

Tacit collusion & firm asymmetries: 'evidence' from EC merger cases

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Underlying Motivation

Ignorance on prevalence of tacit collusion

We're esp. interested in tacit collusion & symmetry amongst firms

Little chance of building a database on real world occurrences. Difficult to identify in practice, and not illegal (cf cartels, predation etc.)

Some lateral thinking?

One area of policy where CAs **are** able to intervene on tacit collusion is in prohibiting/remediating mergers with coordinated effects

Large databases of reports on merger decisions, incl. those with coordinated effects. Source of information for understanding real world conditions where tacit collusion might arise?

Our more immediate purpose

Attempt to identify European Commission's implicit model of tacit collusion with respect to market structure (esp. asymmetries) from analysis of all merger cases involving collective dominance (= coordinated effects?)

Relevance:

- Not only to our ultimate academic objective (previous slide), but also highly policy-relevant: criticisms from academics e.g. Compte et al (2002), and the courts (Airtours) overturning decisions
- Reform of merger regulations

Outline

- 1) **Previous literature**
- 2) **Mergers in the EU & Collective dominance**
- 3) **Oligopoly triangle**
- 4) **Econometric model & strategy**
- 5) **Results**
- 6) **Conclusions & implications**

Previous literatures (i) tacit collusion and symmetry of firms

- In terms of repeated games, tacit collusion less likely, the more asymmetric are firms (Ivaldi et al 2003 for DGCOMP). This can be explained in terms of the impact of differential incentives to deviate.
- Various potential sources of the asymmetry:
 - Costs (Rothschild 1999, Mason et al 1992, experimental)
 - Capacity (Lambson 1994, Compte et al, 2002)
 - Product differentiation (Kuhn, 2002)

Previous literatures

(ii) predicting CAs' decisions

- Early studies: Coate & McChesney (1992), Khemani & Shapiro (1993), Weir (1991,1992, Davies et al (1997)
- More recently, Bergman et al (2005), Lindsay et al (2006), Bougette & Turolla for EC, Coate & Ulrick (2005) for US
- Typically: $P = P(\mathbf{S}, \mathbf{X}, \mathbf{Z})$
- Estimated on large samples of merger decisions, where:
 - P probability of intervention
 - S vector of market structure variables (concentration, market shares)
 - X vector of other market characteristics (e.g. entry barriers, buyer power)
 - Z vector of sundry others factors (e.g. political/institutional)

