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The estimates presented reveal that the reductions in barriers to competition over recent decades have had a significant impact on the real exports of manufacturing firms, especially larger ones, as a result of greater competition in the supply of their inputs.

The results underline the fact that further improvements in the degree of competition may influence the competitiveness of the Spanish economy as a whole.

SERVICES REGULATION, INPUT PRICES AND EXPORTS

The author of this article is Mónica Correa-López, of the Associate Directorate General Economics and Research.¹

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Introduction

Since the 1990s the barriers to competition in certain services activities in the Spanish economy have been progressively lowered. The change in the regulatory framework has involved a substantial reduction in the effective barriers to entry for new firms, favouring more competitive market structures. As a result, Spanish regulation has moved closer to the best practice framework of the advanced economies (see Chart 1).²

Services activities have a significant influence on the ability of manufacturing firms to compete both in the domestic market and abroad. This is because services include activities with a high technological content, such as telecommunications and engineering services, which play an essential role in improving the efficiency of the industrial sector. Also, competitive strategies in industry based on product differentiation and quality improvement largely depend on the availability to firms of specialised services.

The empirical literature has tended to focus on analysing the effects of the deregulation of services on the major macroeconomic aggregates, such as growth, employment and inflation.³ More recently, however, some authors have attempted to quantify the economic impact of such reforms on the industrial base of OECD countries.⁴ Barone and Cingano (2011), for example, find that countries with a more competitive regulatory framework in the services sectors have higher growth rates of value added, productivity and exports in those manufacturing industries that make the most intensive use of services in their productive processes. This suggests that the regulation of the services sector may affect the pattern of specialisation and international trade in the advanced economies.

This article addresses precisely this question for the Spanish economy, from a disaggregated perspective, using firm-level data. The central hypothesis it seeks to verify is whether regulatory initiatives that increase competition, raising the number of competitors in the services market or reducing the power of suppliers in the negotiation of contracts, give rise to lower prices for the

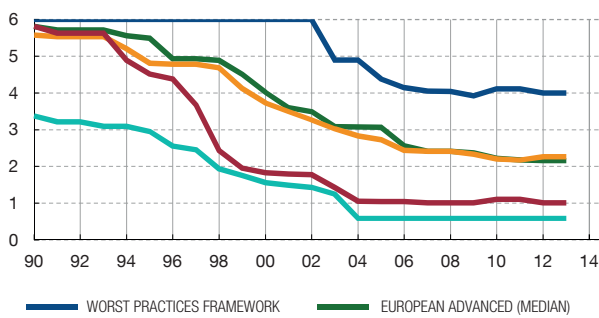
1 This article is a summary of the research carried out in Correa-López and Doménech (2017).

2 According to the OECD Product Market Regulation (PMR) indicators. This set of indicators quantifies de jure information on the regulatory environment for different market services in OECD countries. Direct quantification of competition in services (a de facto indicator) is less common in the literature. For further details, see Mora-Sanguinetti and Martínez-Matute (2014).

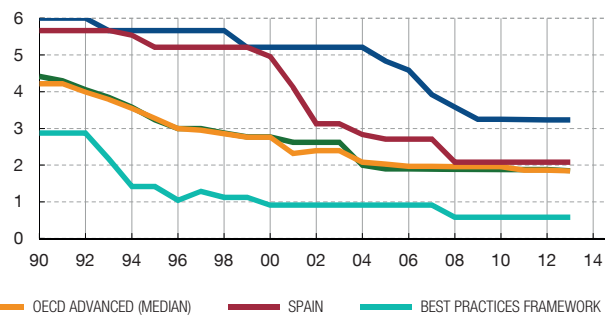
3 See, for example, Nicoletti and Scarpetta (2003), Griffith et al. (2007), Fiori et al. (2012) and Correa-López et al. (2014), among others.

