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A Study on the Effectiveness of Competition Policy

Lear – Laboratorio di economia, antitrust,
regolamentazione

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Outline of the presentation

- The main objective the study
- Definitions: Competition Policy and its main objectives
- Deterrence: definition, key determinants, measurement
- Measuring the intensity of competition
- Measuring Competition policy
- The empirical approach
- The results
- Conclusions



The main objective of the study

- This study has been commissioned by the Directorate-General for Economic and Financial Affairs of the European Commission
- Its main objective is *“to develop and test a methodology or methodologies for evaluating the effectiveness of competition policy and for identifying the features of the policy that have a measurable impact on its performance”*
- The study has been performed in two stages:
 - Stage 1: development of the empirical methodology,
 - Stage 2: application of the methodology to a sample of countries.



Competition policy and its main objective

- The term competition policy refers to the *competition legislation* (including merger control provisions) and its *enforcement*.
- Competition policy includes a set of prohibitions and obligations that firms have to comply with when operating in the market, together with an array of tools for policing their behaviours and punishing any violation
- All other forms of competition-enhancing public policies, **are not** included in our definition of competition policy
- The main objective of a competition policy regime is to deter firms from undertaking behaviours that reduce social welfare by limiting, or distorting, competition, while not chilling any behaviour that improves social welfare.



Deterrence: definition, key drivers, measurement

- The optimal level of deterrence consists in preventing only those infringements that cause harm to society larger than the net gain that accrues to the wrongdoer
- To obtain this level of deterrence it is necessary to set the actual sanction, and the perceived probability of detection at a level such that the expected sanction equals the social harm
- Errors in the application of the law weaken the level of deterrence a given sanction can induce



Deterrence: key drivers

- Hence, deterrence depends on:
 - the level of the loss that wrongdoers expect to suffer if they violate competition law and are convicted.
 - the perceived probability of being caught and convicted after violating competition law (i.e. the perceived probability of the CEA not committing a type II error)
 - the perceived probability of the CEA investigating and convicting an innocent firm (i.e. the perceived probability of the CEA committing a type I error)



Deterrence: competition policy variables

- These factors are determined by the following policy variables:
 - the *independence* of the CEA with respect to political or economic interests
 - the degree of separation between the adjudicator and the prosecutor
 - the *quality of the law on the books*
 - the level of loss that firms (and their employees) can expect to suffer as a consequence of a conviction
 - the type of *investigative powers* held by the CEA
 - the amount and the quality of the *financial and human resources* the CEA can rely on in performing its tasks, in particular the level of its budget and the skills of its staff



Deterrence: measurement

- Measuring deterrence is an extremely difficult task, because the deterrent effect implies that the firms choose a different behaviour from the one they would have adopted without a competition legislation and its enforcement
- To measure this effect one would have to be able to determine the actions that firms would have undertaken had they not been constrained by the risk of a sanction, but it is impossible to directly observe intentions if these do not materialise into actions
- In some cases it is possible to study how the number of violations of the law have changed over time when there has been a change in the law or in its enforcement, but only when one has a reliable knowledge of the total number of crimes committed in a given period of time



The intensity of competition

- Preventing anticompetitive conducts and avoiding to chill competitive conducts should make markets more competitive
- The effectiveness of competition policy regime can be assessed by evaluating its impact on the intensity of competition
- To do this we need a definition of competition and an indicator of its degree



Defining and measuring competition

- Structural indicators
 - They measure the existence of some structural conditions that are likely to make markets more or less competitive
- Outcome indicators
 - They measure some market variables that are likely to be affected by the intensity of competition
 - Competition as rivalry in the short run
 - Competition as a selection process
 - Competition as a stimulus



Outcome indicators

- *Competition as rivalry in the short run*
 - It refers to the IO model of oligopolistic interaction in which competition affects the price-cost margin and the level of profits
- *Competition as a selection process*
 - Competition should reward the most efficient firms which in turn affects their market shares, and relative profits
- *Competition as a stimulus*
 - Firms react by employing more efficient methods of production and better products; this would affect productivity and the rate of innovation



