates total average ex-post effect of the merger
 - This is the difference between average post-merger price and the average price predicted “but for” the merger
- Remaining coefficients are not ceteris paribus effects
 - Instead, they capture a mix of causal and predictive effects

The remaining coefficients need not have expected signs or magnitudes

Comparison of treatment effect approach with traditional approach

- Treatment effect approach
 - Explicitly permits use of proxies in X
 - Avoids misspecification via interactions and flexible transformations of X
 - Does *not* deliver estimates of ceteris paribus effects of non-merger variables
- Treatment effect approach delivers robust estimates of merger effects
 - Robust to errors in variables
 - Robust to misspecification

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Presentation and paper available at www.bateswhite.com