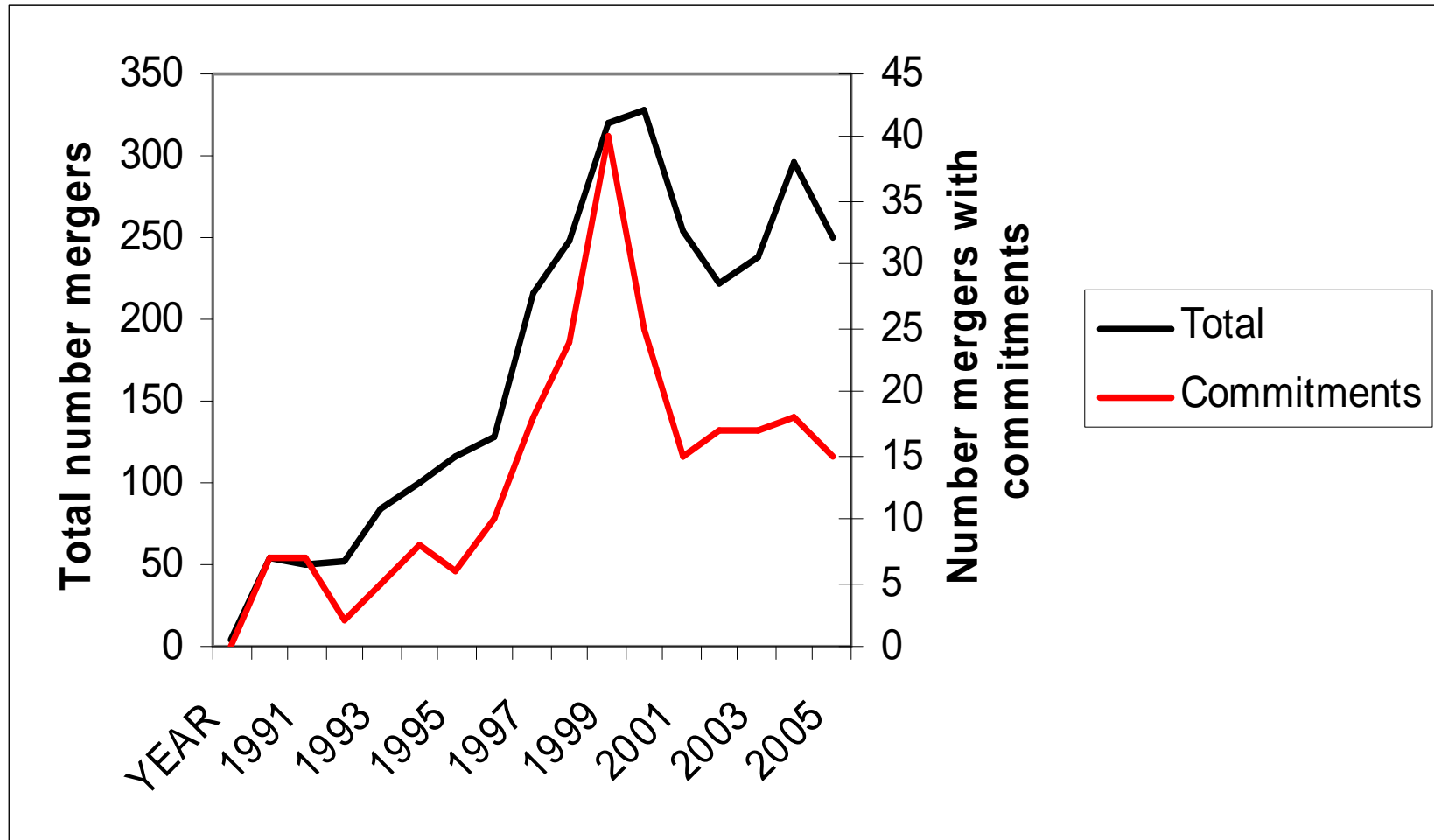
Limitations of these previous studies

- Typically same model for unilateral and coordinated effects
- Unsatisfactory treatment of X variables. Dummies based on subjective assessment – usually the CA's. Tautological self-justification?
- Usually the analysis is conducted at the merger level, taking no account of different assessments of the merger's impact in different markets. Thereby discards considerable information on intra-merger variation.

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Mergers in the EU (1990-2006)



Database of cases in which CD an issue

From 2000+ EC merger decisions (1990-2004), we've identified 94 mergers which contained one or more of the following phrases:

Collective/Joint Dominance, (Tacit) Collusion, Coordinated Effects

