Competitive pressure and economic integration: An illustration for Spain, 1983-1996

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Abstract

This paper estimates sectoral mark-ups in the Spanish economy during the period 1983-1996. The data consists of a large firm level data set that encompasses all sectors of economic activity apart from financial institutions. The time period considered is well suited to assess the pro-competitive effect of economic integration, as Spain's economy became fully integrated in the EU, which was itself embarking on a massive liberalisation exercise. I find that sectors most exposed to international competition witnessed a significant drop in margins, while those more sheltered from competitive pressures did not. Finally, comparing estimated mark-ups to accounting margins indicates that the latter are a reasonable proxy for margins obtained econometrically.

JEL classification: L13; L4; L6.

Keywords: Mark-ups; Economic Integration; Instrumental Variables; GMM.

1. Introduction

An idea often put forward is that, compared to traditional Vinerian effects, the principal outcome stemming from the removal of trade barriers is to sharpen competitive pressure (see, among others, Baldwin *et al.* (1992), Allen, Gasiorek, and

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Smith (1998)). Under conditions of imperfect competition, reductions in trade barriers can sharply increase competitive pressures, which in turn have the potential to generate substantial welfare gains (Baldwin and Venables (1995)). As stressed by Levinsohn (1993), the theory of international trade -almost- unambiguously indicates that trade liberalisation increases competitiveness on the domestic market.

Spain's recent experience represents an interesting case of liberalisation triggered by economic integration. In the early 1980's, the country was still in the midst of its political transition to democracy, and the economy had not yet been freed from the corporatist and interventionist policies of the previous regime. Shortly after, in 1986, the country joined the European Union (EU). This led to the progressive opening of the Spanish economy. In parallel, EU membership triggered a wave of domestic liberalisation meant to bring the Spanish economy into the European mainstream. Moreover, entry into the EU coincided with the most important liberalisation exercise in Europe since the 1960's, namely the implementation of the Single Market Programme (SMP). From that perspective Spain's experience represents an interesting "natural experiment" of policy induced changes in competitive conditions.

The identification and analysis of industry mark-ups has evolved over time. Starting with the cross-section focus of the structure-conduct-performance (SCP) paradigm, research in "new empirical industrial organisation" has moved towards the time-series analysis of market power in single or closely related industries (Bresnahan (1989)). A third avenue to estimate mark-ups across industries has been pioneered by Hall (1986). By using the properties of the Solow residual under perfect competition, Hall derived an empirical specification that permits retrieval of industry-wide price to marginal cost ratios. His contribution gave birth to an extensive macro literature regarding the influence of market imperfections on macroeconomic fluctuations (see Jun (1998) for a review). While most of the macro-oriented papers make use of 2-digit industry level data, Domowitz, Hubbard and Petersen (1988) extend Hall's framework by including intermediate consumption, and their results are obtained at a much finer level of aggregation (4-digit industries). That paper has helped to bridge the gap between macro and micro studies of mark-ups.

Changes in competitive pressures stemming from the removal of tariff and non-tariff barriers (NTBs) have been extensively analysed (EU Commission (1996), Baldwin and Venables (1995)). For instance, the ex-post study of the European single market programme of Allen *et al.* (1998) adopts a computable general equilibrium approach based on imperfect competition and increasing returns to scale. A more direct alternative consists in estimating industry mark-ups, and assessing whether the latter have been altered as a result of economic integration. Levinsohn (1993) develops an oligopoly model, and estimates it with firm level data to gauge the impact on mark-ups of Turkey's trade liberalisation programme implemented during the 1980's.

Bottasso and Sembenelli (2001) follow that line, and apply an adapted version of Hall (1986) to Italian firm-level data to assess the impact of the EU's SMP on mark-ups. They find that firms that belonged to sectors deemed to be "sensitive" experienced a drop in their price cost margins following the launch of the SMP. In a similar vein, Konings, Van Cayseele, and Warzynski (2001) attempt to identify the effect of competition policy and import penetration on mark-ups in Belgium and the Netherlands. This is the approach I adopt in this paper: I estimate industry mark-ups, and try to identify changes in competitive conditions following Spain's entry into the EU.

I use an extensive survey of firms carried by the Bank of Spain since 1983, gathered in the database *Central de Balances*. The data collected is comprehensive. Each annual cross-section exceeds three thousand observations, and it covers all sectors of economic activity (except for financial institutions). Working with such a data set permits a proper treatment of endogeneity and firm-level fixed effects. Moreover, the broad sectorial coverage allows for a natural distinction between sectors that are more or less exposed to the presumed increase in competition that occurred during the sample period. Overall, the data permits me to shed some light on the evolution of competition dynamics.

As a first step, I estimate sectorial mark-ups for the period 1983-1996 using two distinct methodologies that differ in terms of data requirements. This initial exercise is motivated by methodological concerns regarding endogeneity. The analysis is then extended in two directions. I also make use of accounting margins, and it emerges that the latter are surprisingly good proxies for mark-ups that are econometrically estimated. Second, the data permit the identification of a structural break in the behaviour of mark-ups. The main results are that firms most exposed to increased competition following EU accession experienced a drop in mark-ups, while firms in more sheltered sectors did not. Note that this paper does not attempt to identify the source of positive mark-ups. The focus is on quantifying firms' ability to price above marginal costs, and on evaluating the effect of economic integration on the behaviour of industry mark-ups.

The paper is organised as follows. Section 2 motivates the exercise by briefly reviewing Spain's experience. Section 3 presents the empirical specification, while section 4 describes the data set. Section 5 provides econometric estimates of mark-ups obtained through different estimation techniques. This section also compares accounting margins to the econometric estimates. Section 6 identifies a structural break in the behaviour of margins that coincides with Spain's entry in the EU. Section 7 concludes.

2. Competitive conditions in Spain, 1983-1996

In 1983, Spain was emerging from its political transition, and with it, the previous statist/corporatist economic system was being progressively dismantled. The exercise of labour's rights put many firms under strain,[1] and a number of sectors experienced serious adjustment problems. By 1985, Spain had signed its accession agreement with the EU, and became a full member in 1986. In addition, Spanish entry coincided with the most important liberalisation exercise in Europe since the 1960's, namely the implementation of the SMP. The latter consisted in the removal of the remaining 300 or so non-tariff barriers (NTBs) that still existed in the EU (see Buigues *et al.* (1990) for a detailed analysis). A foreign direct investment boom during the late 1980's increased domestic competition to a degree hitherto unknown. As a result of accession, Spain adopted EU legislation (the *acquis communautaire)*, which led to the liberalisation of many economic activities. A competition tribunal was set-up in 1989 to apply the legislation adopted to protect competitive conditions in the domestic market.[2] The Spanish economy was thus subjected to a positive supply shock that originated from three contemporaneous and interrelated sources: domestic reform, EU accession, and the SMP.

