Applied Economics Letters
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/rael20

Endogenous antitrust: cross-country evidence on the impact of competition-enhancing policies on productivity

Joan-Ramon Borrell [a] & Mara Tolosa [a]
[a] Department de Política Econòmica , University of Barcelona , Avda. Diagonal 690, 08034, Barcelona, Spain
Published online: 12 Sep 2008.

To cite this article: Joan-Ramon Borrell & Mara Tolosa (2008) Endogenous antitrust: cross-country evidence on the impact of competition-enhancing policies on productivity, Applied Economics Letters, 15:11, 827-831, DOI: 10.1080/13504850600949137

To link to this article: http://dx.doi.org/10.1080/13504850600949137

Applied Economics Letters, 2008, **15**, 827–831

Routledge
Taylor & Francis Group

Endogenous antitrust: cross-country evidence on the impact of competition-enhancing policies on productivity

Joan-Ramon Borrell* and Mara Tolosa

Department de Política Econòmica, University of Barcelona, Avda. Diagonal 690, 08034 Barcelona, Spain

This article presents empirical evidence regarding the effect of simultaneous antitrust and trade policy on productivity. We find that treating antitrust across countries as an exogenous policy overestimates the impact of competition on productivity by as much as 18%.

I. Introduction

Empirical estimates of the effect of competition policy on productivity are subject to a problem: the decision to enforce antitrust regulations is endogenous and may be determined by productivity, other competition-enhancing policy decisions such as trade policy and other economic, political and institutional factors.

As highlighted by the literature that has studied endogenous policies (Duso and Röller, 2003), we are interested in two separate effects. The first one, the *selection effect*, relates to the impact of productivity on the decision to enforce antitrust. To what extend are more productive countries more prone to enforce antitrust? The second effect, the *competition effect*, relates to the impact of antitrust on productivity: in how much antitrust boosts productivity. Cross-country empirical studies have focused on this second effect of antitrust on GDP per capita growth (Hayri and Dutz, 1999), while ignoring the first one. Treating the decision to enforce antitrust as exogenous, ignores the selection effect. As a result, the competition effect is biased.

Recent cross-country or cross-state empirical studies focused on a set of polices that still does not includes antitrust have been able to identify the selection bias and the policy effect on economic performance: these include the selection of social policies and regulations (Kraft, 1998; Besley and Case, 2000; Hayfron, 2001), monetary and fiscal policies (Persson and Tabellini, 2003), regulatory reform (Ai and Sappington, 2002) and deregulation policies (Duso and Röller, 2003 and Duso, 2003).

From a theoretical perspective, Aghion and Schankerman (2004) provide a political economy model of the underlying mechanisms at work in the case of policies that intensify product market competition (such as the creation of single markets, currency unions or investing in physical infrastructure). They also show how an endogenous demand of such policies can arise. There has been scarce literature that analyzes specifically antitrust as an endogenous policy. Only Symeonidis (2003) using within country data has been able to identify the selection and the competition effects on wages and productivity in the special quasi-experimental setting of the early cartel policy in the United Kingdom.

The contribution of this article is to show that it is important to consider antitrust as an endogenous policy. The inference of the impact of antitrust on productivity using cross-country data might be underestimated or overestimated depending on the nature of the underlying simultaneity bias.

*Corresponding author. E-mail: jrborrell@ub.edu

Applied Economics Letters ISSN 1350–4851 print/ISSN 1466–4291 online © 2008 Taylor & Francis
http://www.informaworld.com
DOI: 10.1080/13504850600949137

II. The Effect of Antitrust When Policy is not Selected Randomly

Let the performance outcome, productivity, be denoted by q. Let competition-enhancing policies decisions in a set of domains including antitrust be denoted by matrix **S**. Openness to international trade qualifies as other competition-enhancing policy domain very closely related to that of antitrust.[1] The objective is to identify the true underlying effect of policies that promote product market competition (**S**) on productivity (q).

