



The drivers of antitrust effectiveness*

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Abstract

This paper shows what drivers the effectiveness of antitrust policy, by using internationally collated data on the perception of effectiveness of competition policy. It concludes that average antitrust effectiveness depends on per capita income and supranational policy leadership, such as the one at the core of the EU. Additionally, it shows that some aspects of competition policy design have a significant impact on policy results. Effectiveness is driven by using an economic approach to judge dominance and abusive practices. We show that antitrust is sounder when the legal mandate on merger policy focuses on competition in markets, rather than on more broadly defined public interests. Antitrust effectiveness is also spurred by taking an active stance against cartels and especially by introducing a leniency programme to enforce the prohibition of cartels. Finally, it is important that an independent antitrust authority has the final say on prohibiting competition restraints.

Keywords: Antitrust; Policy Effectiveness; Political economy.

JEL classification: D7; L4; O4.

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1. Introduction

Competition policy is at the core of a set of policies designed to foster product rivalry in the goods and services markets. Promoting competition has become a policy objective enforced in order to pursue the ultimate goal of improving economic performance.

Policy-makers claim that, by designing and enforcing competition legislation and antitrust institutions that promote and protect competition effectively in the product markets, welfare improvements are rendered. However, Bertrand and Ivaldi (2006) emphasise the lack of research into identifying the distinct features of antitrust that drive the effectiveness of promoting competition in the domestic markets.

Competition policy has very gradually been introduced in countries around the world; Canada passed the first antitrust statute in 1889. The US has had a federal antitrust policy since the Sherman Act of 1890; however, according to ABA Section of Antitrust Law (2003) 13 states had already enacted some form of antitrust statute. In 1889 Kansas enacted the first generally applicable state antitrust law. Even Senator Sherman described the federal law he was promoting as supplementary to the states' antitrust statutes.

Most European countries, including the EU since its inception with the Treaty of Rome, have had antitrust policies since the mid twentieth century; other countries have adopted antitrust regimes much more recently. Antitrust acts have been included in market orientated reforms packages in South East Asia and Latin America, and also through regional trade agreements; i.e. by Eastern Europe prior to acceding to the EU. Commitments to pass antitrust legislation have been included also in multilateral agreements such as the Uruguay Round and in the accession agreements of the new members of the WTO. Around 100 nations currently have competition laws. Merger policy was established in the USA in 1914, but prior notifications of mergers have only been compulsory since 1976. The EU established merger controls with a system of prior notification with a 1990 Council regulation.

Although antitrust statutes have been enacted worldwide, antitrust law design and implementation differs substantially across countries. It is an open question as to the type of institution and as to which policy practices drive sounder enforcement. The aim of this paper is to shed light on whether some of the distinctive characteristics related to the way antitrust is enforced generally spur policy effectiveness. In order to do so, we have coded qualitative information on objective features of competition policy from several countries around the world. Next we offer a comprehensive insight into what drives the effectiveness of competition policy, from national variations in antitrust design and implementation, to variations across policy areas.

The paper is organised as follows. After this introductory section, Section 2 reviews the literature on the drivers of antitrust effectiveness. Section 3 describes the data and the empirical strategy. Section 4 shows and discusses the results, and the paper concludes with Section 5.

2. Literature review

According to Aghion and Schankerman (2004), competition enhancing policies, reforms and certain types of physical infrastructure facilitate welfare gains in three ways, through cost reduction by incumbent firms, market selection of more efficient firms and entry. First, competition provides an incentive for existing firms to reduce their production costs. Static efficiency gains are achieved through reducing slack in the use of inputs, and via improved resource allocation in response to higher competitive pressures; i.e. **cost reduction** or *re-structuring*. Second, competition moves market shares from high-cost to low-cost firms, and this reduces the industry average production costs; this is **market selection** of the efficient incumbent firms. Third, post-entry competition reduces the incentives for new high-cost firms to enter the market, but it encourages **entry** by low-cost potential entrants. Furthermore, competition might boost dynamic efficiency by spurring innovation and the faster diffusion of new technologies, along the lines suggested by Aghion and Howitt (1996).

Although there is a consensus in the literature that competition provides welfare gains, it is less clear cut how the effective enforcement of antitrust law fosters competition in the market place, and whether antitrust policy spurs welfare. There is no common consensus on how antitrust should be designed and enforced, in order to effectively promote competition. There is a large literature on regulatory effectiveness. Recent papers such as Gutiérrez (2003), Stern and Trillas (2003), Levine, Stern and Trillas (2005), Stern and Cubbin (2005) and Cubbin and Stern (2006) discuss theoretically and empirically what drives effectiveness in regulation of telecoms and energy. By contrast, less effort has been devoted to analyse the drivers of antitrust effectiveness.

Additionally, it is far from established how the effectiveness of competition policy and the impact of antitrust and welfare across countries should be measured. There are two main avenues of research.

On one hand, Serebrisky (2004) and Voigt (2006) use synthetic indicators to obtain a comprehensive picture of the strength of competition policy, based on objective indicators that rank countries with a set of characteristics that are assumed to drive antitrust effectiveness. Voigt (2006) estimates the significant and positive impacts on productivity of policy characteristics that are assumed to strengthen antitrust. However, he shows that the estimated impacts are not particularly robust, when the indicators for the general quality of institutions are included.

On the other hand, some papers such as Dutz and Hayri (2000) and Borrell and Tolosa (2008) rely mostly on subjective indicators that try to assess the effectiveness of competition policy across countries, in terms of their respective growth and productivity. Both these papers show that antitrust has a strong positive impact on growth and productivity. Subjective indicators measure the perceived effectiveness of policy, using surveys of mainly business people. There are two measures of perceived effectiveness of competition policy. The World Economic Forum (WEF) used the Executive Opinion Survey to compile the Global Competitiveness Report.¹ It asks executives to rank their country according to the following statement: “Antimonop-

oly policy in your country is 1=*is lax and ineffective at promoting competition*, 7=*effectively promotes competition*.” The other indicator is the one included in the World Competitiveness Yearbook that is compiled by the International Institute for Management Development (IMD).² IMD asks, “Is competition legislation efficient in preventing unfair competition?” According to Voigt (2006), the two subjective measures of perceived competition are highly correlated (over 80%), and they are both also correlated with general policy effectiveness.