While there is a priori evidence that the economy was subjected to a competitive shock, measuring its extent is marred by practical difficulties. The first consists in the fact that relevant variables are unobservable or poorly measured. Second, the change in competitive conditions may have been fairly uneven across economic activities. Sectors that were already exposed to international compe-

[1] Until the late 1970's, many firms had survived because labour costs had been kept down by suppressing workers rights. Once the right to free trade unions were recognised, many firms went bust because they could not operate profitably with higher labour costs.

[2] The Competition Law in Spain is modelled on the relevant articles of the Treaty of Rome and the related secondary legislation. Spanish competition law applies European rules to domestic competition cases.

tition may have experienced little change following accession, while others may have remained sheltered even after entry. Related to this point is the possible existence of "knock-on" effects: activities not directly exposed to international competition may also experience an increase in competitive pressures. Third, the effect of integration may have been dwarfed by the restructuring that took place during the 1980's and early 1990's, at least in some cases. Fourth, EU accession for Spain involved bilateral liberalisation, which led to increased import competition, but also better access to markets that were hitherto protected. Under such circumstances, the effect on mark-ups is ambiguous and has to be determined empirically.

3. Empirical specification

The derivation of the empirical specification is based on Hall (1986, 1988) and the extension proposed by Domowitz *et al.* (1988). A detailed exposition can be found in Martin (2002). For expositional simplicity, time, industry, and firm indices are dropped for the time being. Let the production function be of the form:

$$Q = \Theta F(.) \tag{1}$$

where Θ denotes technological progress, and the arguments of $F(.)$ are the inputs used in production. Suppose that (1) is represented by a constant returns to scale Cobb-Douglas production function, with three inputs: labour (L), materials (M), and capital (K). The latter, which depreciates over time, is chosen before the realisation of demand (assumed to be stochastic). Once demand is realised, firms can purchase any quantity of labour and materials in competitive factor markets.[3] Let w and p_m denote the competitive wage rate and the price of materials, and r the service cost of new capital. Thus, profit maximisation involves choosing the labour and material inputs once demand has been realised.

A variation in costs, denoted ΔC, can be expressed as:

$$\Delta C = w\Delta L + p_M \Delta M + r\Delta K \tag{2}$$

where Δ is the difference operator. Thus, marginal cost can be expressed as:

[3] As pointed out by Klette (1999), this is consistent with a situation in which firms and workers bargain over the wage rate, but where firms can impose the number of hours to be worked.

$$c = \frac{w\Delta L + p_M \Delta M + r\Delta K}{\Delta Q - \vartheta Q} \tag{3}$$

where ϑ is the rate of Hicks-neutral technological progress, i.e. $\Delta Q - \vartheta Q$ measures the increase in output that results from using extra inputs in the absence of technical progress. After dividing both sides by Q, and re-arranging terms, we obtain:

$$\frac{\Delta Q}{Q} = \frac{p}{c}\frac{wL}{pQ}\frac{\Delta L}{L} + \frac{p}{c}\frac{p_M M}{pQ}\frac{\Delta M}{M} + \frac{p}{c}\frac{rK}{pQ}\frac{\Delta K}{K} + \vartheta \tag{4}$$

where p is the output's market price. Under the maintained assumption of constant returns to scale, cost shares sum to one, so that we have:

$$\frac{rK}{cQ} = 1 - \frac{wL}{cQ} - \frac{p_M M}{cQ} \tag{5}$$

By multiplying (5) by $\frac{\Delta K}{K}$, substituting it in (4), we obtain:

$$\frac{\Delta Q}{Q} - \frac{\Delta K}{K} = \frac{p}{c}\frac{wL}{pQ}\left(\frac{\Delta L}{L} - \frac{\Delta K}{K}\right) + \frac{p}{c}\frac{p_M M}{pQ}\left(\frac{\Delta M}{M} - \frac{\Delta K}{K}\right) + \vartheta \tag{6}$$

Let s^L and s^M denote the labour and material shares in revenue (i.e. $s^L = \frac{wL}{pQ}$ and $s^M = \frac{p_M M}{pQ}$). To simplify notation, let $q = \log\left(\frac{Q}{K}\right)$, $l = \log\left(\frac{L}{K}\right)$, and $m = \log\left(\frac{M}{K}\right)$. (6) transforms into:

$$\Delta q = \frac{p}{c}\left(s^L \Delta l + s^M \Delta m\right) + \vartheta \tag{7}$$

Let δ denote the Lerner index, that is $\delta = \frac{p-c}{p} = (1 - \frac{1}{p/c})$. The expression above can be written as:

$$\Delta q - s^L \Delta l - s^M \Delta m = (1-\delta)\vartheta + \delta \Delta q \tag{8}$$

where the left hand-side represents the Solow residual. The last step necessary to obtain an equation that can be empirically estimated involves specifying technological progress. Let t stand for time, and j and i index industries and firms respectively. I assume that $\vartheta_{i,j,t}$ can be expressed as:

$$\vartheta_{i,j,t} = \sum_{j=1}^{J} \vartheta_j d_j + \sum_{t=1}^{T} \vartheta_t d_t + \Delta u_{i,j,t} \tag{9}$$

where ϑ_j denotes the component of Hicks-neutral technological progress common to all firms in industry j, ϑ_t is the component that represents a time specific productivity shock common to all firms (irrespective of the sector), and the d's stand for industry and time dummies. Finally, $u_{i,j,t}$ is assumed to be a serially uncorrelated measurement error with mean zero in the *levels* equation. This implies that $\Delta u_{i,j,t}$ follows an $MA(1)$ autoregressive process. Importantly, the use of first differences ensures that any firm-specific fixed effect that may be related to productivity in the levels equations is eliminated. Thus, an equation that can be empirically estimated is:

$$\begin{aligned} \Delta q_{i,j,t} - s^L_{i,j,t}\Delta l_{i,j,t} - s^M_{i,j,t}\Delta m_{i,j,t} &= (1-\delta_j)(\sum_{j=1}^{J}\vartheta_j d_j + \sum_{t=1}^{T}\vartheta_t d_t) + \\ &\quad \delta_j \Delta q_{i,j,t} + (1-\delta_j)\Delta u_{i,j,t} \end{aligned} \quad (10)$$