Close textual examination revealed that, in 32, these phrases used in a throwaway manner. Leaving 62 mergers (covering 367 markets) in which collective dominance was a real potential issue

In the event:

- i) For 25, the Commission intervened (remedies of some sort) for CD &/or SD in some but typically not all markets: **IM subsample**
- ii) For the other 37, merger was okayed - no finding of CD or SD in any market: **NIM subsample**

Types of cases/decisions

	Total	IM	NIM
Mergers	62	25	37
Markets	367	222	145
Interventions	118	118	0
of which:			
CD Interventions	45	45	0
of which:			
CD duo	29	29	0
CD tri	1	1	0
CD comm links	15	15	0

Post-merger market structures*

- Markets in the sample are typically very small-number oligopolies:
 - S5 exceeds 10% in only 2% of markets
 - S3 exceeds 15% in only 20% of markets
- Modal market share ranges:
 - S1: 40-50%
 - S2: 20-40%

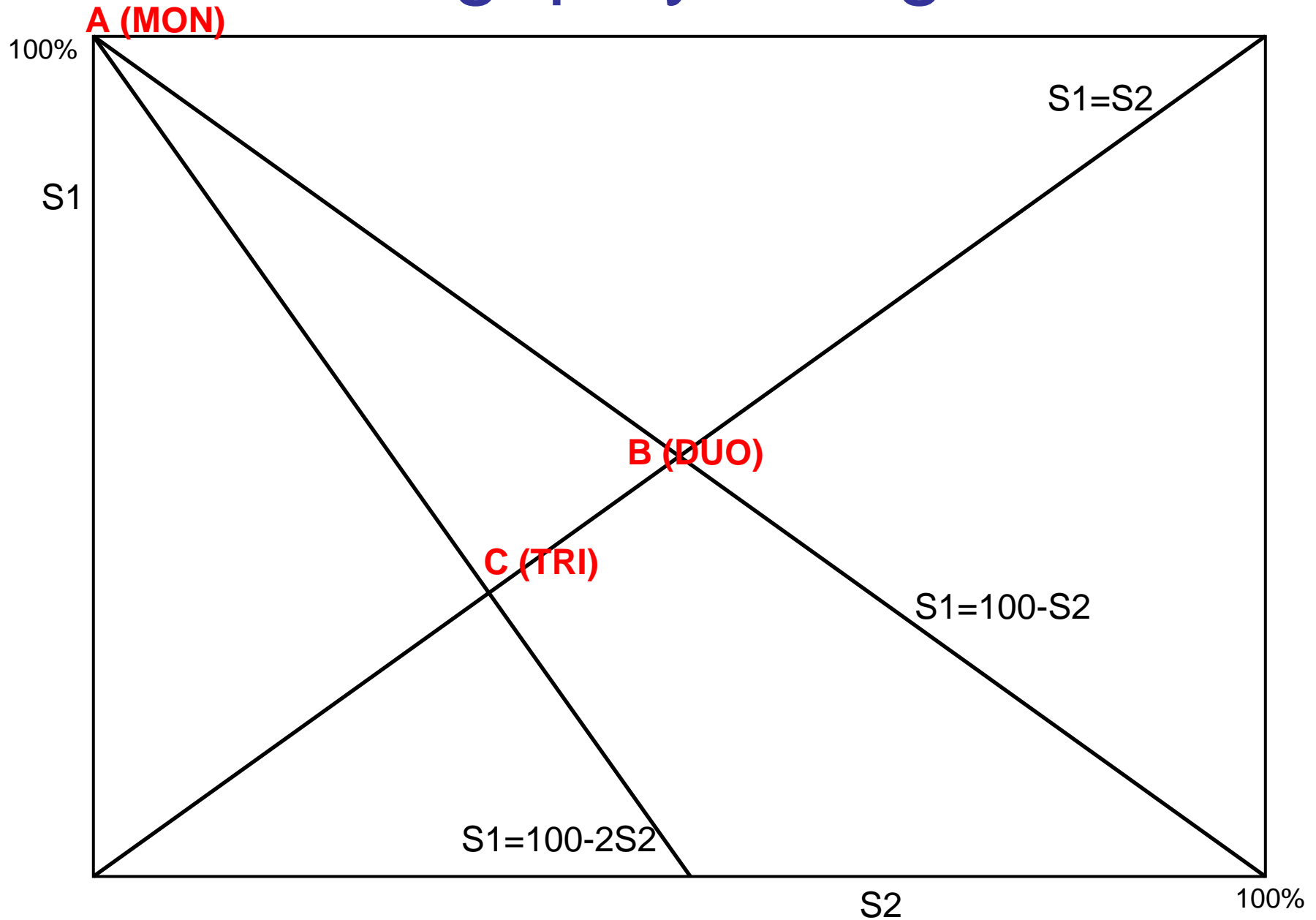
Typically then, monopoly or duopoly with a few triopolies or more