We let cross-country variations in productivity (q) be determined mostly by policies (**S**) and also by geographic and historical determinants[2]:

$$q = f(\text{geography, history, } \mathbf{S}) + \varepsilon \qquad (1)$$

Let policy decisions (**S**) be simultaneously determined by the productivity outcome (q) as in Röller and Duso (2003) in order to assess empirically the impact of the selection effect. Competition-enhancing policies decisions in the antitrust and other domains (**S**) are determined as in Hall and Jones (1999) by observable historical and geographic features and additionally, by observable institutional country characteristics as in Persson and Tabellini (2003). Additionally, we allow policies to be determined by how big is the country and by institutional features such as how pervasive corruption is.

$$\mathbf{S} = g(\text{geography, history, institutions, size, corruption, } q) + \upsilon \qquad (2)$$

With respect to size and antitrust, Gal (2003) shows that optimal competition policy is very much dependent on the size of an economy. In small economies, competition must be equipped to deal effectively with the concentrated nature of most markets because markets cannot support the same number of firms as large economies.

With respect to corruption and antitrust, Aghion and Schankerman (2004) show that economies can fall in a low-competition enforcement trap when political institutions do not effectively discipline the behaviour of politicians and losers from antitrust successfully bribe them. Glaeser and Shleifer (2003) show also theoretically that most of regulations and by analogy antirust regulations, are only optimal policies to be in place in countries that can eventually enforce them. This is only the case in countries that enjoy low levels of corruption and relatively strong institutions.

The main objective is to disentangle the impact of **S** on q, the competition effect, from the impact of q on **S**, the selection effect. The problem is that estimating Equations 1 and 2 by OLS may be subject to simultaneity bias because **S** is endogenous. Countries select competition-enhancing policies in a nonrandomly way. Competition and selection effects can be consistently estimated by considering (1) and (2) jointly. The above set-up provides for a set of instruments; that is, the institutional factors that determine policies in Equation 2 and that are uncorrelated with productivity.

III. Cross Country Evidence

In this article we use the Persson and Tabellini (2003) data set which includes cross-section observations for 85 countries that qualify as free or semi-free. Country performance is measured by total factor productivity in logs (log A) computed by Hall and Jones (1999). Openness is measured by the index compiled by Sachs and Werner (1995) and reported by Hall and Jones (1999). It shows the fraction of years that the economy of each country has been open between 1950 and 1994.

We follow Persson and Tabellini (2003) using the following variables as determinants of growth policies: latitude (lat01) as defined in Hall and Jones (1999) and regional dummies (OECD, Latin-America, Eastern and Southern Asia, Africa); geographic location and physical endowments are captured by the (log) predicted trade share of a country's economy based on a gravity model of international trade computed by Frankel and Romer (1999) and reported by Hall and Jones (1999); history is captured by variables such as the fractions of the population speaking English as their mother tongue (engfrac) or speaking one of the five primary European languages (including English) as their mother tongue (eurfrac) as reported in Hall and

[1] Openness to international trade is a close substitute to antitrust. Both are competition-enhancing policies in Aghion and Schankerman (2004) terms, both reduce 'transport cost' in a circular model of competition. In a seminal article, Eastman and Stykolt (1960) highlighted the importance of foreign competition to avoid collusion among domestic firms in industries where the number of firms permitted by economies of scale is more than one but small enough to allow effective collusion. So, governments might be less prone to open the economy when internal markets are already highly competitive. And, with openness playing channeling foreign competitive pressures, governments might be less active in enforcing antitrust.

[2] We will let the data talk on whether geographic and historical determinants affect productivity directly or just indirectly through policies as in Hall and Jones (1999) and in Persson and Tabellini (2003).

Jones (1999); institutions are measured by a dummy of federalism (federal) and a set of colonial-origin variables weight by the amount of time since independence (col_uka, col_espa, col_otha).

Apart from these variables, we additionally use corruption and country size as exogenous determinants of policies: corruption (cpi9500) as compiled by Transparency International and the Internet Center for Corruption Research and the (log) of population. Both variables are reported in Persson and Tabellini (2003).

The effectiveness of antitrust enforcement is a variable computed by the World Economic Forum (published in the World Economic Report). It reports the average answer to business persons of 75 countries in 2000 to the following question: anti-monopoly policy in your country (1 = is lax and not effective at promoting competition, 7 = effectively promotes competition). The process of matching this data with Persson and Tabellini's (2003) leaves our data set with 52 country observations.

We estimate simultaneously Equations 1 and 2 taking into account only two competition-enhancing policies: antitrust enforcement and openness to international trade. We allow each policy to enter also Equation 2 as simultaneous determinant of the other. So, we end up with three equations and three variables simultaneously determined (log A, antitrust and openness).