This equation is similar to that estimated by Domowitz *et al.* (1988). The main difference lies in the fact that I use firm level data, while their results pertain to four-digit industries. The formulation of (10) exploits the fact that in the presence of mark-ups, a factor's share in costs is equal to its share in revenue times the price to marginal cost ratio. As shown by Konings *et al.* (2001), it is possible to give a structural interpretation to (10). The latter, which has been obtained from production theory, is consistent with the structural framework developed by Levinsohn (1993).[4]

4. The data

The data, which consists of an unbalanced panel, comes directly from the raw files of *Central de Balances*, a yearly survey carried out by the Bank of Spain. The original files contain more than ninety-one thousand observations (with one observation corresponding to data pertaining to one firm in a given year). The data is annual, for the time period 1983-1996. Given sample size, it is possible to impose strict filters, aimed at eliminating dubious observations (replies), or questionnaires for which some of the essential data is missing. The filters that are applied are described in the appendix. The latter are those typically used by researchers familiar with *Central de Balances* (see, for instance, Hernando and Vallés (1994)).

[4]See Konings *et al.* (2001, pp. 856-857) for a derivation of (10) based on Levinsohn (1993).

The final sample is about half the original size, and consists of 39926 observations. This panel is unbalanced in the time dimension, given that some firms do not report in all years. Each firm is classified according to its sectorial activity. This affiliation ranges from broad 2-digit sectors (26 for the whole economy), intermediate (82 sectors, 3-digit), to very fine (more than 400 sectors, 4-digit). Subject to the number of observations available, it is thus possible to work at very different levels of aggregation.

Given the large number of short term (or temporary) contracts in Spain, the questionnaires report the number of employees on long term and short term contracts separately. Firms also report the average number of weeks that employees on short term contracts have worked during the year. Thus, it is possible to construct the labour input in full time equivalents (the variable L).

Output is measured as gross output (i.e., including intermediate consumption).[5] The labour share in revenue (s^L) is obtained as the ratio of total labour costs to gross output. Total labour costs are made up of wage costs as well contributions to social security and pension funds. The share of materials in revenue (s^M) is measured as the value of net intermediate purchases on gross output. Given the assumption of constant returns to scale, capital's share is then obtained as a residual ($1 - s^L - s^M$).

As is often the case, construction of the capital stock proved the trickiest issue. In the survey, firms report their level of fixed assets, gross investment, and depreciation allowance, for each year. In addition, the Bank of Spain computes annual fixed capital formation (net of depreciation) for each firm, using the raw data. The capital stock was constructed as follows: the level of fixed assets reported by the firm in the first year available was taken to be the true value of capital stock in that year (see Hernando and Vallés (1994) for a discussion). That initial capital stock was then expanded using the series constructed by the Bank of Spain.

It is well known that firms may have distorted incentives (e.g. tax) to report the true value of their capital stock, so that the initial estimate may be a biased one. In addition, the initial value of the stock is reported using historical costs. This is problematic, as it introduces a positive bias in the computation of the growth rate of the capital stock.

Bearing this caveat in mind, the estimates obtained make sense. First, the survey carried out by the Bank of Spain is extremely detailed (so that cross-

[5] As shown by Hall (1988, p. 927) and Domowitz *et al.* (1988, p. 56) this is a better measure when data on intermediate consumption is available.

referencing is possible), thus minimising the risk of gross mis-reporting. Second, these surveys are confidential, and not made available to tax authorities. Third, it is possible to compute an implicit depreciation rate (and thus expected lifetime of an investment). The resulting estimates are quite sensible not only at the aggregate level (all sectors, or broad sectors), but also at the disaggregated level. On average, depreciation is estimated to be between 5% and 10% per year, well in line with what is found in the literature. Moreover, when a closer look is taken at the sectorial data, that initial impression is confirmed.[6]

All variables have been deflated using aggregate (economy-wide) deflators, taken from the *Boletín Estadístico* published by the Bank of Spain. The value-added deflator has been applied to output (to obtain Q), and capital has been deflated using the deflator for machinery and equipment (to obtain K). Net purchases of intermediate goods has been adjusted using the deflator for intermediate consumption (to obtain M). Finally, the capital input has been adjusted by an aggregate indicator of capacity utilisation.[7]

5. Empirical estimates of sectorial mark-ups

The specification of (10) implies that the error term is pre-multiplied by a sector specific constant $(1 - \delta_j)$ which is itself estimated. When the estimation involves more than one sector, this may generate heteroskedasticity. In order to ensure that heteroskedasticity does not affect statistical inference, all results reported below are obtained with White's (1980) proposed covariance matrix. The latter ensures that the results are robust to heteroskedasticity, irrespective of its form.[8] In addition, the use of first differences introduces a specific form of serial correlation of the error term (since $\Delta u_{i,j,t}$ follows an $MA(1)$ autoregressive process). This

[6] That is, sectoral depreciation rates are in line with priors. For instance, depreciation is estimated at 20.2% for business machines (computers) and 18.13% for aerospace equipment. By contrast, depreciation for railway services stands at 2.6%, that of ancillary port and airport services at 2.9%, and that of electricity production and distribution at 4.8%. In between, depreciation for electro-domestic apparatus stands at 7.7%.

[7] Data on electricity consumption by firm would provide a much more accurate indicator of capacity utilisation. Unfortunately, no such data is available.

[8] The possible presence of heteroskedasticity due to the product of $1 - \delta_j$ and the differenced error can also be dealt with by providing an alternative specification for (10).

By substracting $\left(s^L \Delta l_{i,j,t} + s^M \Delta m_{i,j,t}\right)$ on both sides of (7), and specifying technological progress as in (9), one obtains:

serial correlation can be accommodated by using an appropriate set of lags of the predetermined variables.[9] In addition, the Sargan tests presented below can be interpreted as a test for the validity of the instruments used.

The set of estimates presented below provide some basic information pertaining to mark-ups in the Spanish economy. The Solow residual (the left hand-side of (10)) has been computed with time-varying revenue shares.[10] As a first step, I assume that, within sectors, mark-ups are constant through time, and estimate sectorial Lerner indices.[11]

5.1. Generalised Method of Moments (GMM) estimates (2-digit)

In industries that depart from perfect competition, output prices are no longer exogenous to the model. To address the issue of endogeneity, the generalised method of moments (GMM) proposed by Arellano and Bond (1991) has been applied to the data. The GMM procedure is specifically designed to be used with panels, and it easily allows for a general mispecification test. This procedure fully exploits all orthogonality conditions (i.e., two-stage least squares -TSLS- are a special case of GMMs). This method also permits the introduction of time dummies to approximate a composite of annual TFP growth (the first term on the right-hand side of (10)). The drawback is that a large number of consecutive observations is necessary to obtain precise estimates, thus greatly reducing sample size. Therefore, GMM can only be applied at the 26-sector breakdown.[12] All GMM results were estimated with DPD, a software made freely available by Arellano and Bond.