** In the absence of intervention*

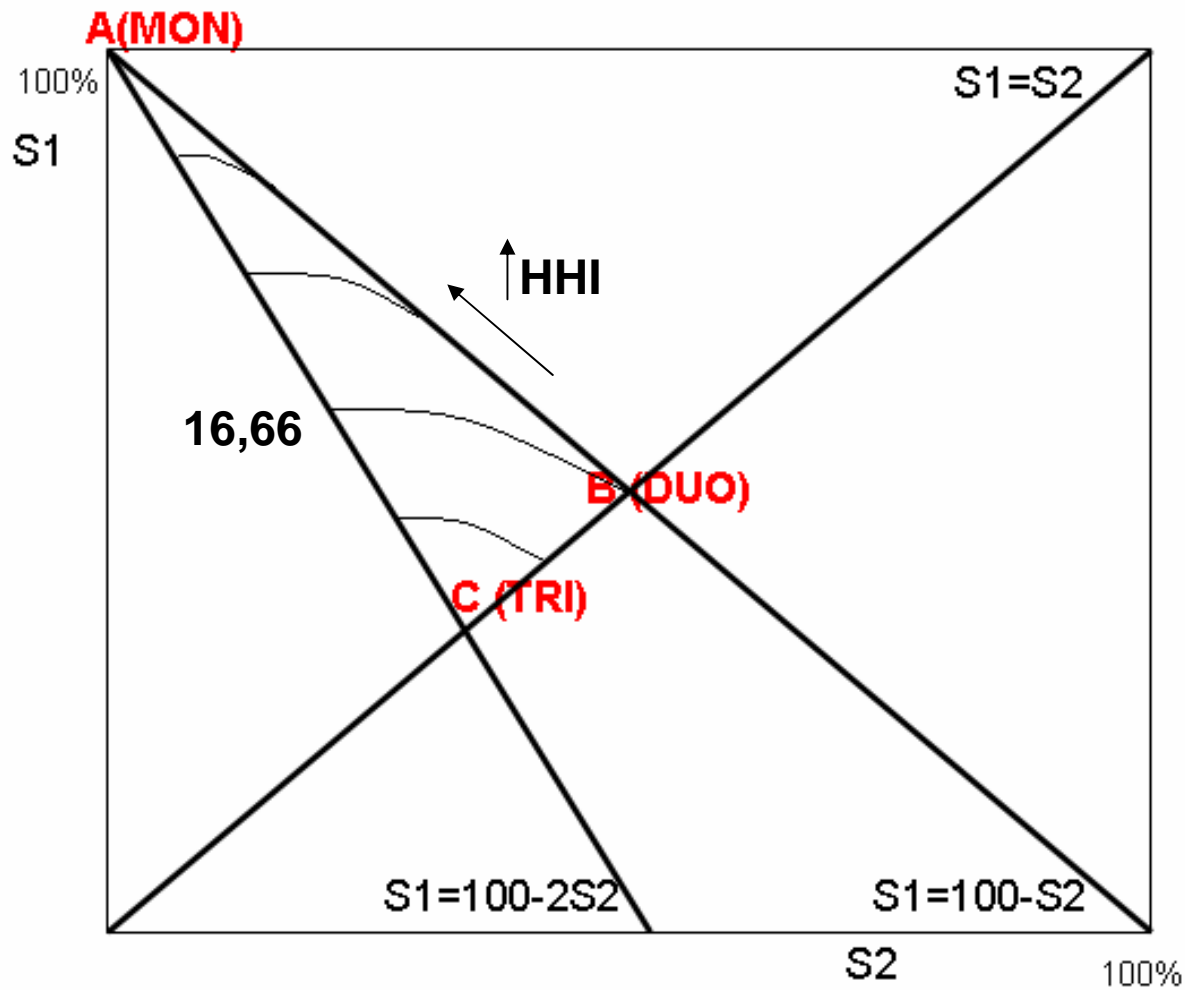
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Oligopoly triangle



