

The Effectiveness of Competition Policy and the Price-Cost Margin: New Econometric Evidence

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Abstract

This paper presents new econometric evidence suggesting that effective competition policy serves to curtail the exercise of market power – countries in which competition policy is judged to be more effective are characterised by lower market price-cost margins, controlling for other factors believed to influence the price-cost margin. The effectiveness of competition policy is measured using the ratings of national competition authorities (NCAs) produced by Global Competition Review (GCR). Our findings reveal a more supportive role for competition policy than previous economic research in the area and imply that governments should facilitate more effective competition policy as an important supply-side instrument.

Key words: Competition policy, price-cost margin, national competition authority (NCA).

JEL: L40, L41, L43, L13, L10.

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1. Introduction

Competition policy is fundamentally concerned with making individual goods and services markets work better for users and generally comprises three main strands: prohibition of agreements or concerted practices among undertakings the object or effect of which is to prevent, restrict or distort competition ('antitrust'); assessment of transactions between undertakings regarding whether or not they would lead to a significant reduction in competition ('merger control'); and prohibition of abuse of a dominant position ('dominance'). Other areas of competition policy include 'market studies', in which a national competition authority (NCA) decides to undertake a detailed examination of competition in one or more markets (many jurisdictions permit an NCA to commence a market study on its own initiative) and (increasingly, it seems) 'competition compliance', in which, for example, an undertaking adopts competition principles and training into its risk management procedures (typically in tandem with its legal and/or economic advisors).

Despite the heightened emphasis and awareness of competition policy in the past decade or so (by governments and among businesses), economic researchers have given relatively little attention to analysis of the *effectiveness of competition policy* and, in particular, to the question of whether more effective competition policy fulfils its objective of curtailing the exercise of market power and leads to more efficient market outcomes.

This paper aims to shed light on this question by presenting the results of new econometric analysis relating the price-cost margin measure of market power to a range of possible determinants of the price-cost margin, one of which is a variable capturing independent assessment of the quality of NCAs, which we adopt as a measure of competition policy effectiveness.¹

¹ The price-cost margin or Lerner index of market power is defined as the difference between price and marginal cost relative to price (i.e. $\frac{p - c}{p}$, where p denotes price and c marginal cost). The price-cost margin is higher the larger is p (which may reflect unilateral or coordinated market power) or the smaller is c (which may reflect efficiency). The price-cost margin is widely regarded as

The panel data used in our econometric analysis comprise 19 markets in the same number of countries during 1999-2003 (inclusive). The dependent variable or ‘variable-to-be-explained’ is the market price-cost margin and the independent or ‘explanatory’ variables include (1) the rate of market growth, (2) import penetration, (3) spare capacity and (4) a measure of the effectiveness of a country’s competition policy using a data source that, we believe, has not been used for this purpose until now. The measure in question is the ratings of NCAs produced by Global Competition Review (GCR), a leading international publication on competition. Since 1999, GCR has been publishing an annual assessment of NCAs worldwide – the most detailed and comprehensive available – which independently rates NCAs (quantitatively) using a large number of criteria, including cartel enforcement, merger review, competition advocacy and economic expertise. The ratings are based on ‘hard’, objective data compiled by GCR on NCAs and their work during the preceding year and also reflect the views of lawyers and economists specialising in competition policy and who are familiar with the outputs of their local NCAs (the GCR scores are produced retrospectively – e.g. the 2003 ratings were published in 2004). While an element of judgement is involved in compiling the GCR scores, the rankings are ‘credible’ in the sense that they corroborate other indicators of competition policy effectiveness (including anecdotal evidence).