The estimations (denoted "GMM") are obtained by using three, four, and five

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$$\Delta q_{i,j,t} - s^L_{i,j,t}\Delta l_{i,j,t} - s^M_{i,j,t}\Delta m_{i,j,t} = (\sum_{j=1}^{J}\vartheta_j d_j + \sum_{t=1}^{T}\vartheta_t d_t) + \quad (10')$$
$$(\frac{p}{c} - 1)\ \left(s^L\Delta l_{i,j,t} + s^M\Delta m_{i,j,t}\right) + \Delta u_{i,j,t}$$

from which it is also possible to retrieve an estimate of industry level Lerner indices. I have estimated (10'), and the results are almost identical to those obtained with (10).

[9] Clearly, the problem does not arise with strictly exogenous variables.

[10] A Thörnqvist (1936) approximation has been used for the change in shares.

[11] When equation (10) is estimated at the level of sectors, $\vartheta_j d_j$ as well as the subindices j disappear from (10).

[12] For sectors that contain enough observations, I applied GMMs at a lower of aggregation. The results are very similar.

period lags of the regressor as instruments. The results, presented in the second column of Table 1, pertain to one-step estimates.[13]

Insert Table 1 about here

The coefficient measuring the Lerner index is estimated very precisely (most estimates of δ_j are significant at the 0.01% levels). Second, almost all sectorial estimations safely pass the stringent statistical tests associated with GMMs (Wald, Sargan, and 1st and 2nd order autocorrelations). Third, the time dummies (not reported in the Table) point to a slowdown in TFP growth during the second half of the time period.[14] This result is in line with other findings regarding the reduction of catch-up opportunities in Spanish economy (de la Fuente 1995), and is corroborated by another study using micro data (Martín and Jaumandreu (1999)). Finally, the order of magnitudes for the Lerner index are reasonable, and a closer look at the sectorial distribution is in line with priors. For instance, mark-ups are quite high in extractive and paper/publishing industries compared to, say, the shoe and leather industry. Also, mark-ups appear to be consistently higher in service industries and utilities (two-digit sectors # 17 to 21, & 24 to 26) compared to manufacturing (sectors # 3 to 16).

5.2. Two-stage least square estimates (3-digit TSLS)

The advantage of applying TSLS is that sample size is not reduced by the use of long lags, so that it is possible to work at a lower level of aggregation. The drawback is that it requires a valid set of instruments that are sometimes hard to obtain. Fortunately, working with firm level data makes it is somewhat easier to construct instruments. Konings *et al.* (2001) use the growth rate of output at the at the 2-digit level minus the growth rate of the capital stock at the firm level. An alternative they propose is the 2-digit growth rate of the capital stock minus the firm's capital stock growth. This may be viewed as the net effect of exogenous (demand driven) factors on firms' input choices. A potential drawback of such an instrument is that a firm may be large enough to influence growth at the two-digit level. To alleviate this issue, the instruments I use are the difference between aggregate GDP growth and the growth rate of the capital stock at the

[13] Arellano and Bond (1991) warn against using two-step estimates for the purpose of statistical inference, as standard errors are "abnormally low" for the two-step estimates.

[14] The time dummies are the empirical counterparts of the first term in (10).

firm level, both current and lagged. Clearly no single firm in my sample is large enough to affect aggregate growth.

Still, in order to check the validity of the instruments, I re-estimated (10) at the 26-sectors disaggregation with DPD, but using the GDP instruments (current and lagged) instead of the lagged levels of the regressors. The estimates confirmed that the GDP instruments were valid (the Sargan tests and the autocorrelation structure of the errors proved satisfactory). Moreover, the estimates obtained with the distinct instruments are very similar (in absolute value), and the correlation between the two sets of estimated mark-ups stands at 0.68.

The next set of results pertain to TSLS 3-digit estimates, and are presented in the second column of Table 2. Since there may exist nonlinearities (for instance, through the revenue shares), I also introduced the square of the current and lagged instruments.[15] All estimations include annual time dummies and have been corrected for heteroskedasticity through the use of White's (1980) proposed covariance matrix.

Insert Table 2 about here

The estimates confirm the earlier findings of positive mark-ups. Again, the precision is generally quite high, and the magnitude of estimated mark-ups is consistent with priors. For instance, "other non-metallic mineral products" enjoys high mark-ups compared to the rest of manufacturing. This sector comprises cement and concrete production, two activities characterised by high fixed costs and a concentrated market structure. The dichotomy between manufacturing and services persists, with the latter displaying higher mark-ups. As for the time dummies, they are jointly significant, at least for some 3-digit sectors. In the latter cases, they confirm the previous finding of declining TFP growth.

5.3. Accounting margins

The results presented above are consistent, both across the level of aggregation and estimation procedure. An additional source of information are accounting margins. The limitations of this measure has been extensively discussed (Bresnahan (1989)), and there is no point re-iterating them here. Nevertheless, recent empirical work suggests that accounting margins may still provide some useful information (see Martin (2002) for an extensive discussion of this issue). Given that my sample covers fourteen years, the estimates are not prone to large biases

[15] I am grateful to a referee for making this suggestion.

due to the business cycle or one-off events. Second, I can compare accounting margins (once they have been averaged over the entire period) to the ones obtained through the estimation of (10). In that way, I am able to assess whether accounting margins are really such a flawed measure. In the event that they are not, accounting margins provide an additional piece of information.