HHI

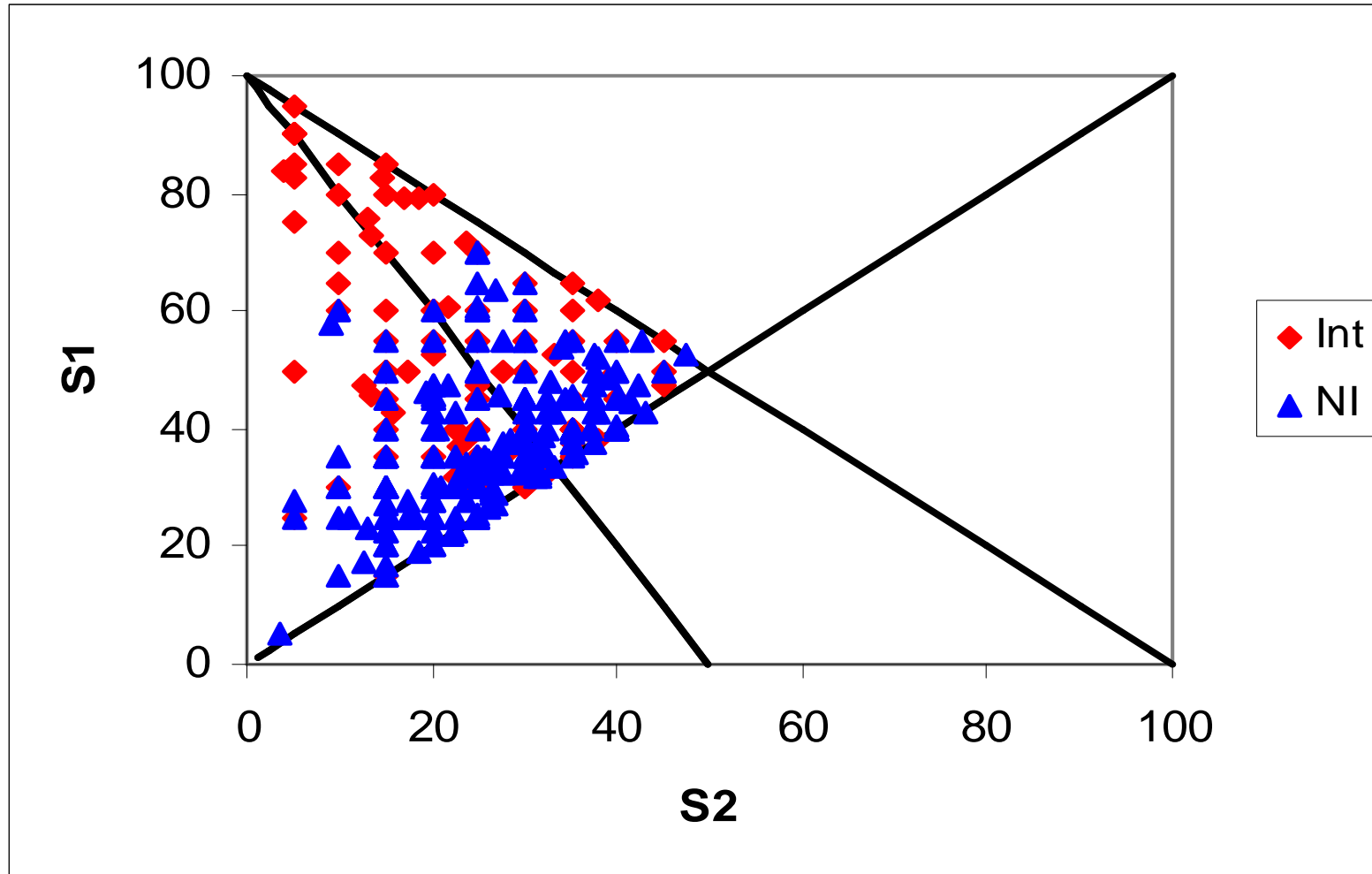


$$N = 3$$

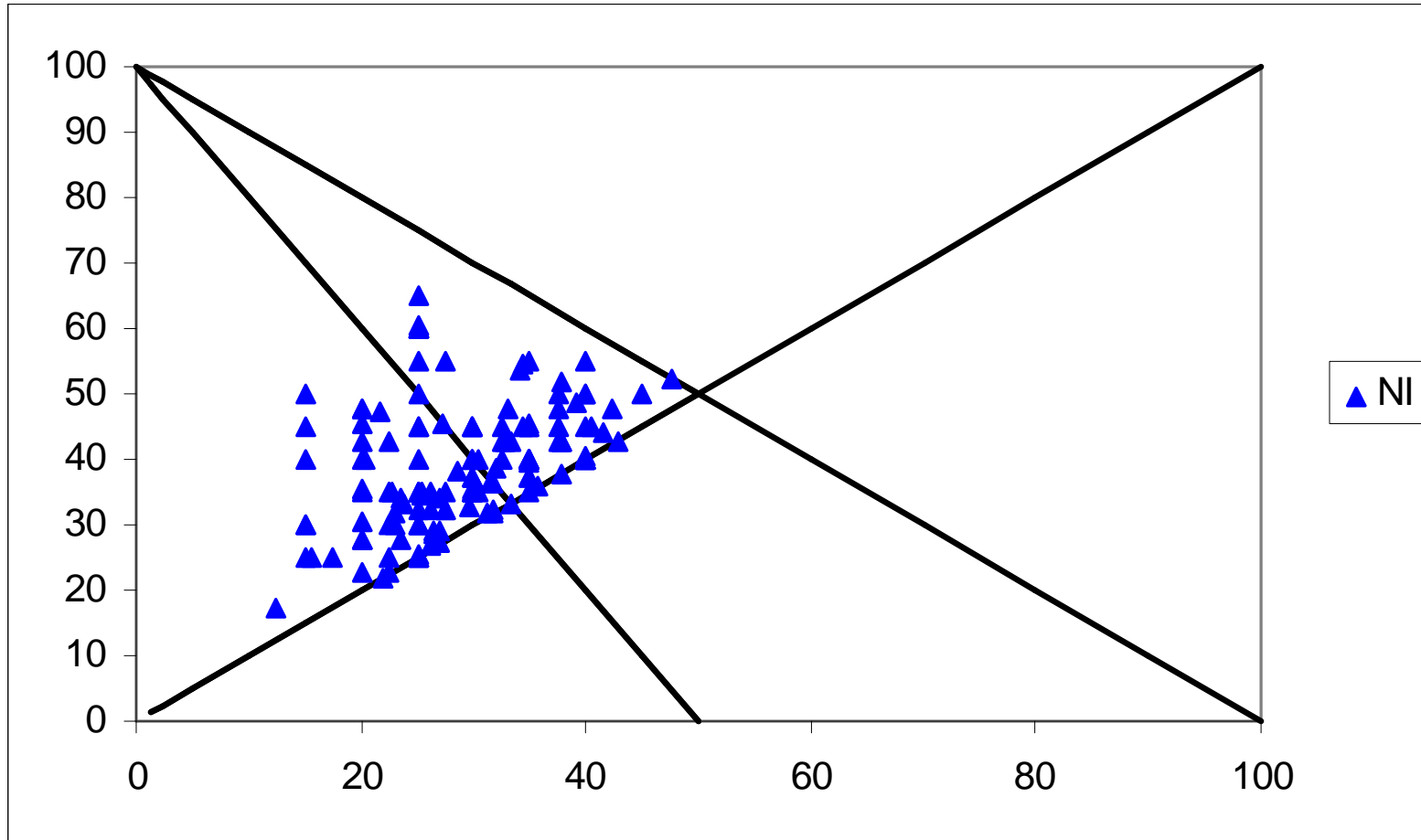
$$HHI_0 = S_1^2 + S_2^2 + S_3^2 = 2S_1^2 + 2S_2^2 - 2S_1 - 2S_2 + 2S_1.S_2 + 1$$