4 See, for example, Barone and Cingano (2011) and Bourlès et al. (2013).

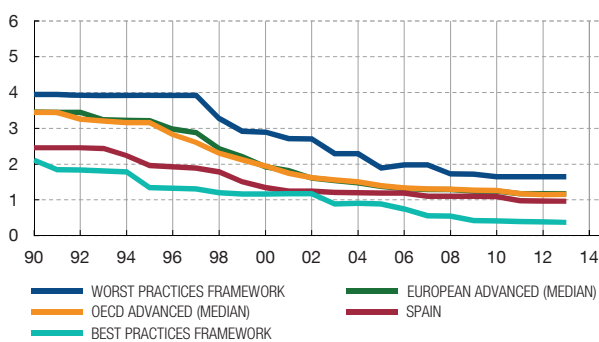
1 ENERGY: SPAIN AND STATISTICS OF ADVANCED COUNTRIES



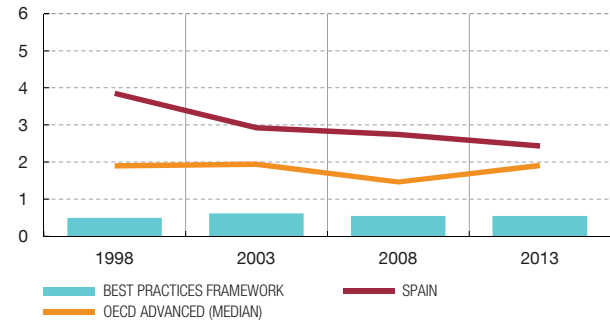
2 TRANSPORT: SPAIN AND STATISTICS OF ADVANCED COUNTRIES



3 COMMUNICATIONS: SPAIN AND STATISTICS OF ADVANCED COUNTRIES



4 PROFESSIONAL SERVICES AND RETAIL TRADE



SOURCE: OECD.

a The indicator takes values between 0 and 6, with lower values denoting more efficient functioning of the markets.

services purchased and, therefore, improve the competitiveness of the firms that use such services in their own productive processes. This mechanism may be especially important for firms that operate in the international market, where competitive demands tend to be higher.

Against this background, the empirical analysis presented in this article seeks to explore the impact of service sector reforms on the input prices and export volumes of manufacturing firms in Spain. The data used for this purpose are taken from the Business Strategies Survey for the period 1991-2007, the main characteristics of which are presented in the next section. The third section summarises the results of the estimation of an empirical model used to analyse the determinants of input prices, and the influence that regulation has on such model. Subsequently, the effect of regulatory reforms on the volume of exports is estimated, through the impact of the former on the cost of inputs. Finally, a simulation exercise is presented which, on the basis of the estimates made, offers a quantitative illustration of the extent to which such reforms may have contributed to the internationalisation of industrial firms and the benefits that may accrue from a regulatory framework more in line with best practice.

Database characteristics and construction of indicators of the impact of regulation

The study is based on an annual sample of 3,540 firms from ten manufacturing sectors, drawing on the data provided by the Business Strategies Survey (ESEE by its Spanish initials) conducted by Fundación SEPI. On average, the data panel has eight years' observations per firm over the period 1991-2007.⁵ Of the 29,137 observations, 8,980 correspond to large firms (more than 200 employees) and 20,157 to small and medium-sized firms (SMEs) with between ten and 200 employees.

⁵ It is, therefore, an unbalanced data panel.

Variable	Whole sample		Large firms		SMEs	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Real exports (a)	1,886,323	14	10,919,710	6	397,436	10
Export intensity (%) (b)	18.0	25.3	30.7	27.3	12.0	21.8
Total factor productivity	12.49	3.71	14.78	4.50	11.52	3.32
Real capital stock per employee (a)	20,304	3	37,967	2	14,979	3
Size (c)	76	5	461	2	32	2
Price of inputs (%) (d)	3.9	6.6	3.3	6.1	4.1	6.8
Market share in the main market (%)	12.3	20.3	20.3	22.9	8.7	17.9
Long-term debt to own funds (ratio)	2.7	299.6	0.6	12.8	3.7	364.6
Age (c)	17	3	26	2	14	2
Foreign share (%)	18.2	37.1	40.6	46.9	7.7	25.3

SOURCE: Banco de España calculations based on the ESEE of Fundación SEPI.

a In euro.

b Ratio of exports to total sales.

c Size is measured by number of employees and age is expressed in years.