To get an accounting estimate of price cost margins, I apply the methodology proposed by Domowitz, Hubbard and Petersen (1986). The accounting price-cost margin for firm i and time t is defined as:

$$\left(\frac{p-c}{p}\right)_{i,\,t} = \left(\frac{\text{Value of sales} + \Delta\text{ inventories} - \text{payroll} - \text{cost of materials}}{\text{Value of sales} + \Delta\text{ inventories}}\right)_{i,\,t}, \tag{11}$$

where Δ stands for "changes in". The inclusion of inventory changes ensures that adjustment for business cycle fluctuations is controlled for in the measure of price cost margins. According to the accounting definitions adopted in the *Central de Balances* survey, this is equivalent to:

$$\left(\frac{p-c}{p}\right)_{i,\,t} = \left(\frac{\text{Value added} - \text{payroll}}{\text{Value added} + \text{net cost of materials}}\right)_{i,\,t} \tag{12}$$

The 2 and 3-digit sectorial averages for the entire period are presented in the third columns of Table 1 and Table 2 respectively. The correlation between estimated mark-ups and accounting margins are provided at the bottom of Tables 1 and 2. As can be readily seen in, the correlations between the series are quite high. Further, these accounting mark-ups confirm that there are important differences across broad sectors. The average for the entire period stands at 0.31 for mining (344 observations), 0.16 for agriculture and related activities (460 observations), 0.15 for manufacturing (22530 observations), and 0.24 (15113 observations) in the case of services and utilities. The high figure for mining is at best indicative, as this industry is heavily regulated and subsidised, and the number of observations is relatively small. By contrast, the dichotomy between manufacturing and services seems structural. A closer examination at the 3-digit level of sectors reveals that accounting margins are higher in services.

The main difference between estimated mark-ups and accounting margins is one of magnitude, the later typically taking lower values. However, accounting margins appear to do a good job of ranking the different sectors in terms of firms' pricing above marginal cost.

6. Quantifying the pro-competitive effect of economic integration

A constellation of events suggest that Spain was subjected to a pro-competitive shock during the late 1980's. In practice, measuring the intensity of competition, and changes thereof, is complicated. Cyclical factors as well changes in the population of firms via entry and exit processes will have affected industry mark-ups. Indirect measures of competitive pressure, such as the import penetration ratio, may be appropriate in the case of unilateral trade liberalisation, but are of limited use in the case of EU accession. For instance, in an industry where trade diversion occurs, margins may well increase as a result of economic integration. Furthermore, imports may remain unchanged if firms react to the *threat* of foreign competition by lowering their prices. Moral and Jaumandreu (2000) provide empirical evidence suggesting that this is what occurred in the Spanish automobile sector. Import penetration is also of limited use in sectors not directly affected by a relaxation of barriers to trade, that is non-tradeables.

Furthermore, variables that are known to influence mark-ups, such as fixed costs and/or concentration are either not available or imprecisely measured. At best, I can construct a proxy for concentration, since I only have sub-sample of the true population of firms.[16] A simple correlation exercise between concentration (measured by a Hirschman-Herfindahl index (HHI) for my sample) and estimated mark-ups and accounting margins yields satisfactory results. At the 2 digit level, the correlation between the HHI and estimated mark-ups stands at 0.53, and between accounting margins and the HHI, at 0.64.[17]

Trade liberalisation expands the relevant market, as imports increase the competitive pressure they exert on domestic firms. Following Waterson (1984), the HHI can be modified to take into account imports. The adjusted HHI is obtained with the following formula:

$$AHHI_{j,t} = HHI_{j,t}(1 - \frac{IMP}{Q})_{j,t} \ ,$$

where IMP and Q respectively stand for imports and output measured at the

[16] Even assuming that I can measure true concentration, the latter's relationship with mark-ups varies across sectors, and may be non-linear.

[17] For the manufacturing sector, a simple heteroskedastic-robust OLS regression of accounting margins on concentration (HHI), GDP growth and its lag, and a set of 3-digit industry dummies, yields a significantly positive coefficient for industry concentration. The same result obtains for services and utilities.

sectorial level. I can only construct this variable for a subsample of manufacturing for which data on trade flows is available. A couple of simple heteroskedastic-robust OLS regressions provides some preliminary evidence. Regressing accounting margins on a time-trend, GDP growth and its lag, 3-digit industry dummies, and $AHHI_{j,t}$ yields consistent results: the adjusted concentration index is significantly positive, and the time trend is negative and significant. The second set of results involves regressing $AHHI_{j,t}$ against a trend, industry dummies, and the GDP variables. The time trend is strongly negative, indicating that in manufacturing, concentration adjusted for imports fell during the time period under consideration.[18] These preliminary findings are not inconsistent with the conjecture that Spain's entry into the EU led to an increase in competitive pressure. They should however by viewed as what they are: a purely descriptive exercise.

The results presented below attempt to go further by directly measuring changes in mark-ups. Under imperfect competition, a narrowing of mark-ups is one of the few robust predictions regarding the effect of successful economic integration (Martin (2001, Chap. 10)). A practical difficulty lies in the fact that mark-ups are "small" in any reasonably competitive economy, and are influenced by a variety of factors that are not necessarily related to competition.[19] Furthermore, mark-ups cannot fall below some industry specific positive value, as this would lead to bankruptcy and subsequent exit. Consequently, identifying a significant structural break in their behaviour is difficult.

Spanish entry into the EU occurred in the second half of the 1980's as did the implementation of domestic economic reforms and the launch of the EU's single market programme. Choosing a cut-off date is bound to be arbitrary, as firms reactions may have been one of anticipating increase in competition, or adopting a "wait and see" attitude given that the internal market programme initially moved slowly. In addition, government policy may have affected the timing of the firms' reactions.

In the results presented below, I used alternative years to date the change in competitive conditions. Obvious candidates are the years that just follow Spanish accession and saw the first concrete steps towards the implementation of the SMP. A simple procedure consists in interacting the second term in (10) with a step time dummy (SD). The distinct set of results reported below were obtained with dummies taking value zero before the cut-off year, and one thereafter. The

[18] These two sets of results are not reported for reasons of space, but are available upon request.

[19] See Klette (1999) for evidence that price to marginal cost ratios are "small", at least in manufacturing.

years chosen are 1988, 1989, and 1990.[20] Bottasso and Sembenelli (2001) choose a similar splitting criteria by dividing their sample in the periods 1982-1987 (pre-SMP) and 1988-1993 (SMP implementation). Thus, the hypothesis that is being tested is:

$$\delta_{pre} > \delta_{post}$$

An initial batch of results at the 2 and 3 digit levels proved inconclusive, as some of the estimates of the interacted dummy were imprecise, possibly due to the limited number of observations. A solution to the lack of precision is to pool observations along a reasonable dimension. Most manufactured goods are traded internationally, while many services and utilities are not. Moreover, the internal market programme mostly affected traded goods.[21] It is thus reasonable to think that the competitive shock has been of greater magnitude for manufactures as compared to services and utilities.

Table 3 presents TSLS estimates of (10) for services and utilities and manufactures separately.[22] The step-dummy variable has been interacted with the regressor (the second term in (10)) and annual time dummies (TD) have also been included.[23] The instruments are the same as before, plus the step dummy interacted with the instruments used previously. Three-digit industry dummies were also included in the regressions.