Neither the WEF nor the IMD indicator of competition policy effectiveness offer data that separates the effect of national competition policy from the EU competition policy; therefore, it indicates the overall effect of both policies for the EU member states.

Synthetic indicators are comprised of information from different policy aspects, like the presence or absence of certain legal provisions, the rules adjudicating antitrust cases, the severity of penalties, and the resources available to the competition authority and its autonomy. The indicators show the variance across countries in the design and implementation of antitrust policy.

For instance, rules adjudicating antitrust cases differ strongly among the countries and policy domains. In some countries, some competition restrictions, such as price fixing agreements, bid rigging or imposing minimum resale prices, are *per se* illegal. For example price fixing agreements are illegal *per se* in Australia, Greece, Mexico; and the USA defines, this conduct as unlawful, regardless of its effect on competition. In 1990 Italy also joined the group of countries that define price-fixing as *per se* illegal. By contrast, in most countries competition restrictions are judged according to the rule of reason, even price fixing tends to be adjudicated on a case by case basis in the European Union and in most European jurisdictions. Conduct is judged lawful or unlawful, depending on its effect on competition, as determined by the evidence in each case. As Motta (2004) has highlighted, article 81(3) of the Treaty of the European Union states that all agreements among competitors do not fall under a *per se* rule of prohibition.

Conversely, Gual *et al.* (2005) and Ahlborn, Evans and Padilla (2004) state that Europe tends to use the *per se* illegality rule, when adjudicating the use of exclusionary practices such as foreclosure, predatory pricing, price squeezes, fidelity rebates or tying by dominant firms. Similar cases are judged, using the rule of reason, on a case by case basis in the USA and in other jurisdictions.

The differences among countries are not only restricted to adjudicating rules, but also exist in matters such as the degree of independence of the antitrust authorities, the use of criminal sanctions, the way plaintiffs can seek redress before civil courts, whether to adopt an economic or legal approach to dominant position abuses, merger policy objectives and enforcement.

There have been different efforts to systematically compare competition rules and institutions across countries. Nicholson (2004) reviews the different efforts made at quantifying an-

titrust regimes. CUTS International has reviewed around 100 jurisdictions worldwide.³ Global Competition Review, the official research partner of the International Bar Association, publishes accounts of the specific legal and enforcement aspects of competition policy in different domains, such as cartels, abuses of dominant position and mergers in developed countries.⁴

Voigt (2006) has undertaken the most comprehensive quantitative analysis of competition laws. He gathered information regarding the basis of competition laws, legal regimes and economic approaches; i.e. *per se* rules versus the rule of reason, the structure of competition authorities and *de jure* and *de facto* independence. He constructed indicators regarding these aspects of competition policy, and has made assumptions on how these elements have made competition policy effective.

Subjective and objective measures both have strengths and weaknesses. The subjective measures depend strongly on the expectations of the business people surveyed, regarding their views on effective competition policy, whereas the objective indicators depend on how they are constructed. A higher value of the indicator can be achieved by optimizing certain areas, while other very important elements are replaced with less decisive or incomplete components; however, this can blur the robustness of the whole policy when being evaluated. By making the nature of the relationship between subjective measures of effectiveness and the objective antitrust design indicators and enforcement more explicit, we can understand the strength and weaknesses of comparative antitrust analysis across countries better.

3. Empirical Strategy and Data

In this paper the data will explain the relationship of the perceived effectiveness of antitrust versus a set of objective characteristics of competition policy design and enforcement.

Our starting point is that average antitrust effectiveness depends mostly on three different sets of covariates. Firstly, we would expect the average policy effectiveness to increase when there is a specialized administrative or judicial body in charge of antitrust law enforcement. Secondly, we expect antitrust statutes to be more effective when implemented selectively, and when tough prohibitions and sanctions are imposed on the more damaging competition restrains. Finally, we would expect the effectiveness of antitrust to be correlated with mean income, as is generally the case for all public policies.

As to who should enforce antitrust, Carlton and Picker (2007) proffer the principal-agent approach found in modern political science literature on legislative bargaining. They analyse the pros and cons of government regulation versus antitrust, whether, either by special agencies or by the judiciary, as a means of controlling competition. They conclude that, historically, the increased enforcement of antitrust law has brought benefits to consumers. Sometimes the benefits came after the government regulation had been replaced by antitrust, but on other occasions the two need to be used in tandem.

With respect to the substantive features of cartel policy, monopolization policy and merger policy, we are going to empirically analyse them in accordance with recent literature on antitrust effectiveness. Baker (2003) and Kaplow and Shapiro (2007) have shown what effective antitrust enforcement is for a consensus of lawyers and economists. In the domains of prosecution and deterrence of cartels, the most important policy is to fight against high profile international cartels that cause substantial harm. With respect to monopolization, the key issue is to prosecute dominant firms that engage in the more harmful exclusionary practices. And, merger policies have to be tailored to remedy the harmful effects of a tiny proportion of horizontal mergers in concentrated markets. This could eventually lead to unilateral price increases and mergers that affect competition in the development of new products.

We have gathered qualitative information regarding the institutional setting up of antitrust, cartel policy enforcement, the handling of monopolization and dominant positions, and the features of merger policy worldwide including developed and developing countries. We have coded information for 13 distinctive objective policy features, that is, 611 items of data. We also have information on subjective antitrust effectiveness indicators and mean income.

We will analyse the data using cross-section variation. Most covariates are not expected to vary much from one year to another, so it would not be more informative to have a panel data with year observations around 2004. And, unfortunately, the available data does not allow us to analyse the effect of long-run governance changes on antitrust effectiveness using panel data techniques as in Gutiérrez (2003) for telecoms regulation and in Cubbin and Stern (2006) for electricity.

