



Economic integration and the dynamics of firms' competitive behavior

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ABSTRACT

We investigate the evolution of firms' competitive behavior in the EU by studying the dynamics of firms' price-cost margins (PCMs) across four countries (France, Italy, Poland and Sweden), in three manufacturing and three services industries for around 170,000 firms over the period 1999–2007. By looking at density distributions of the PCM across firms, we detect an aggregation problem affecting country specific measures of PCM levels, with PCM changes providing instead an unbiased representation of industry dynamics. A Laspeyres-type decomposition of PCM changes shows pro-competitive effects over the period, induced mainly by the reallocation channel, and a tendency to a quality upgrading of firms, revealed by the positive interaction term. These trends are stronger after 2002. We also observe a trend towards lower PCMs across manufacturing industries, while the latter is not true for services. These findings are confirmed by a dynamic panel econometric exercise performed on the pooled firm-level sample.

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1. Introduction

European firms have faced in the last 10 years a number of competitive shocks. The introduction of the euro in 2002 as a single currency has increased the pace of the integration process. At the same time, the European Union has faced the largest enlargement process of its history: 10 countries have joined the EU in 2004, and an additional two, Bulgaria and Romania, in 2007. Such a widening and deepening process has thus expanded the single market, significantly intensifying the competitive pressures within it.

And still, researchers and policy makers are at odds in properly investigating how the firms' competitive behavior has evolved over time in a comparative perspective,

since homogeneous data across countries tend to be available only in an aggregate (at the industry or sub-industry level) form. In this paper we aim instead at explicitly using firm-level data, now available in a relatively comprehensive format for a large number of European countries, in order to provide a more detailed analysis of the competitive behavior of firms in the Single Market. In particular, we focus on a selected number of both manufacturing and services industries (food, chemicals, car production, retail services, telecoms, real estate) in 4 different EU member states (France, Italy, Poland and Sweden). Our analysis is based on an average of around 170,000 firms observed each year over the period 1999–2007.¹

¹ The source of data is the AMADEUS database developed by Bureau van Dijk, a consulting company which collects balance sheet data and ownership data for more than 11 million of active firms in 41 European countries. However, the quality and coverage of these firm-level data varies across countries.

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The use of firm-level data allows to grasp information on the average changes taking place in each industry and across countries, as well as on the distribution and sources of these changes in terms of individual firms' pricing behaviour and market share, an information which is impossible to gather in detail from aggregate, traditional sector-level measures. However, using firm-level data for such a comparative analysis poses a number of methodological problems, which we try to present and address in this work. The latter, in our opinion, constitutes the main contribution of the paper to the literature.

We start by identifying a measure of the competitive behavior of firms: the firm-level price-cost margin (PCM) and its changes over time. As the latter is typically a proxy of profitability, analysing its variation by industries and countries across firms allows to extract information on changes in the competitive environment.² When presenting the indicator, we also discuss its application to firms operating in services, which might have a relatively larger share of unaccounted for variable costs driving profitability, typically associated with intangible assets such as R&D and skilled labor.

Building on the existing literature, we have then analysed the variation over time of the density distribution of the firm-level PCMs within each country. The latter allows to exploit the informational content of firm-level heterogeneity to assess potential, systematic cross-country differences in the PCM distribution. In performing this exercise, we have detected a significant aggregation problem affecting country specific measures of the PCM: comparing data within the same industries, we have found a systematic country-specific difference in the aggregate distribution of PCM *levels*. However, we have found that the distribution of PCM *changes* is highly comparable across countries.

Capitalising on this finding, and in order to explore the drivers of the country- and industry-specific PCMs' dynamics, we have then performed a Laspeyres-type decomposition of the changes in the aggregate PCM, thus retrieving the within, reallocation and interaction effects driving the evolution of firms' pricing strategies, as well as the impact of firms' entry and exit. We have found evidence of an average pro-competitive effect over the considered period, induced mainly by the reallocation channel, as well as a general tendency to a quality upgrading for Italian, French and Swedish firms, as revealed by the positive interaction term. All these trends are stronger after 2002, the year of the introduction of the euro. Changes in the PCM of Polish firms, on the contrary, seem to be still subject to increasing competitive pressures generated by the transition to a market economy. In general, we observe a trend towards lower PCM across manufacturing industries, while the latter is not true for services.

These findings are confirmed when pooling together firms across countries in an econometric exercise. The latter exploits dynamic panel estimation techniques, given

the persistence of the firm-level PCM measure over time. Results confirm a common trend across firms towards lower PCMs in the manufacturing industries, possibly as a consequence of pro-competitive pressures induced by the adoption of the euro, but not in services.

The paper is structured as follows. [Section 2](#) provides a brief overview of the literature on PCM estimation and its application to the analysis of firms' competitive behavior. [Section 3](#) describes the database and defines the firm-level measure of price-cost margin on which the analysis is based, discussing the potential problems of calculating PCM for services firms, as well as the aggregation issues arising when using firm-specific PCM measures. [Section 4](#) presents the analysis of PCM distributions and decompositions across countries, industries and time. [Section 5](#) corroborates these results with econometric evidence. [Section 6](#) concludes.

2. Related literature

Several studies have investigated how competitive pressures affect market power. One stream of literature measures competition by estimating an industry-level mark-up adopting methodologies by either [Hall \(1986, 1988\)](#) or [Roeger \(1995\)](#).

Hall's insight is to introduce imperfect competition in a growth accounting model based on a standard Cobb–Douglas production function augmented with a technological shock.³ Adopting [Hall's \(1988\)](#) approach, [Bottasso and Sembenelli \(2001\)](#) show that the Single Market Program has reduced mark-ups in Italy's manufacturing sector, while [Small \(1997\)](#) investigates the cyclicity of mark-ups in manufacturing and service industries in United Kingdom. [Nishimura et al. \(1999\)](#) estimate mark-ups for a panel of large Japanese firms in 21 industries over 24 years (1971–1994).

A shortcoming of the Hall's methodology is however linked to the presence in the estimating equation of an unobserved technological shock, which may be correlated with the input factors and may thus bias the estimated PCM. The latter endogeneity is in principle difficult to overcome, since instrumental variables for productivity are hard to find at the firm-level. The problem can be solved following [Roeger \(1995\)](#), who is able to decompose the price-based (or dual) Solow residual according to a different expression, in which the unobserved productivity shock is canceled out. Therefore, the simultaneity bias previously discussed disappears. [Badinger \(2007\)](#) applies the [Roeger's \(1995\)](#) methodology on a sample of 10 European countries over the period 1981–1999, always to investigate the effect of Single Market Programme.

Still, the application of the [Roeger \(1995\)](#) methodology to firm-level data is not ideal, as the dual production function introduced by Roeger requires a correct measurement of the cost of capital, and is based on the assumption of constant returns to scale. Indeed, the method has been successfully applied to firm-level data when the average

² These changes in competitive behavior may be induced by a number of factors, such as changes in pricing strategy, quality upgrading, dynamic efficiency, product mix changes, evolution of market shares, entry or exit.

³ See [Altomonte et al. \(2010\)](#) for a detailed discussion of the alternative econometric models to estimate mark-ups.

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