$$\& S_1^2 + S_2^2 - S_1 - S_2 + S_1.S_2 - (1 - HHI_0) / 2 = 0$$

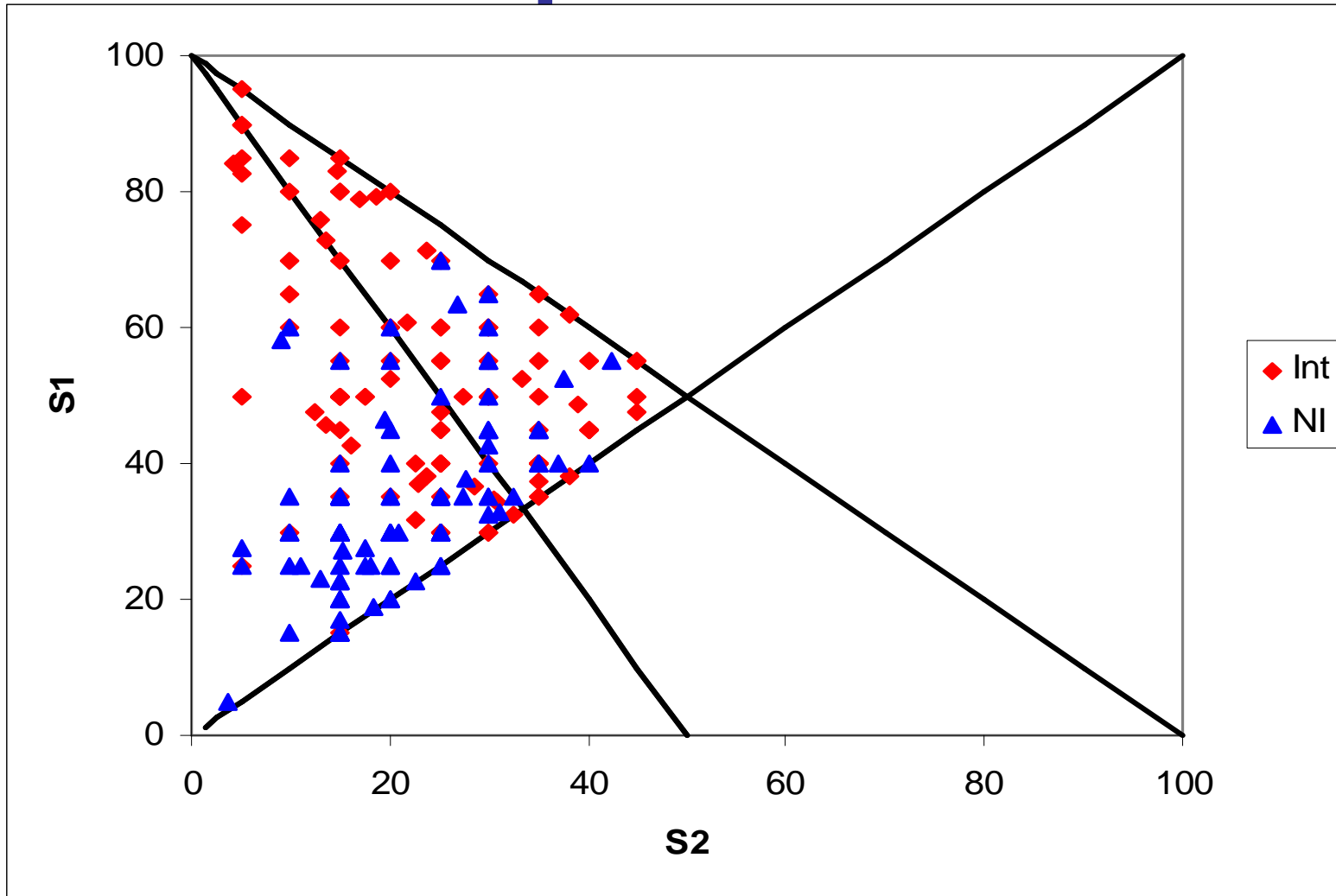
Oligopoly triangle – full sample



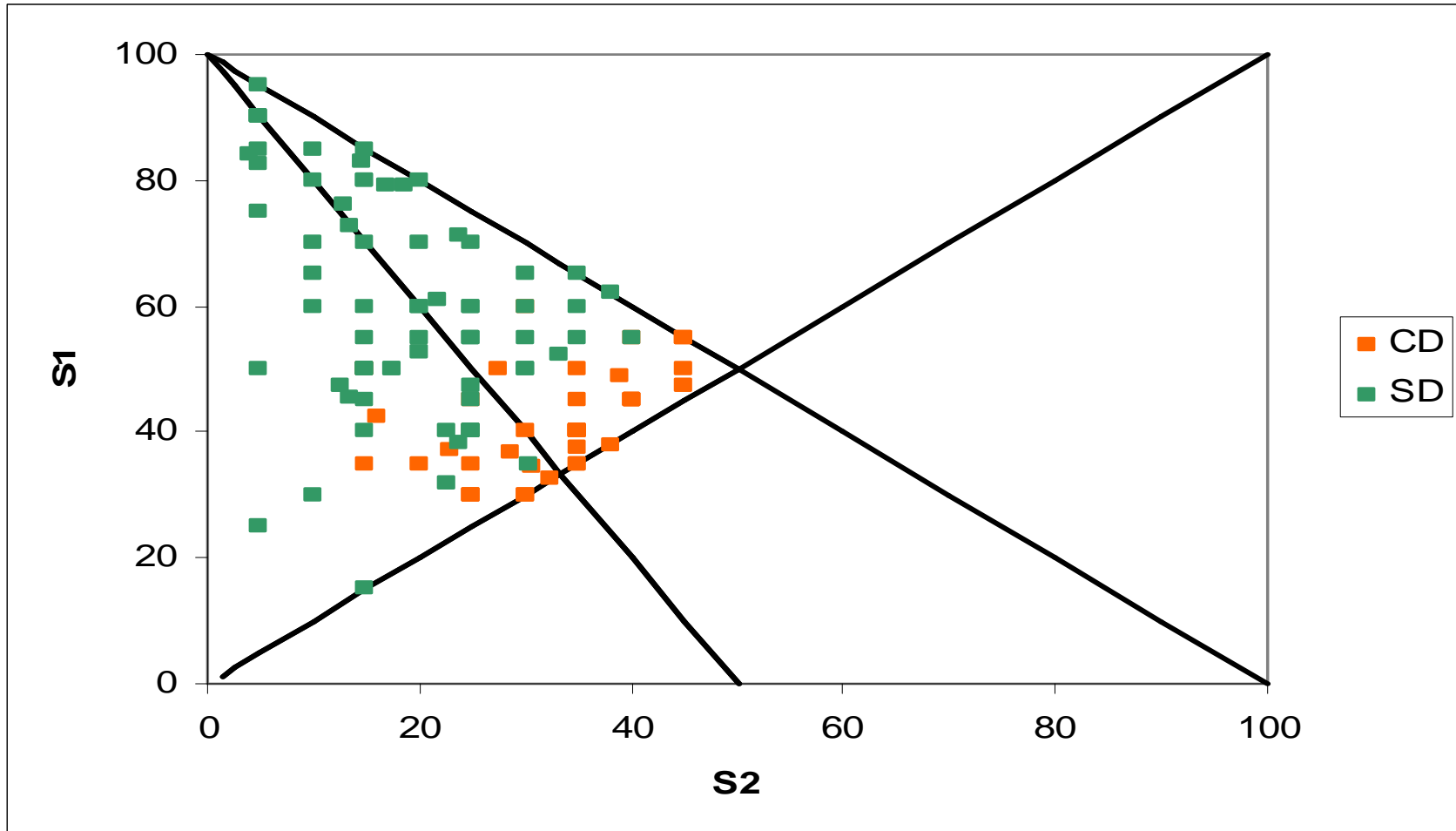
NIM sample



IM sample - Int v NI



IM sample - CD v SD



Summary of descriptive results

- SD markets highly concentrated & S2 typically small
- CD markets highly concentrated & S1 & S2 relatively symmetric
- Although markets in NIM sample typically less concentrated, a significant number highly concentrated
- High S1 and concentration insufficient for Commission to intervene on grounds of SD; similarly, approx. symmetric S1 & S2 necessary but not sufficient for intervention on grounds of CD

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The Commission's market assessment

For a given merger, assume the Commission makes a choice, for each market, between NI, SD & CD

Two parts to the assessment:

- i) Do the structural indicators (S) – market shares, concentration – indicate potential dominance?
- ii) Does the market satisfy a checklist of other market characteristics (X): entry barriers low, price transparency, absence of buyer power, etc?

It also takes account other evidence of competition beyond static structural measures: innovation, fluctuating market shares etc.

Key properties of the checklist factors (X)

- 1) Impossible to measure directly
- 2) Could proxy with dummy variables but subjective & based on CA's own self-justification (failing of previous studies)
- 3) Probably come close to the status of necessary conditions for dominance e.g. barriers to entry