Given the primary role played by NCAs in enforcing competition policy, it may be inferred that the GCR scores provide a reasonable, independent assessment of the effectiveness of a country’s competition policy in terms of design and implementation. Of particular interest in this paper is whether more effective competition policy, as captured by a higher GCR score, is associated with lower market price-cost margins, controlling for other factors also believed to influence the price-cost margin (including market growth, spare capacity and import penetration). Controlling for these others factors is important because the magnitude of the price-cost margin may reflect other factors instead of, or as well as, the exercise of market

preferable to structural indicators of market power, such as concentration indices, and is the most frequently used dependent variable in previous (inter-industry) studies, despite being less straightforward to measure than concentration indices.

power – for instance, a higher price-cost margin may be associated with a surge in demand rather than market power or may reflect cost efficiencies.²

The panel data econometric analysis presented below reveals a statistically significant negative relationship between the effectiveness of competition policy, as captured by the GCR variable, and the price-cost margin (taking account of other factors believed to influence the price-cost margin). This suggests that competition policy is succeeding in its objective of curtailing the exercise of market power and in turn implies that governments should support and facilitate effective competition policy as an instrument of supply-side reform and economic efficiency.

The structure of the paper is as follows. The next section provides a brief review of previous studies in the area and Section 3 sets out the central hypothesis to be tested. Section 3 describes the data in more detail and Section 4 presents the new econometric results. Finally, Section 5 concludes the paper.

The material presented in this paper is done so in a non-technical manner to facilitate wide dissemination.

2. Research Review

Konings *et al.* (2001) studied price-cost margins in Belgium and the Netherlands during 1992-1997 and “tentatively” found that the change in competition policy in the former country in 1993 did not significantly affect price-cost margins, although margins were higher in the Netherlands during the period, which, according to the authors, had a less stringent competition policy at the time. The tentative nature of the finding in respect of Belgium was because the change in competition policy in that country (in 1993) came in the context of a former system of price regulation, which, the authors consider, may have already served to discipline firms in Belgium and thus may have limited the effect of the new competition policy introduced in 1993. Konings *et al.* (2001) also found that higher import competition does not lead to lower price-cost margins, in contrast to earlier studies by Levinsohn (1993), Harrison (1994), Grether (1996) and Djankov and

² This paper does not attempt to ascertain the extent to which the price cost-margin reflects

Hoekman (2000), which suggested that import competition and trade liberalisation reduce price-cost margins.

More recently, Kee and Hoekman (2007) suggest that while markets that have higher import exposure or larger numbers of domestic firms tend to be more competitive, the direct effect of competition policy on market performance is unlikely to be significant, even though competition policy may have an indirect effect on market performance by promoting entry (Kee and Hoekman do not attempt to quantify the indirect effect).

In contrast to the studies by Konings *et al.* (2001) and Kee and Hoekman (2007), which suggest a limited role for competition policy in terms of curbing market power (captured by the price-cost margin), a number of other papers suggest a more prominent role for competition policy in enhancing economic performance (although they do not consider the price-cost margin). These studies include Nickell (1996), Blundell *et al.* (1999) and Aghion *et al.* (2005a&b), which examine competition and innovation, and Aitken and Harrison (1999), Pavcnik (2002) and Javorcik (2004), which look at trade liberalisation and productivity. The study by Nicoletti and Scarpetta (2003) assumes that product market reforms affect the rate of total factor productivity convergence across countries and industries, and finds that the impact of reforms tends to be larger for countries further behind the frontier, suggesting that policy-makers in such countries have an incentive to implement product market reform (i.e. that competition policy yields positive economic benefits). Griffith *et al.* (2006) associate the reforms carried out under the EU Single Market Programme with increased product market competition, as measured by lower average profitability and a subsequent increase in innovation intensity and productivity growth for manufacturing sectors in the countries considered.³

Some non-specialists (including some politicians) have recently cast doubt on the efficacy of competition policy to deliver its intended benefits speedily and

efficiency and/or market power, although we comment on this issue at the end of the paper.