Table 1 shows the definition of the coded data, and table 2 shows the data's descriptive statistics. Table 3 shows the distribution of the detailed features of the setting up, design and implementation of antitrust policy across countries.

Table 1
VARIABLES IN THE DATASET

Name	Acronym	Source	Description
Antitrust effectiveness	effectiv	WEF	Anti-monopoly policy in your country (1 = is lax and not effective at promoting competition, 7 = effectively promotes competition)
Independence on antitrust decisions	indcard	Authors	1 = There is an independent competition authority; 0 = In other case
Government prosecution	mininst	Authors	1 = There is an competition authority but a dependent ministry of the executive files complains; 0 = In other case
Cartel per se illegal	cartperse	Authors	1 = Cartels are per se illegal; 0 = Cartels are adjudicated using the rule of reason
Published guidelines for cartel enforcement	cartelguide	Authors	1 = Competition authority has published some cartel guidelines; 0 = Otherwise
Criminal sanctions	penalcart	Authors	1 = Cartels are criminal felonies; 0 = In other case
Punitive damages	danoscart	Authors	1 = It is possible to claim for punitive damages; 0 = Otherwise
Leniency programs	leniency	Authors	1 = There is a leniency program; 0 = Otherwise

Table 1
VARIABLES IN THE DATASET

(Continued)

Name	Acronym	Source	Description
Dominance abuses per se illegal	dompos	Authors	1 = Per se for dominant position; 0 = Rule of Reason for dominant position
Dominance defined by market share	thresdom	GCR	1 = It exist a threshold above which a position is qualified as dominant; 0 = In other case
Dominance threshold (0 or 20 to 70%)	levthresd	GCR	1 = If it exists, level of the threshold dominant position; 0 = In other case
Published merger guidelines	mergerguide	Authors	1 = Competition authority has published some merger guidelines; 0 = Otherwise
Government has the last say mergers	findecmerg	Authors	1 = Government has the last say on mergers; 0 = Competition authority takes decisions regarding mergers
Protecting competition in merger law	objectimerg	Authors	1 = Legal mandate for merger control is protecting competition; 0 = It is protecting the public interest in general
Per capita GDP	cgdp	Penn Tables	GDP (current US dollars), 2003

Table 2
DESCRIPTIVE STATISTICS

	Acronym	Obs	Mean	Std. Dev.	Min	Max
Antitrust effectiveness	effectiv	47	4.66	0.89	2.8	6.1
Independence on antitrust decisions	indcart	47	0.94	0.25	0	1
Government prosecution	minist	47	0.13	0.34	0	1
Cartel per se illegal	cartperse	47	0.34	0.48	0	1
Published guidelines for cartel enforcement	cartelguide	47	0.23	0.43	0	1
Criminal sanctions	penalcart	47	0.36	0.49	0	1
Punitive damages	danoscart	47	0.23	0.43	0	1
Leniency programs	leniency	47	0.47	0.50	0	1
Dominance abuses per se illegal	dompos	47	0.32	0.47	0	1
Dominance defined by market share	thresdom	47	0.70	0.46	0	1
Dominance threshold (0 or 20 to 70%)	levthresd	47	28.36	21.15	0	70
Published merger guidelines	merguide	47	0.62	0.49	0	1
Government has the last say mergers	findecmerg	47	0.43	0.50	0	1
Protecting competition in merger law	objectimerg	47	0.91	0.28	0	1
Authority Independence	ind	47	0.87	0.28	0	1
Active stance in cartel policy	cartel	47	1.64	1.24	0	5
Economic approach in dominance law	dominance	47	-0.74	0.56	-1,75	0
Competition focussed merger policy	merger_pol	47	2.11	0.87	0	3
Per capita GDP	cgdp	47	19,164.81	9,111,38	3,212,53	37,313.33
EU-15	eu15	47	0.30	0.46	0	1
EU-Enlargement 2004	eu15-25	47	0.21	0.41	0	1
Bulgaria & Romania	eu-25-27	47	0.04	0.20	0	1

Table 3
DISTRIBUTION OF OBJECTIVE FEATURES OF COMPETITION POLICY

Variable	Value	Countries for which the variable takes the value shown
Independence on antitrust decisions	0	Colombia, Costa Rica, Venezuela
Government prosecution	1	<i>Belgium, France</i> , India, <i>Latvia, Spain, Malta</i>
Cartel per se illegal	1	Australia, <i>Austria</i> , Chile, Costa Rica, Slovenia, <i>France, Greece, Hungary, Italy, Korea</i> , Latvia, Mexico, Romania , South Africa, <i>USA</i> , Venezuela
Published guidelines for cartel enforcement	1	<i>Canada, Greece, Netherlands, Ireland, Japan, Korea, Malta, New Zealand, Sweden, United Kingdom, USA</i>
Criminal sanctions	1	<i>Canada, Czech Republic, Estonia, France</i> , India, <i>Ireland, Island</i> , Israel, <i>Japan, Korea, Mexico, Norway, Slovak Republic, Slovenia</i> , Taiwan, <i>United Kingdom, USA</i>
Punitive damages	1	<i>Canada, Croatia, Czech Republic, Hungary, New Zealand, Norway, Slovak Republic, Slovenia</i> , Taiwan, <i>USA</i>
Leniency programs	1	<i>Canada, Cyprus, Czech Republic, Finland, France, Netherlands, Hungary, Ireland, Korea, New Zealand, Norway, Poland, Romania</i> , South Africa, <i>Slovak Republic, Sweden, United Kingdom, USA</i>
Dominance abuses per se illegal	1	Costa Rica, Croatia, <i>Czech Republic, Denmark, France, Greece, Hungary</i> , India, <i>Ireland, Italy, Latvia, Mexico, Romania</i> , South, Venezuela
Dominance defined by market share	0	<i>Australia, Belgium</i> , Chile, Cyprus , Colombia, Costa Rica, <i>Finland, Japan, Kenya, Luxemburg, Mexico, New Zealand, Portugal, Romania, Spain</i> , Venezuela
Published merger guidelines	1	<i>Australia, Austria, Belgium</i> , Brazil, <i>Canada, Czech Republic, Finland, Germany, Greece, Ireland, Japan, Korea, Latvia, Lithuania, Malta, Netherlands, New Zealand, Norway, Poland, Romania</i> , South Africa, <i>Slovak Republic, Spain, Sweden, Switzerland</i> , Taiwan, <i>United Kingdom, USA</i> , Venezuela
Protecting competition in merger law	0	Argentina, <i>Poland, Portugal</i> , Taiwan
Government has the last say on mergers	1	Argentina, <i>Belgium, Cyprus</i> , Colombia, Costa Rica, <i>Finland, France, Germany, Greece</i> , India, Israel, <i>Italy, Malta, Norway, New Zealand, Poland, Portugal, Romania, Spain</i> , Taiwan