- 4) Likely to be common across all markets for a given merger

(1) & (2) suggest the need for an empirical methodology which avoids measuring these variables.

(3) & (4) offer a way forward (see below)

The Structural Model

The Commission employs a structural model which allows it to choose between the 3 alternatives. The choice is simultaneous and can be modelled as multinomial logit

Thus, the 'utility' the Commission receives from choosing alternative k in market j from merger i depends on concentration & asymmetry:

$$U_{ijk} = a + b_{ijk} (S1 + S2) + c_{ijk} (S2 / S1) + \varepsilon_{ijk}$$

Where k = NI, CD or SD & ε is an unobservable error term

Therefore the probability of choice k is:

$$\Pr \{ y_{ij} = k \} = \Pr \{ U_{ijk} = \max(U_{ijNI}, U_{ijSD}, U_{ijCD}) \}$$

Empirical strategy

- We start by estimating the structural model, but only for the IM sample. By assumption, it is these markets where we can isolate the structural conditions - checklist having been satisfied.
- We identify those markets for which the model incorrectly predicts CD, and note the reasons given by the Commission for non-intervention.
- We then use the estimated parameters of the structural model to predict decisions in the NIM sample, and again note the reasons given by the Commission for non-intervention.
- Our expectations on the Commission's reasons, if the structural model is correct:
 - i) Not structural for either IM or NIM
 - ii) Not X factors for IM but should be for NIM