³ According to Wolf (2006), “[u]ndistorted competition...is the most important long-run determinant of productivity and so prosperity. Competition is how productive companies win out”. (Very recent papers on the effectiveness of competition policy include Jenny (2008).)

effectively and have re-opened the debate regarding the extent to which competition policy should entertain other policies, including industrial policy, consumer policy and the public interest. In response to these concerns, Freeman (2008) has recently suggested that NCAs should “manage expectations” in explaining what can and cannot be achieved through competition policy, which should “not hide behind a narrow orthodoxy and should be willing to take account of the overall policy context”. At the same time, Freeman makes clear that competition policy should “minimise the lessening of competition in any policy ‘trade-off’” and concludes strongly (p. 10):

“But that is as far as things should go. The idea that competition is just another policy to be weighed in the balance against others is insidious and potentially dangerous to the functioning of the economy”.

2. Hypotheses to be Tested

The principal hypothesis to be empirically tested in this paper is as follows:

More effective competition policy is likely to lessen the ability of firms to engage in unilateral or coordinated market power and, as a result, the market price-cost margin will be lower (controlling for other factors believed to influence the price-cost margin).

More effective competition policy is associated with more highly rated NCAs and the latter we capture using the annual GCR ratings. Associating more effective competition policy with more highly rated NCAs (higher GCR ratings) is not unreasonable (we believe) since NCAs are the primary enforcers of national competition policy. In terms of *a priori* expectations, we posit that the market price-cost margin will be inversely related to the GCR variable.

In respect of the ‘other factors’ with a possible influence on the market price-cost margin, we consider a range of other variables, including:

- *Market growth* – the relationship between market growth and the price-cost margin may be positive or negative (rapidly growing markets in which there is ease of entry may have lower price-cost margins, other

thing being equal; on the other hand, where entry is less easy, demand growth may tend to be absorbed by existing firms in the form of higher prices, implying a positive relationship between market growth and the price-cost margin);

- *Import penetration* – the relationship between import penetration and the price-cost margin may be negative because greater openness to international competition is likely to constrain the exercise of market power (as found in some of the previous studies cited earlier, namely Levinsohn (1993), Harrison (1994), Grether (1996) and Djankov and Hoekman (2000));⁴
- *Capacity constraints* – economic analysis of unilateral effects suggests that unilateral market power is less likely to be exercised where capacity constraints are low (because other competitors will be better placed to meet growth in demand for their output) and so we might expect an inverse relationship between the level of spare capacity and the price-cost margin.

3. Data

The main sources of data are the OECD STAN database, which contains a range of structural indicators at the level of industry and country, and the annual GCR ratings described earlier. The latest year covered by the OECD STAN database (at the time our research was carried out in 2007) is 2003 and that determined the end-date of our observation period. Likewise, the earliest year covered by GCR is 1999 and that governed the start of our observation period (1999-2003).

Our econometric analysis is based on two data samples: Sample A and Sample B. The respective structures of the Sample A and B panel datasets, in terms of the number of countries and years covered, are given in Tables A1 and Table A2 in the Appendix.

Sample A comprises 938 observations and is used to estimate the first specification of our econometric model comprising all explanatory variables. As an added check on the robustness of the results from Sample A, we also considered a parsimonious econometric specification consisting of those explanatory variables found to be statistically significant in the first specification. Accordingly, we were able to increase the size of the sample in the parsimonious specification (2,027 observations).⁵

For each country in each sample (A and B), we include data on nineteen industries. The OECD STAN dataset provides a range of (sometimes overlapping) levels of industry aggregation. We have used the most disaggregated level available, on the grounds that it constitutes the grouping of firms approximating (within the available dataset) the concept of a ‘relevant market’.⁶ The list of industries included is shown in Table A3 in the Appendix.

Variable descriptions and summary statistics for the two samples are provided in Table 1 and Table 2. In Sample A, the range of the market price-cost margin variable (*PCM*)⁷ is -0.375 to 0.542 and the *GCR* variable assumes the full range of values (1-5). The same is true of Sample B, where the larger sample size accommodates even greater variation in the data. The market growth variable is denoted *D_PROD*, the spare capacity proxy *OUTGAP* and the import penetration variable *IMPPEN*. Other factors controlled for are employment growth (*D_EMP*) and the change in the GDP deflator (*D_GDPDF*), which accounts for the annual change in prices during the period.