Summary of the available competition indicators

Structural indicators	Competition as rivalry	Competition as a selection process	Competition as a stimulus
<p><i>Concentration:</i> concentration ratios; Herfindahl-Hirschman index; number of firms</p>	<p><i>Profitability:</i> price-cost margin; level of profits; changes in share prices;</p>	<p><i>Selection:</i> entry and exit rates; churn rate; survival rate; firms' longevity</p>	<p><i>Productivity:</i> total factor productivity labour productivity;</p>
<p><i>Barriers to entry:</i> excess capacity entry and exit rates; churn rate; advertising to sales ratio; R&D expenditure to sales ratio; capital expenditure to sales ratio; minimum efficient scale</p>		<p><i>Redistribution:</i> volatility of firms' market shares; relative profit measure</p>	<p><i>Innovation:</i> resources devoted to R&D; number of patents</p>
<p><i>Demand-side:</i> actual level of switching; price differentials between new and old customers; price dispersion</p>			<p><i>Growth:</i> GDP growth; GDP per capita growth</p>



The selected indicators

- We selected two competition indicators:
 - Total factor productivity growth (TFP)
 - Price-cost margin (PCM)
- Structural indicators are theoretically weak, moreover they require the definition of relevant markets
- TFP reflects both the notion of competition as a selection process and that of competition as a stimulus; there is strong empirical evidence of a positive relationship between competition and TFP
- PCM captures the notion of competition as rivalry in the short run; it is the most frequently used in previous empirical works



Measuring competition policy: the LCPIs (1)

- To construct the Lear Competition Policy Indexes (LCPIs) we have submitted a set of tailored questionnaires to all the CEAs in the countries in our sample
- The data from the survey was integrated with information derived from the country studies carried out by the OECD, from the OECD Economic Surveys and from the CEAs' own websites.
- The database covers 13 jurisdictions. It includes data on the features of the competition legislation and of its enforcement, as well as details on the institutional design of the CEAs.
- The database does not cover all the features that we had identified as the main determinants of deterrence: some of the necessary information, in particular on the enforcement of competition, was not available, mostly because the CEAs do not keep a record of it.



The LCPIs (2)

- The methodology used for building the LCPIs is similar to the one used for building the OECD Product Market Regulation (PMR) index. There are also strong similarities with the approach used, again by the OECD, to build the competition law and policy (CPL) indexes (Høj, 2007).
- However, the LCPIs focus on policies aimed at promoting competition, while the PMR indicators aim at measuring restrictions to competition due to inappropriate regulations
- While the CPL indexes consider both ex-post policies implemented by CEAs and ex-ante policies implemented by sector regulators, the LCPIs only focuses on the former ones.
- LCPIs cover all the years between 1995 and 2005, while the CPL index has been calculated only for the year 2003. The PMR indexes have been calculated for two years 1998 and 2003.



The LCPIs (3)

- The LCPIs have been obtained from the aggregation of a set of low level indexes, which incorporate the information on each of the six policy variables identified as determinants of deterrence (formal independence, quality of the law, separation of powers, sanctions and damages, powers during the investigations), separately for each type of possible competition law infringement and for mergers.
- Each piece of information contained in the databases was assigned a score on a scale 0-1 against a benchmark of generally agreed best practice (from worse to best).
- These low-level indexes have then been aggregated to form the LCPIs.
- At each step of the aggregation process we have used a set of weights developed on the basis of what we consider to be the importance of each element.
- We have tested the sensitivity of the LCPIs to alternative weighting schemes using the random weights technique.



The LCPIs (4)

- The low level indexes have been combined in a number of ways generating a variety of high level indexes. We have built the following set of LCPIs, to be included in the empirical analysis:
- 1) An index for each relevant institutional dimension of the competition policy regime (the **FI** index, the **QL**, the **SD**, the **SP** and the **PDI** index)
- 2) An index that measures the quality of the competition policy in the investigation and prosecution of antitrust infringements (the **Antitrust LCPI**) and one that measures its quality in the merger control process (the **Merger LCPI**).
- 3) An index that summarizes the institutional features (the **Institutional LCPI**) and one that summarizes the enforcement features (the **Enforcement LCPI**) of a competition policy regime.
- 4) A single index that incorporates all the information on the competition policy regime in a jurisdiction (the **Aggregate LCPI**).



Table 4.2: The high-level indexes.