OCDE countries in italics, and EU countries bolded.

Our aim is to identify and quantify the impact of a set of policy features on mean antitrust effectiveness. We use the World Economic Forum (WEF) “effectiveness of antitrust policy” as the dependent variable that needs to be explained. Table 2 shows that antitrust effectiveness ranges from 2.8 to 6.1, and it also shows that the sample average is 4.66.

Firstly, we will estimate the impact of all the detailed qualitative coded information on the effectiveness of antitrust features controlling per capita income and EU membership. We do not expect to obtain precise estimates from this first empirical specification, because sound policy is rarely based on single feature of a policy, but we expect the data to highlight some salient characteristics. Secondly, we will construct four indicators based on what the literature has

identified as sound antitrust policy; they are the independence of the authority, an active stance with respect to cartel policy, an economic approach to dominance law and competition focused merger policy. We then estimate how important having a sounder policy design in each domain is for overall antitrust effectiveness, again controlling for per capita income and EU membership. Thirdly, we group the averages of these four policy domain indicators into two summary indicators using weights based on the principal components analysis. This type of analysis allows us to identify to what extent sound policy in one domain correlates with sound policy in another, but it is uncorrelated with sound policy in yet other domains. This can help us to understand the transitional path to more effective antitrust within the cross-section.

Income is measured by using GDP per capita in 2003 in US dollars; this is the most recent data available for all the countries in the Penn World Table sample.⁵ Table 2 shows that income ranges from US\$3,212 in India to US\$37,313 in the USA; average income is US\$19,164. EU countries constitute 55% of our sample and table 2 also shows that 30% are EU15 countries, and 21% are the new EU members.

As stated before, we include income in all the estimations, because we want a control set for the omitted variables that are heavily correlated with income; examples are the general quality of public policies. Voigt (2006) has already shown that it is difficult to separate the effects of better antitrust from the quality of other policies. Countries with higher incomes would be expected to have better staffed and better resourced antitrust authorities. Those countries probably have better detection, sanctioning infrastructure and technologies. Additionally, as we expect antitrust to spur income, we have estimated the coefficients using instrumental variables techniques.

By including income per capita, we also take into account a set of national characteristics that are strongly correlated with income per capita, and make antitrust enforcement easier; examples are the degree of rule of law in the country, the policy measures available to control corruption, the overall quality of economic regulation, the mechanisms in place to make politicians accountable, the efficiency of the legal system, the intensity of competition in local markets, the degree of firm and corporate power decentralization and the openness to international trade. Using data from the World Bank Institute, the World Economic Forum and Transparency International we have computed coefficient correlations between per capita income and these types of national characteristics ranging from 91% to 60%, see table 4. Therefore, controlling just for income allows us to have a parsimonious specification.

Most of these income related covariates would also be endogenous; however, we prefer to only include conveniently instrumented income, in order to get unbiased and consistent estimates, rather than including those endogenous covariates in the regression analysis. Finding the appropriate instruments for all these covariates would have proved very difficult, and estimates could easily have turned biased and inconsistent.

The objective features of competition policy across countries come from the information provided by CUTS International, Global Competition Review, the International Competition Network, the annual OECD reports and the national government agencies web pages and sta-

tistics.⁶ All but one of the objective characteristics of antitrust design and enforcement are coded, taking values 0 or 1.

Table 4
CORRELATION BETWEEN PER CAPITA GDP AND OTHER COVARIATES

	Source	Per capita GDP
Intensity of Local Competition	WEF	0.60
Decentralization of Corporate Activity	WEF	0.72
Openness of Customs Regime	WEF	0.72
Efficiency of Legal Framework	WEF	0.76
Voice and Accountability	WBI	0.81
Regulatory Quality	WBI	0.82
Perception of Corruption Index	TI	0.88
Control of Corruption	WBI	0.89
Rule of Law	WBI	0.91

Source: World Economic Forum (WEF), World Bank Institute (WBI), Transparency International (TI), and Penn Table.

As outlined before, we have computed four indicators that are related to the organizational structure of competition policy; these four are comprised of the “authority independence”, the “active stance of cartel policy”, “economic approach to dominance law”, and “competition focused merger policy”. Table 2 offers some descriptive statistics of the objective features and the indicators. We have computed the indicators as follows.

“Authority Independence” takes into account two objective features of the antitrust authorities: independence in antitrust decisions and independence of prosecution. Most countries have independent competition authorities that take the final decisions on prohibiting and sanctioning; i.e. agreements and abuses of dominant position. Those competition authorities, whether administrative or judicial, decide in these policy areas independently of their governments, and the judiciary alone reviews their decisions.