[Insert Table 1 here please]

[Insert Table 2 here please]

⁴ On the other hand, Konings *et al.* (2001) found that higher import competition does not lead to lower price-cost margins.

⁵ Sample B comprises three more countries than Sample A, namely South Korea, Mexico and Norway.

⁶ However, the industries are aggregated in comparison with typical relevant markets defined according to the SSNIP test and this is a limitation of the OECD data.

⁷ The proxy for the price-cost margin in this paper is the same as the one used in recent work by Boulhol (2005a and 2005b) on the determinants of, and trends in, margins across the OECD.

The 2003 GCR ratings of 17 of the 19 countries considered in our analysis are illustrated in Figure 1 (Belgium and Portugal were not ranked in 2003). Competition policy was judged to have been most effective in the US, the birthplace of antitrust. Within Europe, the competition regimes in Germany, the UK, the Netherlands, Italy and France were all assessed as strong (GCR rating of 4 or more). On the other hand, Greece was found to have a less robustly performing competition policy regime according to the GCR ratings during the sample period (the GCR rating of which fell to 1.5 in 2003 from 2.5 in 2000).

[Insert Figure 1 here please]

4. Econometric Results

Initial testing of the econometric model, using an OLS (ordinary least squares) fixed-effects (FE) estimator, indicated the presence of heteroscedasticity (an underlying econometric problem the existence of which makes econometric estimates less reliable), so we corrected for this problem by estimating robust standard errors.⁸ In addition, we corrected for possible Moulton bias by allowing for standard errors clustered at the country level.⁹

Both the OLS and OLS Moulton bias-corrected estimates for sample A (938 observations) are reported in Table 3 (robust t-stats are also reported). Both show a well-determined econometric model, with over 90% of the variation in the price-cost margin being accounted for by differences across the countries. In each case, the coefficient on the *GCR* variable is significantly negative, providing empirical support for our hypothesis that more effective competition policy is associated with lower market price-cost margins, controlling for other influences on the price-cost margin. The other variables that are statistically significant are *D_PROD* (positive coefficient) and *OUTGAP* (negative coefficient). The negative coefficient on the latter variable implies that greater spare capacity is associated with lower

⁸ We used a modified Wald test for groupwise heteroscedasticity (Greene, 2000, p. 598) and corrected for this by estimating robust standard errors.

⁹ This problem may arise when some explanatory variables are at a higher level of aggregation than the dependent variable. See Moulton (1990). Here, the GCR and GDP deflator variables pertain to

profitability, which suggests that spare capacity may mitigate the exercise of unilateral market power. The positive coefficient on the market growth variable indicates that the price-cost margin is higher in more rapidly growing markets, which might suggest some entry barriers (at least within the sample period) because otherwise market growth would stimulate the arrival of new competitors and in turn put downward pressure on margins. The import penetration variable (*IMPPEN*) is not statistically significant and the same is true of the other two explanatory variables (*D_GDPDF* and *D_EMP*).

[Insert Table 3 here please]

We next considered a parsimonious model with fewer explanatory variables (using sample B, 2,027 observations). Our ‘best-fitting’ model is shown in Table 4, where as before we report both the standard FE and Moulton bias-corrected FE results (also with robust t-stats). These show a very well-determined model (over 90% of the variation in the price-cost margin is explained, much of it by fixed effects) with the *GCR* variable having an even stronger influence on the price-cost margin compared with first model (the market growth variable, *D_PROD*, continues to be statistically significant but the spare capacity variable, *OUTGAP*, is no longer statistically significant). As before, import penetration is not significant.¹⁰ The insignificance of import penetration in this study both corroborates some previous studies (e.g. Konings *et al.*, 2001) and differs from some previous evidence (e.g. Djankov and Hoekman, 2000, which finds that import penetration and trade liberalisation tend to reduce price-cost margin). The finding that import penetration may not be important in this paper might reflect the data sample used, which does not include any ‘closed’ economies (which in any case are few and would be unlikely to have competition laws). Nevertheless, there is an appreciably large degree of variation in our import penetration variable (as evident in the summary statistics in Table 1 and Table 2) and so we are inclined to the view that import penetration is unlikely to be important in affecting the price-cost margin when other

the level of the country in the data, while the other variables pertain to the level of market within each country.