	Overall competition policy			
	Antitrust 3/4)			Mergers (1/4)
	Hard-core Cartels (1/3)	Abuses (1/3)	Other agreements (1/3)	
Institutional features (2/3)	Formal independence (1/6)	Formal independence (1/6)	Formal independence (1/6)	Formal independence (1/3)
	Separation of powers (1/6)	Separation of powers (1/6)	Separation of powers (1/6)	Separation of powers (1/3)
	Quality of the law (1/6)	Quality of the law (1/6)	Quality of the law (1/6)	Quality of the law (1/3)
	Powers during investigation (1/6)	Powers during investigation (1/6)	Powers during investigation (1/6)	
	Sanction policy and damages (2/6)	Sanction policy and damages (2/6)	Sanction policy and damages (2/6)	
Enforcement features (1/3)	Resources (2/3)	Resources	Resources	Resources (2/3)
	Actual sanctions and cases (1/3)			Number of cases (1/3)



The LCPIs (5)

- The EU is one of the 13 jurisdictions we have collected data on. However, the EU competition policy is peculiar in that the EU is not a country in itself.
- In order to correctly evaluate the effectiveness of the competition policy regime in each Member State it is necessary to consider both the national and the EU regime.
- In addition to the indexes just discussed, which refer just to the features of the national competition policy of each country in the sample, we have also built a set of indexes for the countries that were in the EU in the years between 1995 and 2005, which incorporate information on both policies.
- These indexes are built as the simple average of the country's national index and the EU index.

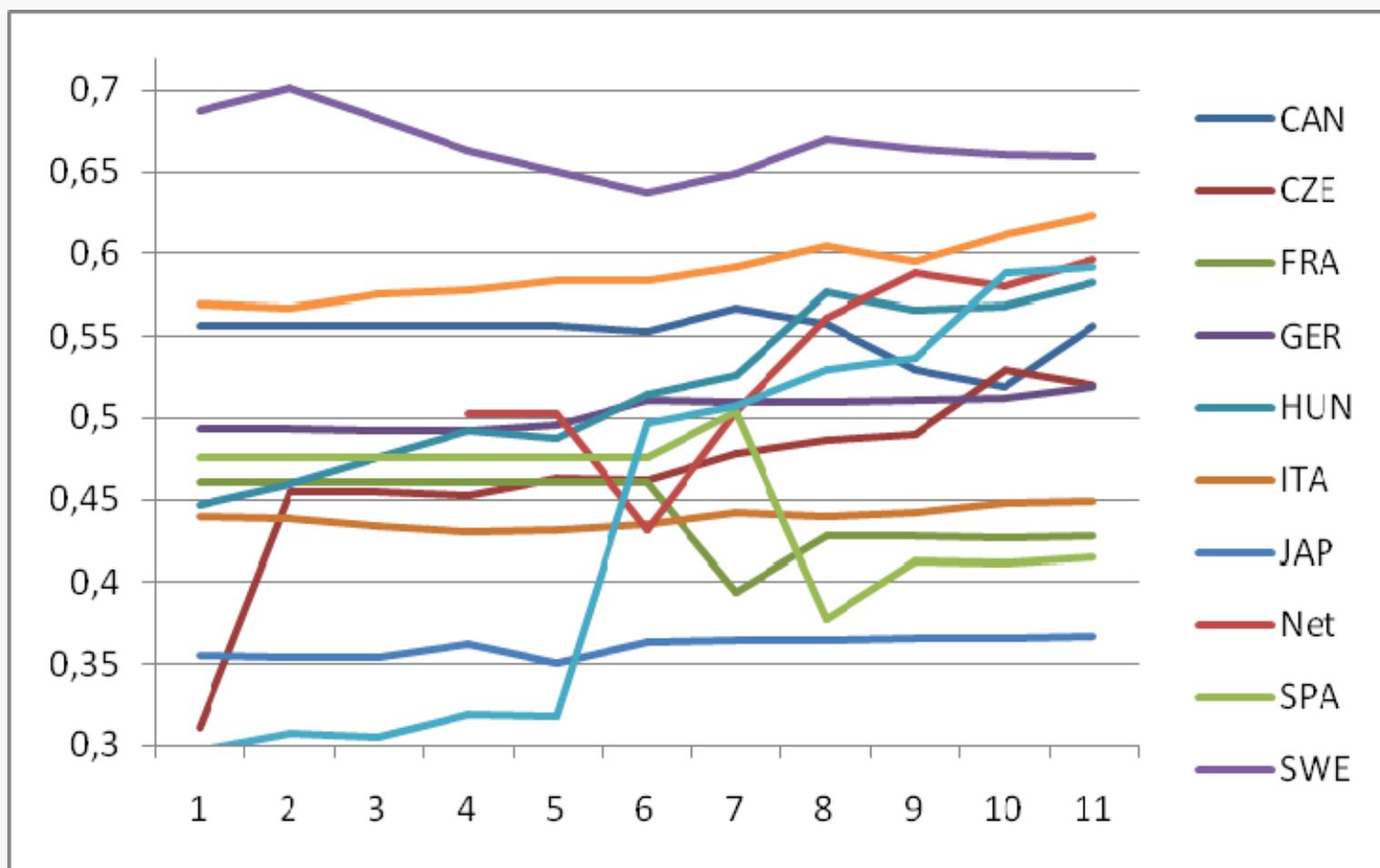


The LCPI (6)

