The impact of competition policy

What are the known unknowns?

Stephen Davies and Peter L. Ormosi

ESRC Centre for Competition Policy

CCP's 9th Annual Conference
Norwich, 6 June 2013

Motivation

- Evaluation of competition policy increasingly frequent worldwide
- For example, annual impact evaluations by CAs ask: does policy generate benefits $>$ costs?
- But nearly all evaluation based (inevitably) on cases detected and intervened by CAs. These may be only the tip of iceberg. What about:
  - deterred cases (surely the main purpose of any law)
  - undetected cases ("failures" of the CA)
- What if these are the most harmful cases? Classic sample selection problem (endemic in much of empirical IO literatures)

Objectives

- To marshal what we do ‘know’ (from theory and deduction) about what is unknown (deterrence & non-detection), in order to make informed speculations about the direction & magnitude of the bias;

and, in so doing,

- To edge us towards an ultimately more ambitious approach to evaluation in which we pose (and answer) 2 questions:
  - How much potential anti-competitive harm is there out there in an economy? (shades of Harberger, 1954)
  - How much of that harm is a CA successful in preventing?

Previous literatures on assessing the impact of anti-competitive behaviour

Literature on the impact of anti-competitive behaviour

Wide ranging literatures on detection and deterrence throughout Economics & Law, but particularly relevant here:

- **Cartel detection**: Ormosi (2013) - and many others - about 1 in 6-7 cartels detected.
- **Cartel duration**: Levenstein & Suslow (2011) and many others
- **Price raising effects of mergers**
- **Surveys of practitioners** (OFT, NMA): how many cartels/mergers deterred (& detected)
    - For every blocked/remedied merger, 5 others are deterred
    - For every busted cartel, 5 others are deterred

Impact evaluations by CAs

- Conducted by OFT, CC, NMA, DGCOMP, FTC, DoJ. Many others now following suit (OECD)
- Typically, the CA evaluates (ideally) all cartels, anti-competitive mergers, (and abuses) in which it has intervened during the year
- Making very conservative assumptions, it assesses the consumer benefits emanating from its interventions
- When compared with the costs of the CA, these are typically impressive: e.g. for OFT, usually in the rough region 10:1
- **BUT no allowance made for deterrence. . . ..or under-detection**

Framework & first-blush estimates

A simple framework

- Suppose N potential cases of anti-competitive harm (cartels, anti-competitive harm, abuses of dominance)
- ω - probability that a case is deterred
- σ - conditional probability that a case is detected, given it is not deterred
- all detected cases are prohibited/remedied
- No errors: Type 1 outside framework, Type 2 ruled out by assumption (for the moment)
- Then number of detected cases is
- $C = (1 - \omega)\sigma N$

First blush estimates:

(i) numbers of cases

- Using information from above surveys, estimates of ω and σ can be derived easily as:
  - Cartels: $\omega = 0.45$, $\sigma = 0.17$
  - Mergers: $\omega = 0.83$, $\sigma = 1$ (assume all anti-competitive mergers are detected)
- N can then be backed out from knowledge of C as:
  - Cartels: $11C$ (1 detected, 5 deterred, 5 undetected)
  - Mergers: $6C$ (1 detected, 5 deterred)

Proposition

Detected cases are likely to be only a small proportion of the population.

First blush estimates

(ii) magnitudes of harm

- Can also be combined with the CA's Impact Evaluation to estimate the magnitudes of harm deterred and undetected.
- For example, EC estimated that its intervened cases (2010) saved consumers:
  - cartels EUR 7.2bn; mergers EUR 5bn
- Applying the above multipliers to these estimates:
  - The value of deterrence = 25bn for mergers, 36bn for cartels
  - But undetected harm from cartels = 36bn euros.

But. . . selection bias

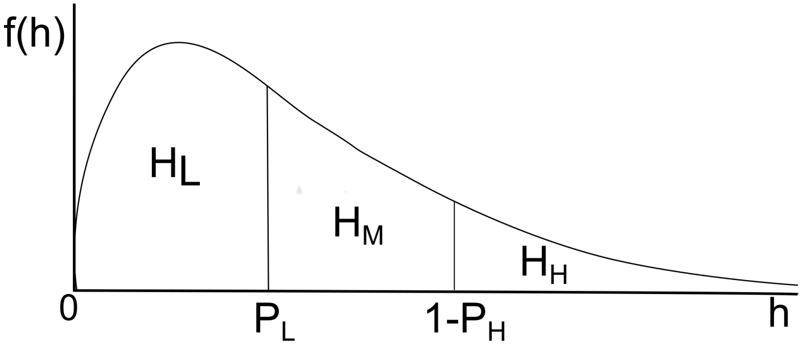
- Why should the cases detected and intervened by the CA necessarily be representative of the cases it deters, or the cases that it fails to detect?
- That question drives the rest of this paper.
- Note, in passing, that it has much wider-reaching relevance to all IO research which uses data on detected cases to draw inferences about the population of all cases.
    - For example, the 'typical' cartel has 7 members, lasts 7 years, and overcharges by 15-20%. Or does it?