variables are controlled for, including the effectiveness of competition policy. Another way to see this is in relation to merger control decisions and market studies, which commonly find that relevant markets are defined nationally, regionally or locally rather than internationally (suggesting that imports may not provide a strong competitive constraint in relevant markets). The late Professor Paul Geroski (former Chairman of the UK Competition Commission) had this to say on the geographic extent of relevant markets (Geroski, 2005, pp. 38-9):

“It is possible to debate endlessly about whether most markets are global or not. I personally do not think that many are. Even 12 years after 1992, most markets in Europe are recognisably national: the vast majority of brand names are national and rarely have much pull beyond their home market. Further, there is still an enormous price dispersion across Europe for particular products, usually accompanied by some degree of differentiation which caters for differences in national, or at least regional tastes”.

We also investigated the possibility of lagged effects in the effectiveness of competition policy feeding through to the price-cost margin (i.e. it may take time for firms to assimilate the effects of competition policy) but lags in the explanatory variables, including the *GCR* variable, did not emerge as statistically significant.

[Insert Table 4 here please]

Our panel data models effectively assume that the coefficients on the *GCR* variable and the other determinants of the price-cost margin are the same across markets. However, it is intuitively possible that this might not be so; for example, some markets are more prone to antitrust action for a range of reasons. We therefore also estimated separate market-level (panel data) regression models using the full set of explanatory variables identified in our analysis. The resulting *GCR* coefficients are shown in Table 5 below. The results show that the *GCR* variable generally has a negative effect on the price-cost margin and that several markets have large and statistically significant *GCR* coefficients – radio, television and communication equipment, electrical machinery and apparatus nec, basic metals, motor vehicles, trailers and semi-trailers and textiles. According to our analysis, it is in these

¹⁰ The spare capacity and import penetration variables were dropped in reaching the best model reported in Table 4.

particular markets that the effectiveness of competition policy appears to have had an especially large influence on profitability across the countries in our sample (sample A). On the other hand, our analysis also identifies a number of markets in which there is no apparent relation between the effectiveness of competition policy and the market price-cost margin, including publishing, printing and reproduction of recorded media, chemicals and chemical products and tobacco products.

[Insert Table 5 here please]

5. Conclusion

This paper has provided new econometric evidence in support of the hypothesis that more effective competition policy (measured using the independent assessment of national competition authorities or NCAs worldwide produced annually by Global Competition Review, GCR) is likely to curb the exercise of market power (captured by the market price-cost margin or Lerner index). In our econometric analysis, we also considered a range of other possible influences on the price-cost margin where it was found that the effect of market growth on the price-cost margin is positive while the evidence that spare capacity is associated with lower price-cost margins is less strong. There was little evidence to suggest that import penetration is associated with lower price-cost margins.

Our analysis concurs with some previous studies (in respect of import penetration) but differs in respect of the strength of the effect exerted by competition policy effectiveness – the results here are more supportive of competition policy than previous research in the area.

The significance of competition policy arising from our analysis suggests that governments should continue to support and facilitate effective competition policy as a key driver of market reform and economic efficiency across the economy.

While we have measured an overall effect of competition institutions on market outcomes, there may be scope for further work to identify the specific channels through which these institutions have their effects, including the role, if

any, played by competition advocacy and market studies, which can sometimes lead to improvements in competition in markets through voluntary and/or imposed remedies.

Finally, it may be worth mentioning a few words concerning the debate about whether the price-cost margin is the result of economic efficiency or the exercise of market power (which has never been resolved in the economic research). Our view is that the inter-industry approach (whether using panel data or cross-sectional data) may not be an appropriate means to investigate this question and that market-specific case-studies may offer a more fruitful means in any future research on efficiency-market power studies.