- An important aspect that needs to be verified of the LCPIs is their variability over time.
- Having variability is important given the Panel framework that we employ in the empirical analysis. The aggregate LCPI does indeed show enough variation over time (see graph in the next slide).
- However, the lower we go into the pyramid of the built indexes, the less is the time variability. This is an important consideration, given that in a panel framework the estimates, when using the “fixed effect estimator” may be less efficient.
- For this reason, the results for low level indexes have to be interpreted with caution.



The evolution through time of the LCPI





The empirical approach: the TFP model

- The model we estimate adopts a three-dimensional panel data approach, in which variation of the TFP growth rate in industry j of country i at time t is regressed on a set of indicators of the institutional and enforcement features of the competition policy regime (the LCPIs indexes discussed in Chapter 4) and a set of control variables.
- The proposed specification builds on two recent papers (by Nicoletti and Scarpetta (2003), and Griffith et al. (2004a)).
- The equation we estimate takes the following form:

$$\Delta TFP_{ijt} = \beta LCPI_{i,t} + \delta \Delta TFP_{Ljt} - \sigma_{ijt} (LP_{ijt} / LP_{Ljt}) + \gamma X_{ijt-1} + \chi Z_{it-1} + \psi_i + \eta_j + \varphi_t + \omega_{ij} + \varepsilon_{ijt}$$



The TFP model (2)

- The dependent variable, ΔTFP , is calculated using a growth accounting technique based on the Solow residual.
- For each equation that we define and estimate, we look at two specifications.
- In the first one, we control for country, industry, and time unobserved heterogeneity through a country, an industry and a time fixed effects, respectively ψ , η and φ . This first specification is estimated using OLS.
- In a second specification, we include an individual effect ω_{ij} that varies both across countries and industries, together with time dummies. This specification is estimated using a panel estimator, fixed effect “within” estimator (after having verified, by means of a Hausman test, that the individual effects should be seen as fixed)



The TFP model (3)

- All the regressors, with the exception of the policy variables (LCPIs and PMR), are lagged one year with respect to the dependent variable, to take into account the fact that their impact on TFP might take some time to be observed, as well as to limit the risk of endogeneity.
- As far as the policy is concerned, we estimate two specifications. In the first one, we model the policy using the contemporaneous values. In the second, we lag our competition policy indexes, together with the other policy variable included in the model.
- The control variables that we include are: productivity on the frontier, productivity gap, research and development, product market regulation, human capital, trade openness, and the quality of institutions.



The PCM model

- As for the TFP model, the PCM model we estimate adopts a three-dimensional panel data approach, in which the PCM in industry j of country i at time t is regressed the LCPIs plus a set of control variables.
- The equation that summarizes this model is based on the one estimated by Griffith et al. (2004b), who look at the impact of several dimensions of PMR on mark-ups.
- The equation takes the following form

$$PCM_{ijt} = \alpha + \beta LCPI_{it-1} + \gamma X_{i,t-1} + \chi Z_{ijt-1} + \psi_i + \eta_j + \varphi_t + \omega_{ij} + \varepsilon_{ijt},$$



The PCM model (2)

- PCM is the price cost margin calculated as the ratio of value added in industry j of country i at time t over the sum of the relative variable labour and capital costs, following Griffith (2006).
- As for the TFP model, for each equation of the PCM model, we estimate two specifications, with different fixed effect included.
- The control variables we include in this model are: PMR, trade openness, GDP per head and the output gap, variables that should capture cyclical factors.



Empirical issues

- Two main problems may arise when estimating the models presented above: the possible **endogeneity** of the LCPIs, and the potential presence of **multicollinearity** between the explanatory variables, in particular between the different LCPIs.
- Two main sources of endogeneity:
 - omitted variables
 - two-way causal relationship
- We have included all the potential control variables that we consider relevant. We have thoroughly examined the existing literature on the determinants of TFP and PCM to identify the most important explanatory variables.
- Panel data allows to control for unobserved individual heterogeneity constant over time.