Table 3 shows that only Colombia, Costa Rica and Venezuela have competition restrictions prohibitions enforced directly by government. We have also gathered information on whether it is the government or the independent authority that investigates and files the cases. Table 3 shows that only in Belgium, France, India, Latvia, Spain (until 2007) and Malta do the governments investigate the cases to be finally adjudicated, either by judicial or administrative independent authorities. We wish to identify to what extent the independence of antitrust authorities is good for effective antitrust enforcement, and whether government prosecution is detrimental to antitrust effectiveness. The summary indicator takes the value of 0 when a government investigates and adjudicates cases. It takes the value of 1/2 when the government investigates but an independent authority adjudicates; and it takes the value of 1, if as the independent authority is responsible for the investigation and adjudication. Table 2 shows that the mean of this indicator is 0.87.

The indicator “Active stance of cartel policy” is the sum of the five antitrust characteristics that are supposed to strengthen cartel policy enforcement. In their papers Polinsky and

Shavell (1989), Kaplow and Shavell (1994), Berges-Sennou *et al.* (2002), Barros (2003), Demouguin and Fluet (2004) and Borrell (2007) emphasise that defining cartels as *per se* illegal acts is a stronger deterrent than declaring them illegal using the rule of reason. Systems of civil sanctions, whereby firms pay damages to those injured by competition restrictions and receive criminal penalties, also spurs deterrence. Enforcement guidelines are also presumed to improve antitrust effectiveness, as are the leniency programmes, under which firms and executives may report misbehaviour to antitrust authorities in order to obtain partial or full redemption for past sanctions. Table 2 shows that the mean of this index is just 1.64 out of 5, and table 3 shows the distribution of cartel policy design in this domain.

By contrast, the defining of abuses of dominant position as *per se* illegal is increasingly contested. Gal (2003) and Borrell (2007) emphasise that in large, integrated and mature markets it is better to judge abusive practices by dominant firms using a rule of reason approach. As markets around the world are becoming increasingly integrated, we would generally expect the rule of reason, and a more economic approach to abuses of dominant position, to become more and more effective. This is also what Gual *et al.* (2005) and Ahlborn, Evans and Padilla (2004) suggest is the case for Europe. The “Economic approach in dominance law” indicator measures three characteristics: Whether the legal standard for judging abuses of dominant positions is the *per se* illegality rule, whether dominance is defined using a threshold market share, and the level of the market share threshold. Both binary characteristics are expected to negatively affect the success of antitrust. By contrast, the market share threshold that defines dominance enters positively; enforcement is expected to improve as the binding market share increases. The national market share that defines dominance ranges from a tight 20% in Brazil to a lax 70% in the USA. In the former case practices by only slightly dominant firms are investigated, while in the latter only the practices of very dominant firms are investigated. Table 2 shows that the mean index of “Economic approach in dominance law” is -0.74 , and that it ranges from -1.75 to 0 .

Finally, the “Competition focused merger policy” index is the sum of three objective policy features: whether merger guidelines have been published, whether the government or the antitrust authority has a final say on merger policy, and whether the legal mandate for merger policy is focused on protecting competition or pursues broader public interests. Table 2 shows this indicator has a mean of 2.11 out of 3. Table 3 shows that 62%, or 29 out of 47 countries, have merger guidelines. It also shows that there are many countries where governments have the final say on mergers. Examples are the largest European economies, France, Germany, Italy and Spain. Smaller and very effective countries in terms of antitrust enforcement are Finland and New Zealand; others are Argentina, India and Taiwan. There is, however, a rather small group of countries in which the legal mandate in merger law is not to protect competition, but to protect the public interest in general; Argentina, Poland, Portugal and Taiwan are examples.

Table 5 shows the correlation matrix among the coded objective features of competition policy and per capita income. Apart from the obvious correlation between the existence and the level of the dominance threshold, none of the correlation coefficients are larger than 42%, and only two correlation coefficients are over 40%; they are the income per capita ver-

sus the dummy of whether there are approved cartel guidelines, and whether it is the dominant abuses or cartels are considered *per se* illegal.

Table 5
CORRELATION AMONG ANTITRUST FEATURES AND INCOME

		CGPD_03	indcart	mininst	cartperse	cartel-guide	penalcart	daoscart	
Per capita GDP	cgdp_03	1.00							
Independence on antitrust decisions	indcart	0.34	1.00						
Government prosecution	mininst	-0.02	0.10	1.00					
Cartel per se	cartperse	-0.10	-0.18	-0.01	1.00				
Cartel guide	cartelguide	0.42	0.14	-0.06	-0.08	1.00			
Criminal sanctions	penalcart	0.15	0.20	-0.02	-0.07	0.21	1.00		
Punitive damages	daoscart	0.21	0.14	-0.21	-0.08	0.05	0.32	1.00	
Leniency programs	leniency	0.34	0.24	-0.10	-0.04	0.29	0.18	0.29	
Per se dominance abuses rules	dompos	-0.31	-0.19	0.15	0.47	-0.16	-0.04	-0.06	
Dominance defined by market share	thresdom	0.11	0.40	-0.03	-0.12	0.14	0.30	0.25	
Dominance threshold (0 or 20 to 70%)	levthresd	0.27	0.35	-0.05	-0.04	0.27	0.38	0.28	
Published merger guidelines	merguide	0.34	0.15	0.04	-0.08	0.44	0.05	0.13	
Government has the last say on mergers	findecmerg	-0.01	-0.13	0.32	-0.16	-0.17	-0.20	-0.07	
Protecting competition in merger law	objetimerg	0.13	-0.08	0.12	0.22	0.17	0.07	-0.01	
			leniency	dompos	thresdom	levthresd	merg-guide	findecmerg	objecti-merg
Leniency programs	leniency	1.00							
Per se dominance abuses rules	dompos	-0.09	1.00						
Dominance defined by market share	thresdom	0.05	0.05	1.00					
Dominance threshold (0 or 20 to 70%)	levthresd	0.14	0.05	0.88	1.00				
Published merger guidelines	merguide	0.48	-0.21	0.06	0.15	1.00			
Government has the last say on mergers	findecmerg	-0.03	-0.04	-0.29	-0.31	-0.12	1.00		
Protecting competition in merger law	objetimerg	0.13	0.21	-0.03	0.09	0.07	-0.35	1.00	

We have computed the Bartlett test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for all the coded antitrust variables together, and for the four policy domains that have constructed indicators. The null hypothesis of the Bartlett test is that the variables are not correlated. The data does not reject that null hypothesis; and as there was no KMO measure above 0.50, so the data is not correlated enough to use principal component analysis proposed by OCDE research such as Nicoletti *et al.* (2000) and Conway and Nicoletti (2006) to create weights for the features that make up each indicator. The coded variables report non-correlated characteristics of antitrust policy design and implementation.