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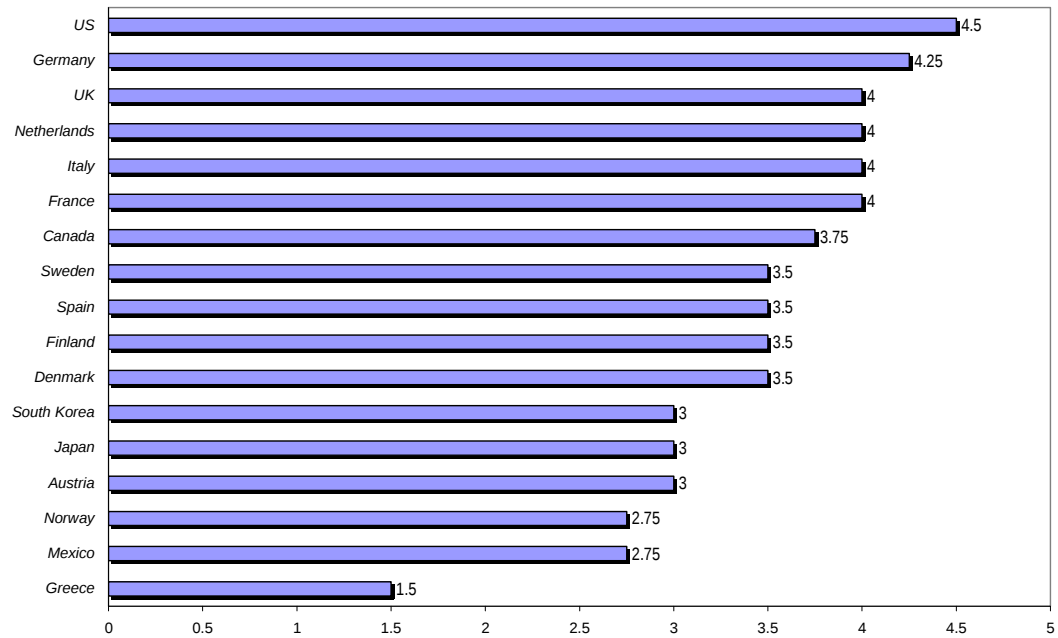
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Tables and Charts for Main Text

Table 1: Variable Descriptions, Sources and Summary Statistics for Sample A							
Variable	Description	Source	Mean	St Dev	Min	Max	Obs
PCM_{ijt}	Price-cost margin; for each country/market = (production - labour compensation - cost of intermediate inputs)/production	Analysis of OECD STAN data	0.136	0.0909	-0.375	0.542	938
GCR_{jt}	Index of competition effectiveness for each country (increasing on a scale of 1-5)	Global Competition Review	3.36	0.795	1	5	938
D_PROD_{ijt}	Annual % change in country/market production	Analysis of OECD STAN data	0.0392	0.132	-0.799	0.945	938
D_EMP_{ijt}	Annual % change in country/market employment	Analysis of OECD STAN data	0.201	1.44	-3.04	3.33	938
D_GDPDF_{jt}	Annual % change in GDP deflator for each country * 100	OECD	1.95	1.45	-1.71	5.22	938
$OUTGAP_{ijt}$	Output gap for each country/market	OECD	-0.0109	0.0638	-0.524	0.357	938
$IMPPEN_{ijt}$	Import penetration for each country/market = imports/(production - exports + imports)	Analysis of OECD STAN data	0.490	1.0496	-26.0	9.91	938
<i>Note: The subscripts i, j and t refer to industry, country and year respectively.</i>							