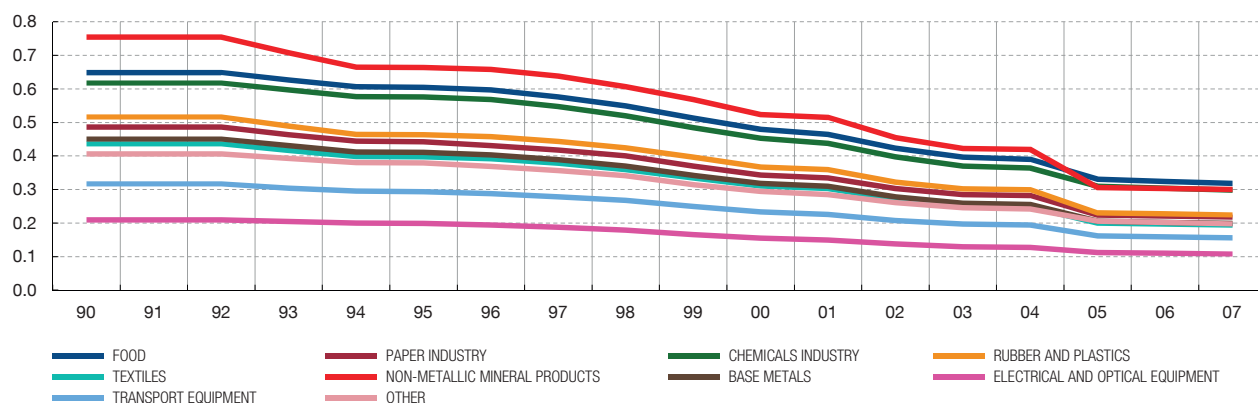
d The price of inputs includes the price of raw materials, components, energy and services, and is expressed as a rate of change.

Table 1 presents some of the main characteristics of these firms by size. It shows that compared to SMEs, large firms have higher real exports and higher export intensity, they are more efficient⁶ and more capital-intensive per employee, they are older and they have a lower level of long-term debt. Large firms also have higher market shares, lower input costs and a higher proportion of foreign capital in their ownership structure.

To analyse the impact of the regulation of services on firms' input costs and exports, an indicator was built, for each manufacturing sector, combining a measure of the restrictions on competition in the energy, transport, communications and professional services markets with an estimate of the level of dependence of each manufacturing sector on the output of those four services. Specifically, the quantification of the restrictions on competition in each of the services sectors was obtained from the OECD's indicators of Product Market Regulation (PMR) that take into account three aspects: barriers to entry, vertical integration and market conduct. For example, barriers to entry exist when there are limits on the number of market operators (telecommunications, postal services, airlines, among others) or when a licence system limits the capacity of an industry (for example, professional services).⁷ The measure of the level of direct dependence of each of the manufacturing industries on the services sectors is drawn from the coefficients of the harmonised input-output tables published by the OECD. In keeping with the previous literature, the coefficients used are those of the input-output table of the country with the fewest barriers to competition (in this case, the United States for the period 1975-2007). The aim is to proxy, insofar as possible, the level of technology dependence of each manufacturing industry on each services sector, and thus avoid endogeneity problems that could arise if the technical coefficients of the country analysed (in this case Spain) were used, influenced as they are by domestic economic policy.

6 In this context, business efficiency is measured by total factor productivity estimated at firm level. For details of the design of the variables, see Correa-López and Doménech (2017).

7 For a detailed description of the indicators, see www.oecd.org/economy/pmr and Conway and Nicoletti (2006).



SOURCE: Banco de España calculations based on OECD data.

a Higher values of the indicator denote a higher impact on manufactures of barriers to competition in the services sector.

Chart 2 illustrates the evolution of the indicator of regulation in the ten manufacturing sectors that make up the sample. As the chart shows, regulation of the services sectors, which changes over time, has an uneven impact on the main manufacturing industries, in keeping with the different levels of dependence on the services sectors.⁸ The widespread lowering of regulatory barriers that has taken place in the services sectors analysed has prompted a certain degree of convergence of the sectoral indicators of the impact of regulation.