Our approach

Set up as a sample selection problem

- Think of the cases detected & intervened by the CA as the observed sample, drawn from a larger potential population, which also includes unobserved deterred or undetected cases
- If inferences are to be made from the sample about the population, we need to know something about:
  - the population distribution
  - how the probability of case selection , i.e. undeterred and detected, $(1-\omega)\sigma$, varies with case harm, h
- From a survey of academic theoretical literatures on mergers & cartels, the paper draws out inferences about both.
- To keep things simple, we distinguish a simplified trichotomy: low-middle-high harm cases (L, M, H)

Population distribution positively skewed: potentially, high harm cases may be very harmful



Sample selection

Cartels

Detection: $\sigma_L > \sigma_M > \sigma_H$

- Leniency – most likely for unstable, less profitable cartels, shown by Motta & Polo (2003), Chang & Harrington (2009)
- Ex-officio – no reason for supposing this is related to case harm (but Block et al (1981) and Houba (2012) et al assume otherwise.
- Leniency cases far more frequent than ex-officio so will dominate

Deterrence: $\omega_L > \omega_M > \omega_H$

- Models by Motta & Polo (2003), Chang & Harrington (2009), Harrington (2004, 2005) all have the implication that deterrence is inversely related to profitability (harm)

Sample selection

Mergers

Detection: $\sigma_L = \sigma_M = \sigma_H = 1$

- 100% above threshold, & harm below threshold probably trivial

Deterrence: $\omega_L > \omega_M < \omega_H$

- Near 100% in any undetected small harm case
- Near 100% in high harm cases (how many mergers from duopoly to monopoly do we observe?)
- Barros et al (2010), Selderslachts et al (2010), Garrod & Lyons (2011)

Deriving the population estimator

An unbiased population estimator

- A population comprises three segments $(i = L, M, H)$, with proportions in the population P_i, which account for proportions of population harm, H_i.
- Each segment is sampled randomly, but with different sample proportions λ_i.
  - denote: $\lambda_L = \delta_L \lambda_M$ and $\lambda_H = \delta_H \lambda_M$ (sampling differentials)
- Then the magnitude of population harm is H:

$$H = \frac{H^s}{\lambda + \lambda_M [(1 - \delta_L)(P_L - H_L) + (1 - \delta_H)(P_H - H_H)]}$$

Suppose that the proportionate sample size, λ, and magnitude of sample harm, H^s, are both known.

Proposition

With random sampling the "simple multiplier" H^s/λ is an unbiased estimator of population harm. With differential sampling across segments, the estimator will be biased, and the direction and magnitude of bias depends on (i) the sampling differentials and (ii) the relative sizes of mass in the two tails:

$$H^s/\lambda \gtreqless H \text{ as } (P_L - H_L)(1-\delta_L) \gtreqless (H_H - P_H)(1-\delta_H)$$

Proposition

For distributions with symmetric Lorenz curve (as for lognormal distributions), H^s/λ will be upward (downward) biased if the upper tail is more (less) heavily sampled than the lower tail, and the magnitude of bias will be greater the more asymmetric is the population size distribution.

Application to the present case - 3 stages

Stage 1: estimating aggregate population harm. The magnitude of sample harm is detected harm, as reported by the CA, and the proportionate sample size is $\lambda = (1-\omega)\sigma$. The differential sampling proportions each have two constituents - differentials in the undeterred and detection rates:

$$\delta_L = \delta_L^{UDR}\delta_L^{DT} \text{ and } \delta_H = \delta_H^{UDR}\delta_H^{DT}, \text{ where}$$

$$\delta_L^{UDR} = \frac{(1-\omega_L)}{(1-\omega_M)}, \delta_H^{UDR} = \frac{(1-\omega_H)}{(1-\omega_M)}, \delta_L^{DT} = \frac{\sigma_L}{\sigma_M}, \delta_H^{DT} = \frac{\sigma_H}{\sigma_M}$$

Stage 2: estimating undeterred harm
Re-define population to refer only to all undeterred cases, sample harm is again detected harm, but the detected cases are now treated as a sample of proportionate size $\lambda = \sigma$. In this case, the δ refer to differentials in detection rates between the low and medium, δ_L^T, and medium and high segments, δ_H^T[1].