In the case of manufacturing, the interacted dummy appears with a negative sign, suggesting an increase in competition did occur. However, the estimates are not very precise, and the estimated fall in margins is significant at the 10% level for the years 1988 and 1989, while it is not for 1990. In services and utilities, no pattern emerges: the interacted dummies are nowhere near being significant. For both broad sectors, the time dummies are jointly highly significant, while industry are not jointly significant at conventional levels. A close examination of the time dummies confirms the fall in TFP growth reported above. Save for 1986, all time

[20] Concretely, the step dummy for 1989 is defined as: $SD89 = 0$ if year< 1989, and $SD89 = 1$ if year ≥ 1989.

[21] Since then, service liberalisation has taken place, but was limited during the time period covered by the sample.

[22] Manufactures are defined as 2-digit sectors #3 to #15 (i.e., "other manufactured products" are not included), and services and utilities are defined as 2 digit sectors #17 to #26, excluding agricultural activities (see Table I for a description of these sectors).

[23] Since I use first differences and one lag for the instruments, 1985 is the first year for which I have estimates. Since there is one time dummy for each year, the estimation does not include a constant.

dummies are insignificant or positive prior to 1992. As of that year, dummies are predominantly negative and significant, at least in the case of manufacturing.

Insert Table 3 about here

An avenue to improve the efficiency of the estimation is to impose some kind of structure on the time dummies. Tables 4 report the estimation of (10) under an alternative specification. In the latter, the time dummies have been substituted for the step dummy that dates the change in competitive conditions.[24]

Once some form of structure is imposed on TFP growth, it emerges that there are important differences in the behaviour of mark-ups across these two broad sectors.[25] In the case of manufacturing, a sharp increase in competitive pressure appears to have occurred since the late 1980's. Prior to Spain's entry into the EU, average mark-ups in manufacturing stood in the 0.35-0.4 range, and later fell to about 0.25 as of the early 1990's.[26] It is interesting to note that the fall is sharpest in 1989 compared to 1990.[27] By 1990, the drop is less marked, reflecting the fact that margins had already fallen. For manufacturing, all estimations confirm the fall in TFP growth.

In the case of services and utilities, mark-ups are estimated in the 0.36-0.4 range. The interacted dummy is negative but not statistically significant at the 10% confidence level. This indicates that if competition increased, it did so mildly. It could be argued that given the smaller number of observations for services and utilities, less stringent standards of significance should apply (say 15% or 20%). Still, even if the point estimates of the interacted dummy were deemed to be significant, the fall in mark-ups is of a much smaller magnitude.

[24]Alternative specifications, such as four three-year time dummies yield very similar results to those reported in Table 4.

[25]It may be the case that the fall in margins simply reflects cyclical factors. Clearly, each of the two broad sectors may react differently to aggregate growth. However, the fact that the results point in the same direction for all 3 cut-off years suggests that the differences amount to more than simply distinct timing. In addition, both the pre and post competitive shock periods are characterised by fast and slow GDP growth.

[26]This 30% drop is consistent with Bottasso and Sembenelli's (2001) results, who report that firms deemed to be "sensitive" to the SMP experienced a 50% drop in their mark-ups.

[27]Given that for manufacturing, the time dummies for the years 1992, 1994 and 1995 are highly significant in the estimations reported in Table 3, I also estimated (10) with a step dummy as well as time dummies for these three years. The results are consistent with those reported in Table 4, that is I find a statistically significant drop in manufacturing mark-ups during the second half of the period (results available upon request, see also footnote # 24). I am grateful to referee for suggesting this additional check.

These results are consistent with the 2-digit results mentioned earlier. For manufacturing and 1989 as the cut-off year, I found that 7 sectors (representing 62% of observations) had experienced a significant fall in mark-ups. In the case of services and utilities, no 2-digit sector appears to have experienced a fall in the Lerner index (even at the 15% confidence level).[28]

Insert Table 4 about here

The specification of (10) allows for an additional hypothesis to be tested. If it is the case that $\delta_{pre} > \delta_{post}$, then the variance of the differenced error term ought to be higher during the post competitive shock period.[29] For the two sets of results presented in Tables 3 and 4, this is indeed the case. Depending on the year chosen to postulate the change in competitive conditions, the variance of the differenced error term during the post competitive shock period is superior at the 1% or 5% significance levels (Spanos (1989) p. 395).

Unraveling the true relationship between margins' dynamics and competitive pressure requires that consideration be given to entry and exit. Unfortunately, *Central de Balances* does not allow for a proper treatment of these processes. However, for a subset of firms, the year of creation is reported. It is thus possible to construct a proxy that identifies "surviving incumbents". The latter are defined as firms that were created before 1983, that appear at least seven times, and replied to the questionnaire at least once during the last three years of the sample. This group of firms ought to experience a discernible and unambiguous drop in mark-ups following an increase in competition.[30] I re-ran the estimations presented in Table 4 for this sub-sample, separating manufactures and services. The results are presented in Appendix A.2. As can be readily seen, the results are qualitatively identical: "surviving incumbents" in manufacturing experienced a significant drop

[28] Aggregate price movements corroborate this finding. Relative to the consumer price index, industrial prices have been falling since the mid-1980's. Over the last decade, the main source of Spanish inflation has been the service sector.

[29] I am grateful to an anonymous referee for pointing this out.

[30] It would of course be preferable to examine the behaviour "entrants" and "exiters" as well. Two difficulties prevent this. The first is that I cannot identify true entrants (many firms do not report their year of creation) and true "exiters". Second, it is not possible to make clear-cut predictions about the efficiency (and therefore, mark-ups) of entrants. If they use state of the art technology, they may enjoy higher mark-ups, or lower ones if they have to go through a learning process whose duration is *a priori* unknown. See Caves (1998) for an extensive survey of the existing empirical literature on industry dynamics, and Martín and Jaumandreu (1999) for an analysis of the Spanish case.

in mark-ups, while those in services and utilities did not.[31]

Overall, these results indicate a fall in manufacturing margins, but it is not possible to say whether it is of a permanent nature. It could be the case that the increase in competition narrows margins temporarily until a new steady state is reached. The theoretical framework proposed by Sutton (1991) is consistent with a fall short-run fall in margins, followed by a return to higher profitability once the industry has restructured and consolidated.