Empirical analysis of the impact of services regulation on manufacturing firms

As a first step, the study analyses whether there is a link between regulation and input prices. To this end, based on the individual information of the firms making up the sample, an econometric model is estimated to investigate the effects of the changes in the regulatory framework of the services sector on the rate of change of input prices. The model controls for three additional sectoral factors. These are, firstly, the change in input prices for manufacturing sectors in the United States, to show how a firm's costs are affected by technological factors which are exogenous and common to all countries, such as the inclusion of new information technology in productive systems. Secondly, the real growth of world exports is used to proxy the impact of factors associated with the pressure of demand. The third factor is the change in the price of imported inputs, which shows the influence of external and domestic factors of relevance to Spanish industry, given its productive structure and dependence on global value chains, for example. The estimates also include a dichotomous variable which takes the value of 1 if the firm states that it is experiencing a downturn and zero otherwise, and which tries to proxy the firm's cyclical position, qualitative variables (dummies) indicating sector and year, and a fixed effect that captures unobserved heterogeneity at firm level. This empirical model is estimated by using fixed and random effects, allowing the different sources of data variability to be exploited.

The results presented in Table 2 show that there is a positive and significant relationship between changes in input prices and changes in regulation of the services sector. In particular, the coefficient obtained suggests that increasing the pace of deregulation in services

⁸ The food, non-metallic mineral products and chemicals industries have the highest levels of dependence on the services sectors (15.5%, 15.4% and 15%, of total inputs respectively), some three times more than the electrical and optical equipment industry which has the lowest level of dependence (5.4%).

Regressor	Dependent variable: change in price of inputs					
	Whole sample		Large firms		SMEs	
	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
Change in regulatory framework	0.184*** [0.040]	0.228*** [0.036]	0.258*** [0.073]	0.262*** [0.062]	0.181*** [0.053]	0.224*** [0.045]
Input price change in US manufacturing	0.261*** [0.036]	0.312*** [0.034]	0.369*** [0.063]	0.405*** [0.061]	0.217*** [0.044]	0.278*** [0.042]
World exports	0.014*** [0.006]	0.018*** [0.004]	0.022** [0.010]	0.022*** [0.006]	0.015** [0.007]	0.017*** [0.006]
Imports of inputs	0.001** [0.001]	0.001** [0.001]	0.002*** [0.001]	0.003*** [0.001]	0.000 [0.001]	0.000 [0.001]
Recession	-0.003** [0.001]	-0.002* [0.001]	-0.002 [0.002]	-0.002 [0.002]	-0.003** [0.001]	-0.002 [0.001]

SOURCE: Banco de España, based on the ESEE of Fundación SEPI.

a All specifications include a constant, and time and industry dummies. *** denotes statistical significance at the 1% level, ** at the 5% level and * at the 10% level, respectively. Figures in brackets are robust standard errors.

by one tenth reduces the cost of inputs by between 1.8 pp and 2.3 pp. Moreover, these effects are greater in large firms than in medium-sized firms. Small firms could possibly be at a disadvantage with respect to large firms when negotiating the best contract conditions with service providers.

As regards the other determinants, changes in the input prices of US manufactured goods, the real growth of world exports and changes in the price of imported inputs are positively and significantly associated with changes in the price of inputs used by Spanish firms. This highlights the importance of global and domestic factors relating to the supply and demand for inputs as determinants of the price borne by manufacturing firms in Spain.

Lastly, the results of the estimation suggest that the firm's cyclical position also affects the cost of its inputs. A firm in recession exerts downward pressure on inputs, because weak demand forces it to look for alternative, more cost-effective, suppliers or else to negotiate lower prices, although in this case the significance level of the coefficients is lower.

As a second step, the study analyses the importance of the cost channel through which barriers to competition influence the volume of exports at firm level. To this end, an initial estimation is carried out to analyse the effect on real exports of the previous year's sales, reflecting the importance of past export behaviour, and the price of inputs. Given its significance as a price determinant, the indicator of the impact of regulation is used as an exogenous instrument to assess its effect on the estimation. The model is then extended to include a range of firm characteristics, such as total factor productivity, capital intensity, size, market share, long-term debt ratio, the age of the firm and dichotomous qualitative variables that identify foreign multinationals and recessionary markets. Further, two sub-samples based on firm size are analysed, specifically, large firms and SMEs.⁹

⁹ It should be noted that various specifications are tested for each sub-sample, so that the explanatory variables ultimately included may differ depending on their theoretical and empirical significance.