Stage 3: estimating deterred and undetected harms.
Both can be backed out as residuals.

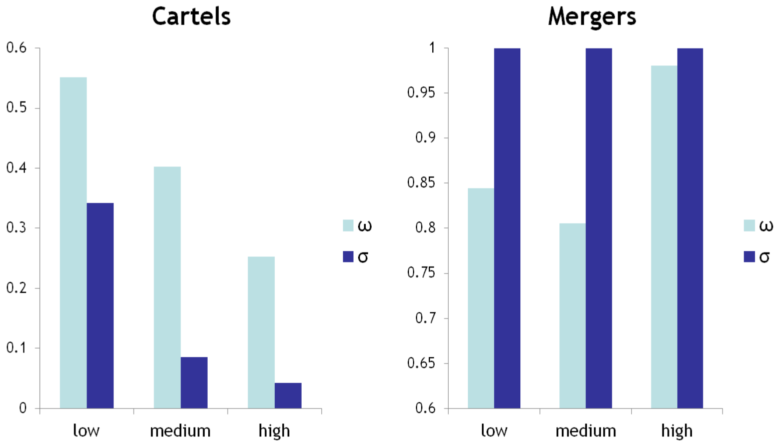
[1]Given that the 'population' is now confined to only the undeterred cases, the segment proportions (P_i) now refer to the proportions of undeterred cases $((1-\omega_i)P_i)$.

Numerical simulations

Illustrative simulations

- Sample harm (bn EUR, taken from EC's impact evaluation 2010): Cartels 7bn, Mergers 5bn
- $\omega^C = 0.45$, $\omega^M = 0.83$, $\sigma^C = 0.17$, $\sigma^M = 1$ (from practitioner surveys and academic literatures on cartels)
- Base case scenario:
  - Population asymmetry: $P_L = 0.4$, $H_L = 0.05$ (for lognormal, implies variance log harm =1.39)
  - Sampling differentials, δ_i, next slide for base case scenario
- Alternatives scenarios, varying degree of asymmetry and sampling differentials
- Both lognormal and Pareto (here only lognormal)

Probabilities of deterrence and detection



Cartels

	(1)	(2)	(3)	(4)	(5)	(6)	H^s/λ
Magnitude of harm							
Population	149	181	94	79	133	172	**79**
Detected	7	7	7	7	7	7	**7**
Deterred	52	82	43	28	49	54	**36**
Undetected	89	92	44	44	77	110	**36**
Parameters (ω**=0.45,** σ**=0.17)**							
P_L	0.4	0.4	0.4	0.4	0.4	0.5	
H_L	0.05	0.05	0.05	0.05	0.1	0.05	
ω_L	0.55	0.45	0.45	0.55	0.56	0.54	
ω_M	0.40	0.45	0.45	0.40	0.41	0.39	
ω_H	0.25	0.45	0.45	0.25	0.26	0.23	
σ_L	0.34	0.31	0.19	0.20	0.35	0.30	
σ_M	0.09	0.08	0.15	0.16	0.09	0.07	
σ_H	0.04	0.04	0.11	0.12	0.04	0.04	

Mergers

	(7)	(8)	(9)	H^s/λ
Magnitude of harm				
Population	41	39	47	**29**
Detected	5	5	5	**5**
Deterred	36	34	42	**24**
Undetected	0	0	0	**0**
Parameters (ω=0.83, σ=1)				
P_L	0.4	0.4	0.5	
H_L	0.05	0.1	0.05	
ω_L	0.84	0.84	0.84	
ω_M	0.81	0.81	0.80	
ω_H	0.98	0.98	0.98	
σ_L	1.00	1.00	1.00	
σ_M	1.00	1.00	1.00	
σ_H	1.00	1.00	1.00	

Conclusion

Conclusion

- How much harm is out there? A lot – with these simulations for this case EUR 109-266bn, of which only EUR 12bn detected
- How successful is the CA in combating this harm? Taking into account deterrence as well as direct interventions, roughly about half for cartels. For mergers, all harm is avoided, BUT this ignores Types 1 and 2 errors.
- But of course these are highly speculative estimates – based on unverified assumptions and calibrations

Future agenda

- Main purpose of paper is to set out an agenda for future research priorities. This will require:
  - A better understanding of the population
  - How deterrence and detection vary with case harm
  - Introduction of Type 1 and Type 2 errors
- Methods
  - Experimental on deterrence
  - Empirical analysis of historical data relating to jurisdictions under which cartels were and were not illegal
  - Meta-analysis of the price-raising effects of mergers