7. Conclusion

The results presented in this paper indicate the presence of positive mark-ups in the Spanish economy. Overall, Domowitz *et al.'s* (1988) approach yields reasonable and precise estimates, both when TSLS and GMM are applied. If the econometric estimates are taken at face value, accounting margins underestimate, in absolute value, true mark-ups. Nevertheless, that proxy does a surprisingly good job of ranking the different sectors in terms of firms' ability to price above marginal cost. This suggests that this measure may not be as flawed as previously thought, at least when sample size is large both within and across time.

EU accession appears to increase competitive pressure, confirming the view held by specialists in the field that this is one of the main effect of integration. The fact that the dynamics of mark-ups differ across manufacturing on the one hand, and services and utilities on the other, provides support to the idea that Spain was subjected to an integration-led pro-competitive shock. In terms of welfare, the result of this increase in competition is probably much larger than traditional Vinerian effects. However, empirically unearthing this effect is arduous, since the number of firm level observations must be large and the time period sufficiently long.

Three important caveats deserve mention regarding the results reported in this paper. First, factor markets have been assumed competitive throughout the analysis, an assumption unlikely to be met in the real world, and in particular, in the Spanish economy. An interesting research topic would consist in assessing

[31] It is true that the results obtained with 1988 as the cut-off year do not fit this conjecture if less stringent standards of statistical significance are adopted (the interacted dummy in services and utilities is significant, but only at the 15% level). This may be due to the fact that 1987 was a year of high mark-ups for "surviving incumbents", possibly due to cyclical factors. However, the important result is that mark-ups are still estimated at around 0.36 for the post competitive shock period, in line with all the results obtained previously.

whether rents are shared, at least partially, among factors of production. Second, the role industry of dynamics has only been touched upon. Finally, no attempt has been made to account for these positive mark-ups. The more macro oriented literature has identified four possible explanations: increasing returns (industry-wide or at the level of the firm), thick market externalities, labour hoarding, and finally, market power. No attempt is made to disentangle the contribution of each of these factors to positive mark-ups. However, the thrust of the results presented in this paper indicate that market power ought to be one of the culprits.

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Appendix A.1

The data was filtered in order to systematically eliminate observations of dubious value.

Labour input: firms reporting non positive values for this variable were dropped.

Value added and gross output: firms reporting non-positive values for either of these variables were eliminated.

Firms reporting total labour costs greater than value added, inclusive of subsidies, were dropped.

Firms which reported gross fixed capital formation data which implied an expected life time of the investment greater than sixty years, or less than three years, were dropped from the sample.

Firms whose payments to suppliers of inputs and total labour costs were greater than the value of gross output were dropped from the sample.

Appendix A.2

Table A.2.1: Behaviour of mark-ups pre and post competitive shock for “surviving incumbents”.
TSLS estimates with t-statistics in parenthesis.
I) Cut-off year for defining the step dummy: 1988
II) Cut-off year for defining the step dummy: 1989
III) Cut-off year for defining the step dummy: 1990

	Manufacturing (8720 obs.)			Services (obs. 4622)		
Regressors	**I**	**II**	**III**	**I**	**II**	**III**
$\Delta q_{i,t}$	0.418 (13.66)	0.402 (18.64)	0.368 (18.12)	0.430 (12.24)	0.382 (10.81)	0.371 (12.20)
$SD88 \times \Delta q_{i,t}$	-0.168 (-4.93)	.	.	-0.072 (-1.60)	.	.
$SD89 \times \Delta q_{i,t}$	.	-0.152 (-5.58)	.	.	-0.044 (-0.93)	.
$SD90 \times \Delta q_{i,t}$	.	.	-0.104 (-3.86)	.	.	-0.055 (-1.24)
SD88	-0.009 (-3.22)	.	.	0.006 (1.06)	.	.
SD89	.	-0.008 (-3.40)	.	.	-0.005 (-1.23)	.
SD90	.	.	-0.005 (-2.08)	.	.	-0.006 (-1.63)
Constant	0.007 (0.80)	0.008 (0.90)	0.003 (0.36)	-0.008 (-0.59)	0.002 (0.14)	0.002 (0.13)
Ind. Dummies (ID)	YES	YES	YES	YES	YES	YES
Joint sig. test ID	0.87	0.87	0.87	0.01	0.03	0.10
R squared	0.46	0.46	0.47	0.45	0.45	0.44
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note: The industry dummies included in all the regressions are defined at the three digit level

Table 1: Second column: one-step mark-up estimates obtained with the GMM procedure at the 2-digit level (t-statistics in parenthesis). Estimates of the constant (first term in (10)) and time dummies not reported. Third column: accounting margins (# of observations in parenthesis).
I) Wald joint significance test; II) Wald joint significance test for the time dummies; III) Test for first order autocorrelation of the errors; IV) Test for second order autocorrelation of the errors; V) Sargan test (from 2-step estimates).

Sector code & number of observations	**GMM estimates**						**Accounting margins**
	d	I	II	III	IV	V	(# of obs.)
1 Extraction of energy minerals (89 obs.)	**0.850** (28.4)	0.000	0.000	0.692	0.752	1.000	0.275 (144)
2 Other mineral extraction (92 obs.)	**0.554** (6.48)	0.000	0.000	0.212	0.891	0.997	0.334 (200)
3 Food, beverages & tobacco (464 obs.)	**0.399** (4.21)	0.000	0.000	0.000	0.678	0.193	0.125 (4534)
5 Chemical industries (1763 obs.)	**0.367** (7.19)	0.000	0.000	0.000	0.145	0.585	0.16 (2603)
6 Other non metallic mineral products (1165 obs.)	**0.565** (15.4)	0.000	0.004	0.363	0.056	0.784	0.212 (1864)
7 Metallurgy & metallic products (997 obs.)	**0.267** (5.72)	0.000	0.000	0.000	0.891	0.937	0.149 (1772)
8 Machinery (905 obs.)	**0.300** (7.92)	0.000	0.711	0.000	0.070	0.536	0.143 (1537)
9 Electrical, electronic & optical equipment (848 obs.)	**0.413** (5.92)	0.000	0.000	0.025	0.906	0.111	0.141 (1404)
10 Transport material (643 obs.)	**0.341** (5.62)	0.000	0.000	0.001	0.429	0.817	0.139 (1038)
11 Textiles (1314 obs.)	**0.463** (5.12)	0.000	0.000	0.001	0.067	0.151	0.142 (2264)
12 Leather & shoes (350 obs.)	**0.182** (3.3)	0.001	0.555	0.000	0.799	0.455	0.103 (650)
13 Wood & cork (391 obs.)	**0.279** (4.61)	0.000	0.002	0.000	0.989	0.335	0.127 (672)
14 Pulp & paper, printing & publishing, and graphic arts (1047 obs.)	**0.508** (5.24)	0.000	0.000	0.017	0.137	0.592	0.177 (1794)
15 Rubber and plastic products (755 obs.)	**0.247** (6.51)	0.000	0.012	0.049	0.486	0.707	0.150 (1235)
16 Other manufacturing industries (712 obs.)	**0.288** (7.65)	0.000	0.016	0.000	0.909	0.292	0.137 (1163)
17 Electricity, gas & water (332 obs.)	**0.408** (2.43)	0.015	0.006	0.072	0.654	0.376	0.305 (434)
18 Water purification and distribution (260 obs.)	**0.400** (6.29)	0.000	0.000	0.044	0.127	0.953	0.249 (363)
19 Building & construction (858 obs.)	**0.392** (3.57)	0.000	0.000	0.000	0.031	0.99	0.136 (2003)
20 Wholesale & retail trade; repairs (4652 obs.)	**0.379** (7.1)	0.000	0.000	0.000	0.000	0.066	0.259 (9323)
21 Transport, storage, and communications (640 obs.)	**0.640** (5.99)	0.000	0.001	0.271	0.927	0.205	0.290 (1324)
22 Agriculture, livestock, hunting , forestry, & related activities. (188 obs.)	**0.274** (3.3)	0.001	0.007	0.037	0.079	0.883	0.156 (460)