Table 2: Variable Descriptions, Sources and Summary Statistics for Sample B							
Variable	Description	Source	Mean	St Dev	Min	Max	Obs
PCM_{ijt}	Price-cost margin; for each country/market = (production - labour compensation - cost of intermediate inputs)/production	Analysis of OECD STAN data	0.198	0.162	-0.375	0.926	2,027
GCR_{jt}	Index of competition enforcement quality for each country (increasing on a scale of 1-5)	Global Competition Review	3.28	0.843	1	5	2,027
D_PROD_{ijt}	Annual % change in country/market production	Analysis of OECD STAN data	0.0497	0.124	-0.799	1.73	2,027
<i>Note: The subscripts i, j and t refer to industry, country and year respectively.</i>							

Figure 1: GCR Rankings in Sample of Countries 2003



Note: Belgium and Portugal not ranked in 2003. France is the average of the Competition Council and the DGCCRF; UK is the average of the Competition Commission and the OFT; and US is the average of the Federal Trade Commission and the Department of Justice (Antitrust Division). Source: GCR.

Table 3: Price-Cost Margin Panel Data Regression Results – OLS Fixed-Effects with and without Standard Errors Clustered by Country (Sample A)				
Variables and Summary Statistics	OLS Fixed-Effects		OLS Fixed-Effects with Errors Clustered by Country (Moulton Bias Correction)	
Dep. Variable	PCM_{it}		PCM_{it}	
	Coef.	Robust t-stat.	Coef.	Robust t-stat.
Constant	0.148	22.3***	0.148	17.3***
GCR_{it}	-0.00489	-2.23**	-0.00489	-1.78*
D_PROD_{ijt}	0.0612	4.38***	0.0612	5.24***
$OUTGAP_{ijt}$	-0.00222	-2.54**	-0.00222	-2.02*
D_GDPDF_{jt}	0.00121	0.90	0.00121	0.94
D_EMP_{ijt}	0.0265	0.60	0.0265	0.69
$IMPPEN_{ijt}$	0.0000212	0.13	0.0000212	0.22
Sample	247 country-industries		247 country-industries	
Observations	938		938	
Adj. R ²	0.922		0.922	
Min. periods	1		1	
Avg. periods	3.8		3.8	
Max. periods	5		5	
F(6,685)	6.00 [0.000]			
F(6,15)			18.6 [0.000]	
Fraction of variance due to u_i	0.923		0.923	
Note: t-statistics are robust, based on the Huber/White/sandwich estimator of variance; *, ** and *** denote significant at the 10%, 5% and 1% level respectively. Numbers in brackets are p-values. Data sources: see Table 1 above. The subscripts i, j and t refer to industry, country and year respectively.				

Table 4: Price-Cost Margin Panel Data Regression Results – Parsimonious Models Estimated using OLS Fixed-Effects with and without Standard Errors Clustered by Country (Sample B)

Variables and Summary Statistics	OLS Fixed-Effects		OLS Fixed-Effects with Errors Clustered by Country (Moulton Bias Correction)	
Dep. variable	PCM _{it}		PCM _{it}	
	Coef.	Robust t-stat.	Coef.	Robust t-stat.
Constant	0.214	46.91***	0.214	36.42***
GCR _{jt}	-0.00534	-4.24***	-0.00534	-3.14***
D_PROD _{ijt}	0.0323	1.86*	0.0323	2.78**
OUTGAP _{ijt}				
D_GDPDF _{jt}				
D_EMP _{ijt}				
IMPPEN _{ijt}				
Sample	592 country-industries		592 country-industries	
Observations	2,027		2,027	
Adj. R ²	0.974		0.982	
Min. periods	1		1	
Avg. periods	3.4		3.4	
Max. periods	5		5	
F(2,1433)	17.2 [0.000]			
F(2,18)			16.9 [0.000]	
Fraction of variance due to u _i	0.975		0.975	
Note: t-statistics are robust, based on the Huber/White/sandwich estimator of variance; *, ** and *** denote significant at the 10%, 5% and 1% level respectively. Numbers in brackets are p-values. Data sources: see Table 2 above. The subscripts i, j and t refer to industry, country and year respectively.				