Results on the impact of openness and antitrust on total factor productivity (log A) are reported in Table 1. Let us first focus on single-equation estimates of Equation 1, the productivity equation. This is the case of estimating the equation as if competition-enhancing policies were exogenously chosen. This is as if antitrust enforcement and openness to international trade were adopted by countries in a random way and that the selection effects were zero.

Apart from these two competition variables, the productivity equation includes only the fraction of European language as exogenous variable. This covariate was the only one that failed to pass the *F*-test for excluding exogenous controls that appear to have only an indirect effect on productivity through policies. It is important to control for all possible determinants of productivity and policies in a cross-country regression, but it makes sense to stick to parsimonious specifications led by the data.

The impact of antitrust enforcement on total factor productivity is positive and statistically significant, implying that competition policy effectiveness raises productivity. The estimates suggest that increasing the average antitrust effectiveness in one standard deviation would increase average total factor productivity by 28%. The problem with this estimate is that we do not know how much relates to the competition effect and how much to the selection effect.

Table 1 also reports the simultaneous estimations of the performance Equation 1 and the policy Equation 2. As in the productivity equation, the policy equations include the direct effect of covariates that failed to pass the *F*-test for excluding controls. OLS overestimates the effect of antitrust on total factor productivity by 18% and underestimates the impact of openness on total factor productivity by 37%.[3]

The table shows the magnitude of the policy substitution effects. It appears that the cross-impacts are asymmetric. Having effective antitrust has a larger impact on openness, than openness on making antitrust more effective. Increasing antitrust effectiveness in one SD reduces openness in approximately one SD. However, increasing openness by one standard deviation reduces antitrust effectiveness by only a third of a standard deviation approximately.

We could not say *ex ante* what the direction of the bias in this three equation system would be. The overall selection bias of each policy depends on how much the positive direct impact of productivity on each policy is neutralized by the negative indirect impact coming from the cross-policy effect, that is, from the fact that productivity increases the other policy and therefore reduces the policy under study. It appears that the positive direct impact of productivity on antitrust is larger than the negative indirect impact of productivity on openness that ends up affecting antitrust.[4]

The robustness of these results depends on the choice of instruments. The instruments must be valid (i.e. not correlated with productivity) and strong (i.e. highly correlated with the competition variables). With respect to validity, the over-identifying

[3] Increasing the average antitrust effectiveness in one SD (going from antitrust enforcement levels of Portugal or Poland to those of Sweden, New Zealand or Canada) would increase average total factor productivity by 23% (from its 4479 mean level in 1985 US Dollars to 5509). Increasing the average openness in one SD (going from the openness of Peru, Malta or South Korea to that of the Netherlands, Ecuador or Canada) would increase average total factor productivity by 32% (from its 4479 mean level in 1985 US Dollars to 5912).

[4] By contrast, in the case of openness, the positive direct impact of productivity on openness is smaller than the negative indirect effect of productivity on antitrust that ends up affecting openness. In this case, the selection bias is negative: on average more productive countries are less open.

Table 1. Total factor productivity, antitrust and openness

	(1)	(2)	(3)	(4)
	OLS	Simultaneous equations, 3SLS		
	LOG A	LOG A	ANTITRUST	OPENNESS
LOG A			0.43 (0.31)	0.60 (0.15)***
ANTITRUST	0.22 (0.04)***	0.18 (0.05)***		−0.31 (0.09)***
OPENNESS	0.60 (0.15)***	0.82 (0.20)***	−0.98 (0.34)***	
Fraction of European language speakers	0.38 (0.11)***	0.28 (0.10)***		
Latin American country				−0.25 (0.10)**
English colonial origin				−0.07 (0.11)
Spanish colonial origin				0.02 (0.25)
Other European colonial origin			0.51 (0.21)**	
Log population			0.23 (0.05)***	
Corruption			−0.42 (0.05)***	−0.09 (0.03)***
R^2	0.58	0.55	0.82	0.34
Partial R^2 excluded instruments:				
Log A			0.26	0.19
Antitrust effectiveness		0.88		0.45
Openness		0.63	0.44	
F-Test excluded instruments:				
Log A			2.59**	2.04*
Antitrust		25.17***		5.98**
Openness		21.59***	12.47***	
Over-identification Hansen *J*-test		8.51	9.57	4.91
(Chi-Square degrees of freedom)		(10)	(7)	(5)

Note: Endogenous variables in columns (2), (3) and (4) are in capital letters: LOG A, ANTITRUST and OPENNESS. Instruments identifying the system when excluded from the simultaneous equations: latitude, fraction of English speakers, fraction of other European language speakers, trade endowment, federal, English colonial origin, Spanish colonial origin, other European colonial origin, Latin American country, East Asia country, African country, corruption, (log) population. Observations = 52.
***, ** and * represent significance at the 1, 5 and 10% levels, respectively.

restrictions in each simultaneous equation are not rejected.[5] With respect to the power of the instruments, the excluded instruments were able to explain a percentage of the variation of the endogenous variables that ranges from 19 to 88%. Moreover, the excluded instruments passed the *F*-test for qualifying as strong instruments (Bound *et al.*, 1995).