Table 6 shows the correlation matrix for the domain indicators and income per capita. None of the correlation coefficients are over 42%, and only one correlation coefficient is above 40%; i.e. “Active stance in cartel policy” versus “Competition focused merger policy.” However, the Bartlett test of sphericity rejects the null hypothesis that these variables are not correlated. The KMO measure of sampling adequacy is 0.57, above the 0.50 threshold. From this we can obtain factors that form averages of the four domain indicators, using the weights based on principal components analysis.

Table 6
CORRELATION AMONG POLICY DOMAIN INDICATORS

		cgdp_2003	ind	cartel	dominant	merger_pol
Per capita GDP	cgdp_03	1.00				
Authority Independence	ind	0.30	1.00			
Active stance in cartel policy	cartel	0.38	0.27	1.00		
Economic approach in dominance law	dominant	0.28	0.04	-0.09	1.00	
Competition focussed merger policy	merger_pol	0.24	0.19	0.42	-0.02	1.00

Factor analysis lets us know which domain indicators are correlated, and how grouping them by factors impacts on antitrust effectiveness, by following the methods proposed by the OCDE for estimating the indicators of product market regulation. Following the method proposed by Nicoletti *et al.* (2000) and Conway and Nicoletti (2006), we use principal component analysis to extract the factors after testing the correlation of the indicators that we have extracted the factors from. We save those factors that have eigenvalues larger than unity, individually explain over 10% of the overall variance, and cumulatively contribute to explaining more than 60% of the data's total variance.

We then rotate the factors to decrease the correlation among them, and to make their interpretation easier. Finally, we give each policy domain indicator a weight, according to its normalized squared loading or the proportion of the variance that it explains; Table 7 shows the results of the factor analysis. The four policy domain indicators are the sum of two factors. One factor is almost entirely associated with the "Economic approach to dominance law" with a weight of 89%, and the other is the average of the other three policy domain indicators "Active stance of cartel policy" 41%, "Competition focused merger policy" 31%, and "Authority independence" 21%.

Table 7
FACTOR ANALYSIS USING PRINCIPAL COMPONENTS

	Factor 1		Factor 2	
	Factor loading	Weights of variables in factor	Factor loading	Weights of variables in factor
Authority Independence	0.61	0.23	0.30	0.09
Active stance in cartel policy	0.81	0.41	-0.15	0.02
Economic approach in dominance law	-0.05	0.00	0.96	0.89
Competition ffocussed merger policy	0.76	0.36	-0.06	0.00
Selection criteria				
Eigenvalues	1.60		1.02	
Variance explained by factors	1.40		0.26	
Total variance explained by factors	0.66			
Bartlett test of sphericity	Chi(6) = 12.64**			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.571			

Factor loading based on rotated component matrix using the varimax method (orthogonal).

Weights using normalised square factor loading

**· for 5% significance level

4. Results

Tables 8, 9 and 10 show the results of the regression analysis. Table 8 shows the impact of the general indicators upon effectiveness. Table 9 shows the impact the two factors have on effectiveness. Table 10 details the impact of each objective feature of antitrust design and enforcement on effectiveness. In the three tables we show the impact of the policy covariates on effectiveness without controls (column 1); the impact when controlling for the effect of EU membership distinguishing among EU-15 countries, the countries of the 2004 enlargement and the last new members, Bulgaria and Romania (column 2); the impact when controlling for per capita GDP (column 3); and, the impact when controlling for both EU membership and per capita GDP (column 4).

Table 8
IMPACT OF BROAD INDICATORS OF POLICY DESIGN OF EFFECTIVENESS

	log(effectiveness)							
	(1) OLS		(2) OLS		(3) IV		(4) IV	
Intercept	-0.60***	(6.72)	-0.64***	(9.01)	-2.97***	(5.60)	-2.17***	(3.92)
Authority Independence	0.13	(1.47)	0.14*	(1.87)	0.03	(0.50)	0.08	(1.50)
Active stance in cartel policy	0.05**	(2.03)	0.05***	(2.70)	0.02	(0.99)	0.02	(1.56)
Economic approach in dominance law	0.13***	(2.73)	0.12***	(2.81)	0.08**	(2.02)	0.09***	(2.43)
Competition focussed merger policy	0.04	(1.17)	0.04	(1.47)	0.04	(1.55)	0.04*	(1.84)
Log per capita GDP					0.25***	(4.63)	0.16***	(2.82)
EU-15			0.16***	(3.25)			0.07	(1.61)
EU-Enlargement 2004			-0.09	(1.53)			-0.08*	(1.90)
Bulgaria & Romania			-0.23***	(4.27)			-0.13*	(1.69)
R ²	0.35		0.63		0.54		0.65	
F test	F(4,42)=6.32***		F(7,39)=55.09***		F(5,41)=7.50***		F(8,38)=19.36***	
Hansen Over-id J test					Chi(1)=0.87		Chi(1)=0.94	

1. The table report the t statistics robust to heterocedasticity in parenthesis. The table reports the values of the F test and the Hansen Overid test.

*, **, ***: for 10%, 5%, and 1% significance level.

2. The null hypothesis of the Hansen J overidentification test is that the instruments are orthogonal with respect to the residual of the regression. Columns 3 and 4 show that the test value is smaller than the critical values, so we do not reject the null hypothesis that the instruments are valid instruments.