Table 5: Coefficient on GCR Variable in Market-Level PCM Regressions – estimated using OLS with Standard Errors Clustered by Country		
Market	<i>In descending order by level of significance</i>	
	Coef.	Robust t-stat.
Radio, television and communication equipment	-0.0476	-4.59***
Electrical machinery and apparatus nec	-0.0335	-3.61***
Basic metals	-0.0202	-3.04***
Motor vehicles, trailers and semi-trailers	-0.0230	-2.99***
Textiles	-0.0183	-2.97**
Food products and beverages	-0.0125	-1.76
Coke, refined petroleum products and nuclear fuel	-0.0248	-1.54
Wearing apparel, dressing and dyeing of fur	-0.0201	-1.52
Medical, precision and optical instruments, watches and clocks	-0.0274	-1.35
Paper and paper products	-0.0136	-1.29
Office, accounting and computing machinery	0.0380	1.17
Other transport equipment	-0.0313	-1.05
Publishing, printing and reproduction of recorded media	0.0108	0.52
Rubber and plastics products	-0.00263	-0.36
Electricity, gas, steam and hot water supply	-0.00831	-0.26
Chemicals and chemical products	0.00291	0.25
Other business activities	-0.00705	-0.17
Fabricated metal products, except machinery and equipment	0.00139	0.14
Tobacco products	-0.00386	-0.11
<i>Note: t-statistics are robust, based on the Huber/White/sandwich estimator of variance; *, ** and *** denote significant at the 10%, 5% and 1% level respectively. Numbers in brackets are p-values. Data sources: see Table 1 above.</i>		

Tables for Appendix: Additional Information

Table A1: Number of Observations per Country and Year (Sample A)					
Country	1999	2000	2001	2002	2003
1. Austria	-	19	19	19	19
2. Belgium	17	-	-	-	-
3. Canada	14	14	14	-	-
4. Denmark	19	19	19	19	19
5. Finland	-	19	19	19	19
6. France	19	19	19	19	-
7. Germany	19	19	18	18	-
8. Greece	-	19	19	19	19
9. Italy	16	16	16	16	3
10. Japan	-	13	13	13	13
11. Netherlands	16	16	16	12	8
12. Portugal	3	3	3	-	-
13. Spain	-	19	17	17	-
14. Sweden	14	14	14	14	-
15. United Kingdom	3	3	3	3	3
16. United States	18	18	18	16	16

Table A2: Number of Observations per Country and Year (Sample B)					
Country	1999	2000	2001	2002	2003
1. Austria	-	37	37	37	37
2. Belgium	37	-	-	-	-
3. Canada	24	24	24	-	-
4. Denmark	37	37	37	37	37
5. Finland	-	37	37	37	37
6. France	37	37	37	37	-
7. Germany	37	37	35	35	-
8. Greece	-	37	37	37	37
9. Italy	27	27	27	27	3
10. Japan	-	14	14	14	14
11. South Korea	-	-	-	22	22
12. Mexico	-	-	21	12	12
13. Netherlands	33	33	33	29	23
14. Norway	-	-	-	33	6
15. Portugal	37	21	21	-	-
16. Spain	-	37	19	19	-
17. Sweden	22	22	22	22	-
18. United Kingdom	37	37	37	37	35
19. United States	26	26	26	24	24

Table A3: Industries included in Analysis		
	Industry description	NACE
1	Radio, television and communication equipment	32
2	Electrical machinery and apparatus, nec	31
3	Basic metals	27
4	Motor vehicles, trailers and semi-trailers	34
5	Textiles	17
6	Food products and beverages	15
7	Coke, refined petroleum products and nuclear fuel	23
8	Wearing apparel, dressing and dyeing of fur	18
9	Medical, precision and optical instruments, watches and clocks	33
10	Paper and paper products	21
11	Office, accounting and computing machinery	30
12	Other transport equipment	35
13	Publishing, printing and reproduction of recorded media	22
14	Rubber and plastics products	25
15	Electricity, gas, steam and hot water supply	40
16	Chemicals and chemical products	24
17	Other business activities	74
18	Fabricated metal products, except machinery and equipment	28
19	Tobacco products	16