IV. Conclusion

Due to the simultaneity among productivity and competition-enhancing policies such as antitrust enforcement and openness, we would overestimate the competition effect of antitrust. Treating the decision to enforce competition-enhancing policies as exogenous attributes to antitrust a larger effect that the true one. Not taking care of policy endogenous selection leads to an overestimation bias of 18%.

Additionally, making policy selection endogenous needs to take into account that there are strong cross effects between different policy domains: antitrust and openness are asymmetric substitute policies. Countries with effective antitrust do open their economies less strongly, while open countries do have moderately less effective antitrust.

Acknowledgements

We thank the comments and suggestions from the members of the University of Barcelona research group on public policies and economic regulation (GPRE), particularly from Germà Bel, Joan Calzada and Christian Duran and also those from George Symeonidis. We gratefully acknowledge financial

[5] This is not a proof of validity of the instruments, but at least we are safe to say that our instrument choices are not violating the restrictions that more than two instruments are orthogonal with the error term in each equation.

support from the Spanish Ministry of Industry, Turism and Trade (DG for Small and Medium Firms Policy). Remaining errors and omissions are the authors' sole responsibility.

References

Aghion, P. and Schankerman, M. (2004) On the welfare effects and political economy of competiton-enhancing policies, *Economic Journal*, **114**, 800–24.

Ai, C. and Sappington, D. E. M. (2002) The impact of state incentive regulation on the US telecommunications industry, *Journal of Regulatory Economics*, **22**, 133–60.

Besley, T. and Case, A. (2000) Unnatural experiments? Estimating the incidence of endogenous policies, *Economic Journal*, **11**, 672–94.

Bound, J., Jaeger, D. A. and Baker, R. M. (1995) Problems with instrumental variables estimation when the correlation between the instruments and the endogenous explanatory variables is weak, *Journal of the American Statistical Association*, **90**, 443–50.

Eastman, H. and Stykolt, S. (1960) A model for the study of protected oligopolies, *Economic Journal*, **70**, 336–47.

Duso, T. and Röller, L. H. (2003) Endogenous deregulation: evidence from OECD countries, *Economic Letters*, **81**, 67–71.

Duso, T. (2003) Lobbying and regulation in a political economy: evidence from the US cellular industry, *Public Choice*, **122**, 251–76.

Frankel, J. A. and Romer, D. (1999) Does trade cause growth?, *American Economic Review*, **89**, 379–99.

Gal, M. S. (2003) *Competition Policy for Small Markets Economies*, Harvard University Press, Cambridge (MA).

Glaeser, E. and Shleifer, A. (2003) The rise of the regulatory state, *Journal of Economic Literature*, **41**, 401–25.

Hall, R. and Jones, C. (1999) Why some countries produce so much more output per worker than others?, *Quarterly Journal of Economics*, **114**, 83–116.

Hayfron, J. E. (2001) Language training, language proficiency and earnings of immigrants in Norway, *Applied Economics*, **33**, 1971–9.

Hayri, A. and Dutz, M. (1999) Does more Intense Competition lead to Higher Growth?, CEPR Discussion Paper No. 2249.

Kraft, K. (1998) An evaluation of active and passive labour market policy, *Applied Economics*, **30**, 783–93.

Persson, T. and Tabellini, G. (2000) *Political Economics: Explaining Economic Policy*, MIT Press, Cambridge (MA) and London.

Persson, T. and Tabellini, G. (2003) *The Economic Effects of Constitutions*, MIT Press, Cambridge (MA) and London.

Sachs, J. and Werner, A. (1995) Economic reform and the process of global interpretation, *Brookings Papers on Economic Activity*, **1**, 1–95.

Symeonidis, G. (2003) The effects of competition on wages and productivity: evidence from the UK, *Review of Economics and Statistics*, forthcoming.