As outlined before, when per capita GDP is included in the regression as a control we run the regression using the instrumental variable techniques (IV). We use per capita GDP of 1994 and its square as instruments for per capita GDP of 2003. We estimate the IV regression using a cumulative updated GMM routine which computes standard errors that are robust to heterocedastic disturbance matrix. We report that the Hansen J overidentification test shows the instruments are valid. We have also computed tests that show that instruments are strong.⁷

By comparing regression estimates that include per capita GDP, using the OLS and IV techniques, we show that OLS estimates are biased slightly upwards; that is the OLS estimates not only measures the causal positive selection effect of per capita GDP on antitrust effectiveness, but also the simultaneous positive policy effect of antitrust effectiveness on per capita GDP. This has previously been shown by Borrell and Tolosa (2008).

Table 8 shows that even when taking into account per capita GDP and EU membership, the design of antitrust policy matters. It matters the most how dominance policy is designed and how it is enforced. Countries embracing an economic approach to investigating alleged dominant position abuses by firms have a more effective antitrust policy. This way of enforcing dominance policies is statistically significant. Additionally, having a merger policy more competition focused is good for antitrust effectiveness; however, this effect is statistically weaker. It is only significant at the 10% level.

Taking an active stance on cartel policy also has a positive effect on antitrust effectiveness; however, cartel policy is no longer statistically significant when we include the per capita GDP control. Independent authorities have a weaker but positive effect on antitrust, and are only significant at the 10% level when EU membership is included but per capita income is not.

Table 9 shows the impact of the two factors on effectiveness, and the results are very robust across the specifications. Apart from the impact of per capita income and EU membership on antitrust, it appears clearly that having an “Economic approach to dominance law” has a strong positive impact on effectiveness. Increasing this indicator by one standard deviation spurs effectiveness by 5% to 9%. Furthermore, it appears that effectiveness is strongly and positively affected by having a combination of authority independence, better cartel policy indicators and improved merger policy. Increasing the factor that averages these three indicators by one standard deviation promotes effectiveness by 4% to 7%.

Table 9
IMPACT OF BROAD INDICATORS OF POLICY DESIGN OF EFFECTIVENESS

	log(effectiveness)			
	(1) OLS	(2) OLS	(3) IV	(4) IV
Intercept	-0.45*** (12.48)	-1.52*** (2.89)	-2.88*** (6.84)	-2.03*** (4.58)
Factor 1: Authority Independence, active stance in cartel policy and competition focussed merger policy	0.09*** (5.40)	0.07*** (3.03)	0.08*** (2.32)	0.06*** (3.12)
Factor 2: Economic approach in dominance law	0.07*** (2.97)	0.04* (1.95)	0.04*** (2.30)	0.05*** (2.48)
Log per capita GDP		0.11** (2.07)	0.25*** (5.90)	0.16*** (3.66)
EU-15	0.16*** (3.58)	0.09* (1.76)		0.07* (1.83)
EU-Enlargement 2004	-0.09 (1.65)	-0.10* (1.99)		-0.09* (1.93)
Bulgaria & Romania	-0.23*** (5.54)	-0.18*** (2.81)		-0.13** (2.04)
R ²	0.63	0.68	0.53	0.66
F test	F(5,41)=71.08***	F(6,40)=30.17***	F(3,43)=21.97***	F(6,40)=29.15***
Hansen Over-id J test			Chi(1)=0.87	Chi(1)=1.0

t statistics robust to heterocedasticity in parenthesis. *, **, ***: for 10%, 5%, and 1% significance level.

1. The table report the t statistics robust to heterocedasticity in parenthesis. The table reports the values of the F test and the Hansen Overid test.

*, **, ***: for 10%, 5%, and 1% significance level.

2. The null hypothesis of the Hansen J overidentification test is that the instruments are orthogonal with respect to the residual of the regression. Columns 3 and 4 show that the test value is smaller than the critical values, so we do not reject the null hypothesis that the instruments are valid instruments.

Table 10 shows our inference of the impact on antitrust of all the distinctive objective competition policy features. It details the main drivers of the previously outlined results, although the large number of covariates makes our results slightly less precise. However, as previously mentioned, the correlation among the covariates is not so strong as to make the estimates inaccurate.

Table 10
IMPACT OF DETAILED FEATURES OF COMPETITION POLICY
OF EFFECTIVENESS

	log(effectiveness)							
	(1) OLS		(2) OLS		(3) IV		(4) IV	
Intercept	-0.89***	(5.50)	-0.87***	(8.89)	-2.66***	(6.18)	-1.92***	(5.07)
Independence on antitrust decisions	0.26***	(3.13)	0.26***	(4.05)	0.10*	(1.70)	0.19***	(3.15)
Government prosecution	-0.03	(0.43)	-0.03	(0.56)	-0.01	(0.24)	-0.01	(0.22)
Cartel per se	0.02	(0.30)	0.03	(0.58)	0.00	(0.06)	0.01	(0.29)
Cartel guide	0.02	(0.41)	-0.04	(0.81)	-0.04	(0.93)	-0.06*	(1.73)
Criminal sanctions	0.07	(1.22)	0.07	(1.19)	0.09***	(2.12)	0.07	(1.64)
Punitive damages	-0.05	(0.75)	-0.01	(0.18)	-0.09*	(1.77)	-0.05	(0.88)
Leniency damages	0.06	(1.16)	0.06	(1.37)	0.06	(1.55)	0.07***	(2.06)
Per se dominance abuses rules	-0.12	(1.61)	-0.13**	(2.23)	-0.05	(1.11)	-0.08**	(1.98)
Dominance defined by market share	-0.24***	(2.57)	-0.20***	(2.66)	-0.11	(1.36)	-0.14*	(1.88)
Dominance threshold (0 or 20 to 70%)	0.005***	(2.54)	0.004**	(2.25)	0.002	(1.04)	0.003*	(1.73)
Published merger guidelines	0.06	(0.96)	0.05	(1.19)	0.04	(1.04)	0.04	(1.34)
Government has the last say on mergers	0.07	(1.16)	0.03	(0.70)	0.03	(0.82)	0.02	(0.72)
Protecting competition in merger law	0.19	(1.45)	0.19**	(2.35)	0.15*	(1.78)	0.17**	(2.56)
Log per capita GDP					0.20***	(4.20)	0.12***	(2.81)
EU-15			0.11**	(2.06)			0.04	(1.02)
EU-Enlargement 2004			-0.11*	(1.93)			-0.12***	(2.74)
Bulgaria & Romania			-0.29***	(5.39)			-0.22***	(4.38)
R ²	0.53		0.75		0.68		0.78	
F test	F(13,33)=12.96***		F(16,30)=27.14***		F(14,32)=11.37***		F(17,29)=33.20***	
Hansen Over-id J test					Chi-sq(1)=1.44		Chi-sq(1)=0.46	