Regressor	Dependent variable: logarithm of real exports					
	(1) Fixed effects	(2) System GMM	(3) System GMM	(4) Fixed effects	(5) System GMM	(6) System GMM
Log of exports (t-1)	0.397*** [0.056]	0.434*** [0.087]	0.541*** [0.102]	0.330*** [0.058]	0.338*** [0.085]	0.340*** [0.086]
Price of inputs (as log)	-0.119 [0.145]	-0.354** [0.181]	-0.568** [0.238]	-0.354** [0.165]	-0.720*** [0.243]	-0.822*** [0.265]
Instrumental variable (REG)	No	No	Yes	No	No	Yes
Additional regressors	No	No	No	Yes	Yes	Yes
Total factor productivity (as log)				0.727*** [0.117]	1.273*** [0.410]	1.248*** [0.380]
Size (as log)				0.529*** [0.074]	0.633* [0.365]	0.685* [0.360]
Real capital stock per employee (as log)				0.083 [0.056]	0.221 [0.204]	0.256 [0.190]
Market share (%)				-0.002** [0.001]	0.000 [0.003]	0.000 [0.003]
Long-term debt ratio				0.001 [0.001]	-0.004 [0.012]	-0.004 [0.014]
Age (as log)				-0.008 [0.022]	-0.083** [0.039]	-0.081** [0.038]
Multinational				-0.053 [0.086]	0.063 [0.062]	0.049 [0.060]

SOURCE: Banco de España, based on the ESEE of Fundación SEPI.

a All specifications include a constant, and time and industry dummies. *** denotes statistical significance at the 1% level, ** at the 5% level and * at the 10% level, respectively. Figures in brackets are robust standard errors.

Table 3 shows the model estimations for the sample of large firms.¹⁰ The results confirm that input prices have a significant negative effect on the export volumes of large manufacturing firms. The inclusion of the regulation indicator in the provision of services as an explanatory factor increases this effect.¹¹ Thus, the study identifies the presence of a transmission channel from the reforms in services to exports, operating through the input costs borne by firms. The simulation exercise at the end of this section illustrates and quantifies the importance of this channel. The direction of the impact of the remaining determinants is as expected and generally coincides with the results obtained in the previous literature. In addition to the importance of the persistence mechanisms, the results indicate that firm size and productivity, in particular, have a significant positive effect on the sales abroad of large manufacturing firms. According to the baseline results shown in column 6, a 1% rise in productivity is associated with an increase of 1.2% in exports, and a 1% increase in firm size translates into export growth

10 To begin with, the fixed effect estimator is used in the data panel. Then the model is estimated using the generalised method of moments (Arellano and Bover (1995) and Blundell and Bond (1998)), and the recommendations of Roodman (2009) are followed by restricting the number of lags used as instruments for each endogenous variable and collapsing the instrument matrix. Note that unless stated explicitly, the above-mentioned impacts are short term given the inclusion of the lagged endogenous variable.

11 This also improves the model's significance and exogeneity tests. For further details, see Correa-López and Doménech (2017).