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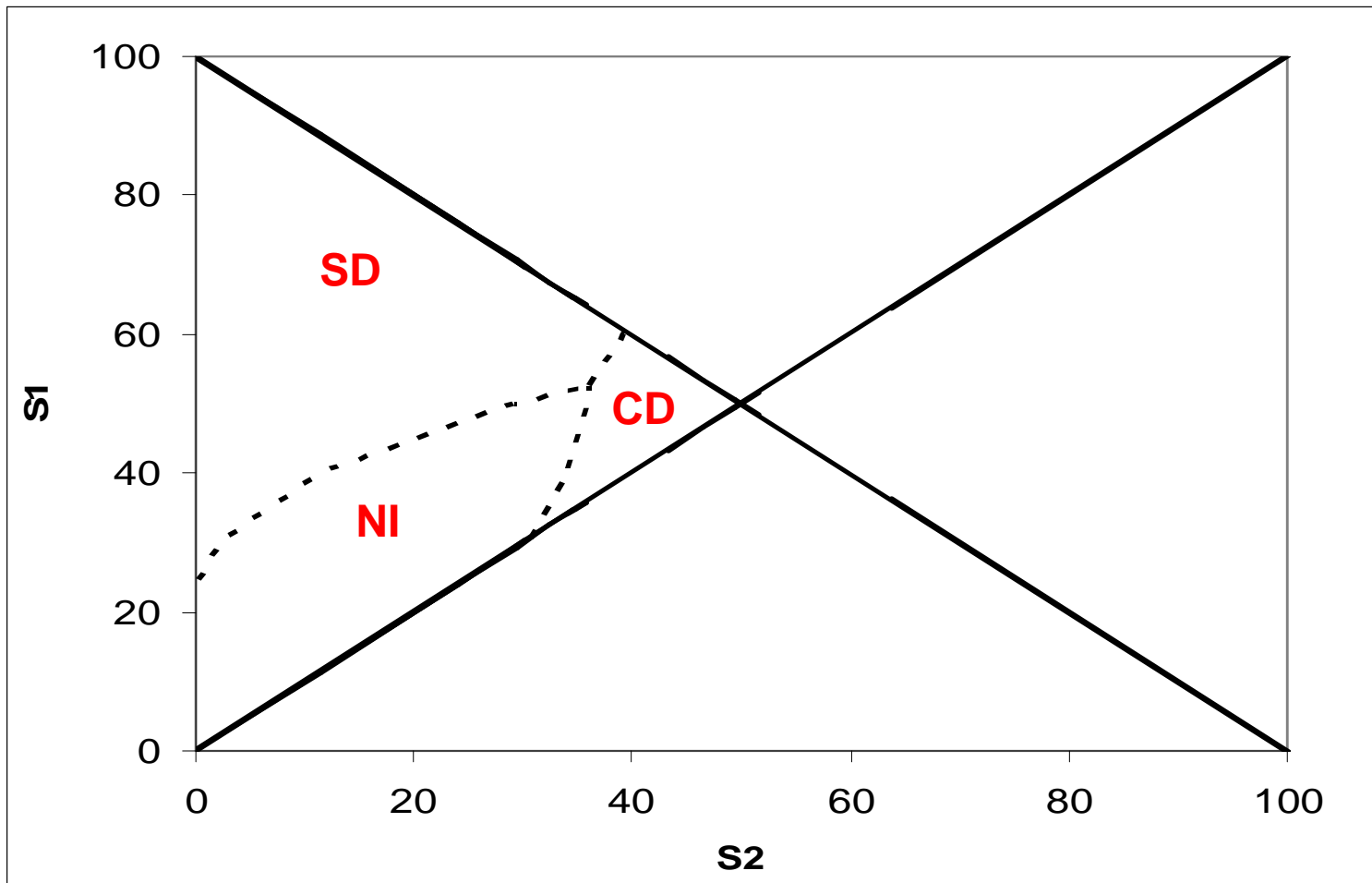
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	Sample	IM + NIM	IM + NIM	IM + NIM	IM	IM (+ com links)
SD	HHI	0.098 ***	0.069 ***			
	Ch HHI		0.019 ***			
	S1+S2			0.047 ***	0.059 ***	0.061 ***
	S2/S1			-7.22 ***	-5.29 ***	-5.65 ***
	Constant	-4.44	-5.01	-0.62	-1.613	-1.52
CD	HHI	0.049 ***	0.061 ***			
	Ch HHI		0.012			
	S1+S2			0.060 ***	0.098 ***	0.098 ***
	S2/S1			4.452 ***	8.55 ***	8.51 ***
	Constant	-3.53	-3.98	-9.91	-14.5	-14.5
	Pseudo R2	0.177	0.261	0.344	0.414	0.445
	Correct CD (%)	0	0	0	69	80
	Correct SD (%)	41	56	66	77	77
	Correct NI (%)	96	96	93	80	80
	N	352	291	352	207	222

Incorrect CD predictions

	IM Sample	NIM Sample
Total number of markets for which CD predicted	42	43
Of which CA did not intervene	7	43
Number for which CA cites X factors amongst reasons for non-intervention	0	33
<i>Price non-transparent, barriers to entry</i>		
Structural reasons	2	4
Other evidence of competition	4	5
Only small increment in market share	1	-

Graphical implications of estimated structural model



Market share thresholds for intervention

- $S_1 < 25$: **always NI**
- $25 < S_1 < 53$: **all 3** decisions possible, e.g. for $S_1=40$:
 - SD if $S_2 < 11$
 - NI if $11 < S_2 < 32$
 - CD if $S_2 > 34$
- $53 < S_1 < 61$: **SD or CD**
(typically SD unless highly symmetric market structure)
- $S_1 > 61$: **always SD**

Additional results

- Changes in market shares – effectiveness of divestiture remedy
- Alternative sequences of decision making
 - decision to intervene then CD v SD
 - SD then CD
- Other variables – phase 2, national markets, year

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Conclusions

- Given the approximations in the data, high predictive power
- Confirms the obvious: Commission applies different structural models to SD and CD – size asymmetries have a key role

What have we learnt about tacit collusion?

- Arguably nothing, unless we have some faith in the Commission!
- Tacit collusion rarely occurs with $N > 2$ (cf results coming out of experimental research)
- Symmetry plays a crucial role, and we now have some practical idea of what constitutes symmetry (in terms of market shares)
- *Similar industrial pattern to cartels*