1. The table report the t statistics robust to heterocedasticity in parenthesis. The table reports the values of the F test and the Hansen Overid test. *, **, ***: for 10%, 5%, and 1% significance level.

2. The null hypothesis of the Hansen J overidentification test is that the instruments are orthogonal with respect to the residual of the regression. Columns 3 and 4 show that the test value is smaller than the critical values, so we do not reject the null hypothesis that the instruments are valid instruments.

Table 10 shows that the independence of the authority when adjudicating cases drives antitrust effectiveness. The authority's independence when adjudicating cases of cartel and dominance does make antitrust more effective even taking into account per capita GDP, EU membership and the other covariates. On average, Colombia, Costa Rica and Venezuela have worse competition policy; these are the three countries in the sample that lack an independent authority. Having governmental power of investigation has a negative but not statistically significant impact on effectiveness; here the relevant issue appears to be having an independent authority calling the shots.

We have previously seen that active stances on cartel policy in isolation doesn't have a significant impact on effectiveness, but leniency programmes do stand out as having an im-

pact in isolation. Countries that have recently implemented innovative leniency programmes are the ones with more effective antitrust policies. Interestingly, it appears to be unimportant whether cartels are prohibited using either the rule of reason or the *per se* illegality rule. This result suggests that, as Borrell (2007) stated, there is no single legal rule that fits all countries in the domain of cartel policy. Or alternatively, that actual enforcement of cartel policy is quite similar across countries irrespectively of the formal legal rule.

Table 10 also shows why the approach to dominance policy is important for antitrust effectiveness. Countries that enforce dominance policy using a *per se* illegality rule have a significantly worse antitrust effectiveness of around 8%. Countries that set a fixed market share to define dominant positions also have a worse competition policy effectiveness of around 14%. However, antitrust effectiveness improves, as the market share that defines the dominant position gets larger.

Finally, what appears to be important in merger policy is to have a competition orientated legal mandate, rather than having a government or agency that decides on mergers. On average, countries that aim to protect competition when authorising mergers have antitrust policies that are 17% more effective.

5. Concluding remarks

The effectiveness of antitrust policy varies strongly across countries. This paper shows that different institutional and policy characteristics drive the effectiveness of antitrust, and concludes that antitrust cannot be effective in a vacuum. Competition policy effectiveness is driven by per capita GDP and EU membership. It also shows how European Eastern countries are finding it particularly difficult to enforce effective antitrust policies.

Antitrust depends on income and EU membership, but is also more effective in some countries than in others. Having an economic approach to dominance law clearly makes antitrust more effective. Investigating dominance using an economic approach avoids the *per se* illegality rules and underscores market share as potential source of market power; it also makes antitrust sounder to have a competition orientated merger policy. Furthermore, engaging in innovative policies such as leniency makes antitrust more effective. Finally, authority independence regarding decisions on prohibiting cartels and dominant position abuses seem to be a prerequisite to sound antitrust; but it is not so important whether an independent agency or the government conducts the antitrust investigations.

Notes

1. See Porter, M. E. *et al.* (2005).
2. See IMD World Competitiveness Yearbook in <http://www.imd.ch/research/publications/wcy/index.cfm>.
3. See Mehta (2006).
4. See Davis (2006), Rowley and Low (2006), and Wessely (2006).

5. See Heston, Summers and Aten (2006). We have not been able to use the 2004 data on per capita income because the per capita income of Brazil, Colombia, India and Latvia were missing from the Penn World Table 6.2 at the time of writing this paper.
6. See Mehta (2006), Davis (2006), Rowley and Low (2006), Wessely (2006), ICN, OCDE and nacional competition authorities websites.
7. The Hansen J overidentification test is the GMM equivalent to the Sargan test. It is a test robust to the presence of heterocedasticity. The joint null hypothesis is that the instruments are valid instruments: the instruments are orthogonal with respect to the residuals of the regression. Under the null, the test statistic is distributed as chi-squared in the number of overidentifying restrictions. A rejection casts doubt on the validity of the instruments. The tables show that the test values are always smaller than the critical values, so we do not reject the null hypothesis that the instruments are valid instruments. See Baum, Schaffer and Stillman (2007)

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Resumen

Este trabajo muestra qué guía la efectividad de la política de competencia utilizando una base de datos internacional sobre la percepción de la efectividad de dicha política. El estudio concluye que la efectividad media depende de la renta per cápita y de liderazgos supranacionales como el ejercido desde el núcleo de la Unión Europea. Adicionalmente, el trabajo muestra que algunos aspectos del diseño de la política tienen un impacto significativo en sus resultados. Así, la efectividad mejora con una aproximación económica a los casos de dominancia y prácticas abusivas. Se demuestra que la efectividad mejora cuando el mandato legal para la política de concentraciones se centra en la competencia en los mercados, más que en el interés general. Además, una política de competencia más proactiva contra los carteles mejora la efectividad y, en particular, son muy valiosos los programas de clemencia. Finalmente, es importante que la autoridad independiente de la competencia tenga la última palabra en cuanto a la prohibición de prácticas restrictivas de la competencia.

Palabras claves: Política de competencia; Efectividad de la política; Económica política.

Clasificación JEL: D7; L4; O4.