Endogeneity

- Two important steps can be taken to tackle the problem of simultaneity:
 - Lagging the potentially endogenous explanatory variables. This is a standard approach that relies on the assumption that the lagged values of the explanatory variables are uncorrelated with the error terms of the estimated equation.
 - Aggregating the features of the competition policy regime. This is particularly true for its institutional aspects, as it is well known that institutions present a great deal of inertia.



The data

- We have selected 13 jurisdictions, which include Canada, Czech Republic, France, Germany, Hungary, Italy, Japan, Netherlands, Spain, Sweden, UK, EU and US. These include countries with different legislative systems and institutional backgrounds. As for the time period, our dataset covers the years from 1995 to 2005
- For each jurisdictions, our sample includes 22 industries based on the definitions of the International Standard Industrial Classification (ISIC)



The results: the TFP model (1)

- Main results for the aggregate LCPI:
 - Competition policy is positively correlated with TFP growth, and this correlation is statistically significant at the 1% level
 - Once we include the EU dimension of the policy, the overall estimated effect appears much larger and still significant at the 1% level
 - These results are confirmed if we use
 - The median value out of 10,000 indexes generated with random weights
 - The lagged values of the LCPI and PMR
 - These results hold for both the estimated specifications (OLS, “Within” estimator)



The Results: the TFP model (2)

- Main results for the sub-indexes
 - The Antitrust LCPI coefficient is positive and significant, while the the Merger LCPI coefficient is positive but not significant
 - Collinearity between the two indicators prevents firm conclusions. This collinearity is due to the fact that a country with a “good” antitrust policy generally has also a “good” merger policy, and viceversa.
 - When we lag the policy variables, the results do not change
 - The equations are estimated using the panel “within” estimator show results that do not differ significantly from those obtained through OLS



The Results: the TFP model (3)

- The “Institutional” LCPI coefficient is significant in the specification with contemporaneous values for the policy, while it loses significance when the variable is lagged
- The “Enforcement” LCPI does not enter significantly the estimated equations
- The results are consistent across both specifications
- A positive impact on the intensity of competition is suggested for the level of sanction and damages envisaged by the national legislation and for the powers held by the CEAs during the investigation



The Results: the PCM model (1)

- Main results for the aggregate LCPI:
 - Significant negative relationship between competition policy and the PCM
 - The same results holds when we include the EU dimension of competition policy
 - These results hold also
 - The median value out of 10,000 indexes generated with random weights
 - The lagged values of the LCPI and PMR
 - The results hold in both the estimated specifications, the one estimated by OLS and the one estimated by the “Within estimator”



The Results: the PCM model (2)

- Main results for the sub-indexes
 - The OLS specifications show a significant link between the “Antitrust” LCPI and the PCM, while the “Mergers” LCPI is never significant.
 - These results hold also when competition policy is lagged one year with respect to the dependent variable.
 - These results are broadly in line with the panel “within” estimation. The results shows a significant impact of both Antitrust and Merger policy on the PCM in the specification with contemporaneous values
 - However, when we lag the Antitrust and Mergers LCPI, only the former remains significant.



The Results: the PCM model (3)

- The OLS estimation show that only the Institutions LCPI enter significantly the estimated equation when contemporaneous values of the competition policy are used.
- The panel “within” estimation broadly confirms this result.
- As far as the single institutional features are concerned, three dimensions appear to play a significant role in shaping the evolution of the PCMs in a given country:
 - the powers held by the CEAs during the investigation,
 - the level of sanctions and damages envisaged by the national legislation, and
 - the formal independence of the CEAs



Conclusions

- The empirical strategy employed for the estimation of the effectiveness of competition policy gives robust and consistent results.
- Competition policy appears to exert a positive impact on the intensity of competition, both if we look at the TFP and the PCM model
- Results related to the single institutional features have to be interpreted with caution. However, the **level of sanctions and damages** envisaged by the national legislation, together with the **powers** held by the CEAs **during the investigations**, seem to play the most important role in fostering competition
- The collection of more detailed information measuring the enforcement activity performed by the CEAs would allow a deeper understanding of the effectiveness of competition policy. CEAs should make the effort to collect such information and make them available for research.