Regressor	Dependent variable: logarithm of real exports					
	(1) Fixed effects	(2) System GMM	(3) System GMM	(4) Fixed effects	(5) System GMM	(6) System GMM
Log of exports (t-1)	0.482*** [0.027]	0.465*** [0.047]	0.480*** [0.047]	0.407*** [0.028]	0.352*** [0.064]	0.371*** [0.062]
Price of inputs (as log)	-0.152 [0.179]	-0.410* [0.235]	-0.578** [0.228]	-0.712*** [0.159]	-0.863* [0.442]	-0.859* [0.450]
Instrumental variable (REG)	No	No	Yes	No	No	Yes
Additional regressors	No	No	No	Yes	Yes	Yes
Total factor productivity (as log)				0.811*** [0.099]	2.081*** [0.708]	2.380*** [0.689]
Size (as log)				0.667*** [0.080]	0.989*** [0.226]	0.892*** [0.204]
Real capital stock per employee (as log)				0.106** [0.054]	0.292 [0.207]	0.246 [0.193]
Long-term debt ratio				0.007 [0.005]	0.010 [0.014]	0.007 [0.013]
Age (as log)				-0.019 [0.037]	-0.120** [0.056]	-0.114** [0.054]
Multinational				-0.129 [0.114]	-0.197 [0.169]	-0.190 [0.165]
Recession				-0.087*** [0.034]	0.784 [0.532]	1.076** [0.459]
Number of establishments				-0.173 [0.106]	-0.383*** [0.109]	-0.347*** [0.101]

SOURCE: Banco de España, based on the ESEE of Fundación SEPI.

a All specifications include a constant, and time and industry dummies. *** denotes statistical significance at the 1% level, ** at the 5% level and * at the 10% level, respectively. Figures in brackets are robust standard errors.

of 0.7%.¹² In contrast, there is a negative correlation between a firm's age and export activity, which could indicate that the expansion strategies of younger firms are focused on growth in foreign markets. Finally, capital intensity, market share, the ratio of long-term debt with financial institutions, and whether or not the firm is foreign-owned are not significant determinants of the volume of exports once the other factors have been taken into account.

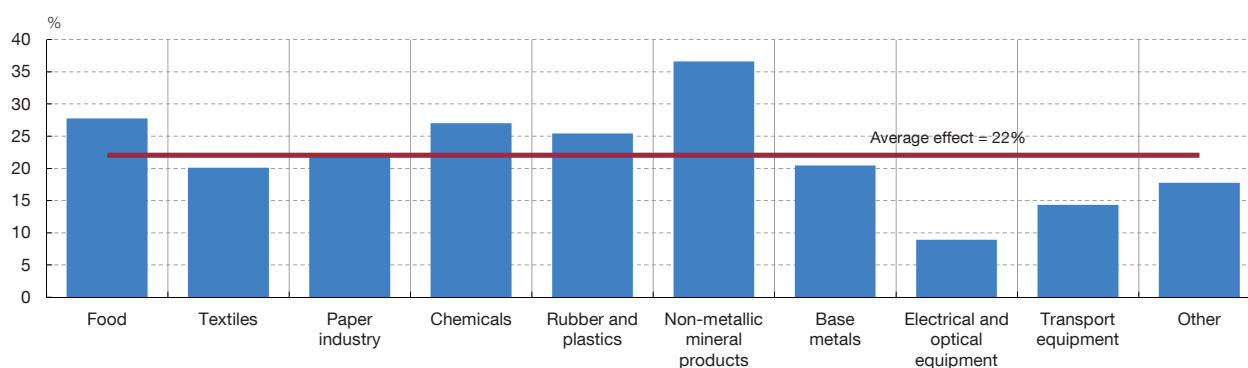
In the case of SMEs, the results shown in Table 4 confirm the significant negative effect of input prices on exports. However, the importance of the transmission channel for regulatory changes that operates through input costs is less evident from an empirical standpoint and is confined to the model in column 3.¹³ Although the reforms in the services sector tended to lower the input costs borne by SMEs, this may have been insufficient to clearly improve their presence in foreign markets during the period under study.

The estimates included in the table also show the importance of the firm's productivity and size as determinants of the export volume of SMEs, with elasticities of more than 2% and around

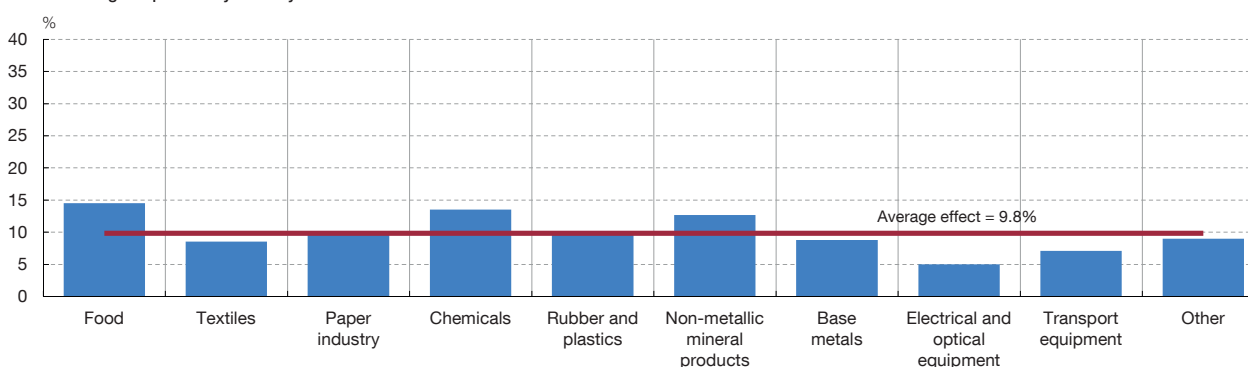
¹² See Martín et al. for an analysis of the determining factors behind the decision to export.

¹³ However, even with this model the exogeneity tests are significantly weaker than in the sub-sample of large firms.

1 EFFECT OF REFORMS IN THE REGULATORY FRAMEWORK OF THE SERVICES SECTOR COMPARED WITH A SCENARIO LACKING REFORMS, 1991-2007
Total change as percent by industry



2 EFFECT OF CONVERGENCE TOWARDS THE BEST PRACTICES FRAMEWORK, 1991-2007
Total change as percent by industry



SOURCE: Banco de España calculations based on the ESEE of Fundación SEPI.

1%, respectively, as the estimation in column 6 shows. In addition, the results suggest a positive association between exports and operating in a recessionary domestic market, and a negative one between exports and the number of industrial establishments. The latter result could reflect, among other factors, the presence of an expansion strategy which favours accessing the domestic market over scaling up and seeking to access the foreign market. As with large firms, a negative correlation between the firm's age and the volume of exports is observed.

To gauge the approximate magnitude of the estimated effects and the importance of the identified transmission channel, a simulation exercise is carried out to try to proxy the impact of the changes in the regulatory framework of the services sector on the exports of large firms (see Chart 3). To this end, the empirical model of large firms shown in column 6 of Table 3 is taken as the baseline and, in line with such model, the long-term elasticity of exports to the price of inputs is considered to be 1.25%. The simulation exercise confirms that the improved regulatory practices in services activities had a strong impact on the input prices faced by firms, which would have increased by 17.7% more had there been no such improvement between 1991 and 2007. According to these estimates, better regulation enabled large Spanish industrial firms to increase their real exports of goods by a total of around 22% over this period, compared with a hypothetical scenario of no reforms. Moreover, had regulation moved closer to the best practice framework in 2007,¹⁴ the export volume of large firms would have been 9.8% higher than it actually was (see Chart 3).

¹⁴ The best practices framework reflects average regulation in the three OECD countries whose regulatory framework is most conducive to competition.

Conclusions

The economic literature has recently investigated the positive effects of greater competition on employment, productivity, inflation and growth, but many of the economic implications of a regulatory framework conducive to competition among firms have still to be assessed. This article has made progress in quantifying the consequences for Spanish manufacturing of reducing barriers to competition in the services sector. The estimates, based on firm-level data, suggest that the effects of such deregulation are positive, potentially large and vary according to firm size. Specifically, larger firms significantly increased their real exports in response to improvements in the regulatory framework in the final decade of the last century and the early years of the current one, while in the case of small and medium-sized firms the effect was smaller.

There is still room for improvement in the regulatory environment of services markets in Spain, especially in certain activities. For example, in 2013, of the 23 most advanced OECD economies¹⁵ Spain was still only fifteenth in the overall Product Market Regulation ranking produced by this organisation. In consequence, further progress in the convergence of competition with the most advanced countries in segments such as professional services and transport may have a considerable impact on the competitiveness of manufacturing firms and their exports.

16.2.2017.

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15 The Netherlands came first in the regulatory environment ranking and the United Kingdom second. See also Mora-Sanguinetti and Martínez-Matute (2014).