Table 1 (Continued)

Sector code & number of observations	GMM estimates						Accounting margins
	d	I	II	III	IV	V	
24 Hotel and catering (528 obs.)	**0.413** (5.06)	0.000	0.012	0.106	0.381	0.579	0.221 (1060)
26 Other services (253 obs.)	**0.728** (7.49)	0.000	0.007	0.059	0.158	0.33	0.227 (606)
Correlation between accounting margins and GMM estimates (full sample): 0.64 **Correlation between accounting margins and GMM estimates (industry only):** 0.77							

Note: The number of observations in the first and last columns do not coincide, since I use lags and first differences in the estimation, while I have the full sample to compute accounting margins.

Table 2: 3-digit estimates of mark-ups (sectors with less than 100 observations have been dropped). Second column: two-stage least square mark-up estimates (t-statistics in parenthesis), time dummy for each year, no constant included. Third column: accounting margins (# of observations in parenthesis).
I) Prob > F
II) Wald test on joint significance of time dummies

Sector description, code & number of observations	**TSLS estimates**			**Accounting margins**
	d	I	II	(# of obs.)
5 Non-metallic & non-energy extraction 5 (109 obs.)	**0.600** (13.54)	0.0000	0.16	0.334 (200)
Meat industry 6 (467 obs.)	**0.168** (7.39)	0.0006	0.00	0.087 (751)
Fish based products 7 (154 obs.)	**0.132** (3.79)	0.0002	0.51	0.095 (248)
Dairy industry 8 (238 obs.)	**0.170** (7.51)	0.0000	0.00	0.099 (375)
Beverages 9 (544 obs.)	**0.251** (3.50)	0.0000	0.04	0.184 (905)
Other food products 10 (1380 obs.)	**0.278** (12.41)	0.0000	0.01	0.120 (2203)
Basic chemicals 14 (490 obs.)	**0.326** (12.01)	0.0000	0.06	0.178 (690)
Pharmaceuticals 15 (457 obs.)	**0.312** (11.10)	0.0000	0.09	0.166 (642)
Other chemical industries 16 (872 obs.)	**0.273** (11.41)	0.0000	0.00	0.147 (1271)
Glass products 17 (149 obs.)	**0.394** (11.13)	0.0000	0.09	0.186 (207)
Ceramics 18 (101 obs.)	**0.287** (7.21)	0.0000	0.35	0.175 (159)
Other non metallic mineral products. 19 (966 obs.)	**0.511** (15.66)	0.0000	0.02	0.219 (1498)
Metal products (except. machinery & equip) 21 (1058 obs.)	**0.287** (11.24)	0.0000	0.00	0.145 (1772)
General use machinery 22 (418 obs.)	**0.278** (18.87)	0.0000	0.88	0.145 (659)
Industrial & agricultural machinery 23 (427 obs.)	**0.293** (10.33)	0.0000	0.99	0.142 (725)
Domestic apparatus 25 (108 obs.)	**0.373** (1.53)	0.0002	0.02	0.132 (153)
Electrical machinery and equipment 27 (575 obs.)	**0.218** (12.86)	0.0000	0.00	0.137 (893)
Electronic components, TV & Radio equip. 28 (137 obs.)	**0.285** (7.20)	0.0000	0.01	0.149 (218)
Watch-making, medical and optical equip. 29 (160 obs.)	**0.243** (8.11)	0.0000	0.95	0.148 (275)
Vehicle bodywork and equipment 31 (492 obs.)	**0.251** (12.84)	0.0000	0.00	0.142 (733)
Textile fibres 34 (233 obs.)	**0.343** (9.06)	0.0000	0.06	0.169 (358)
Textile cloth 35 (200 obs.)	**0.329** (7.70)	0.0000	0.02	0.148 (329)

Table 2 (Continued)

Other textiles 36 (526 obs.)	**0.326** (16.57)	0.0000	0.19	0.143 (819)
Clothing: textile & leather 37 (418 obs.)	**0.383** (10.12)	0.0000	0.00	0.125 (758)
Shoes & other leather products 38 (378 obs.)	**0.206** (8.89)	0.0000	0.30	0.103 (650)
Wood & cork 39 (418 obs.)	**0.227** (10.40)	0.0000	0.02	0.127 (672)
Pulp & paper 40 (523 obs.)	**0.258** (10.71)	0.0002	0.00	0.139 (781)
Printing & publishing, graphic arts 41 (599 obs.)	**0.369** (16.74)	0.0000	0.00	0.207 (1013)
Rubber products 42 (187 obs.)	**0.301** (13.04)	0.0000	0.34	0.136 (272)
Plastic products 43 (595 obs.)	**0.256** (14.25)	0.0000	0.00	0.155 (963)
Other manufacturing industries 44 (745 obs.)	**0.256** (15.15)	0.0000	0.01	0.137 (1163)
Electric power production and distribution 45 (280 obs.)	**0.394** (7.10)	0.0000	0.13	0.313 (356)
Water purification and distribution 48 (268 obs.)	**0.415** (6.68)	0.0000	0.07	0.249 (363)
Civil engineering works 50 (722 obs.)	**0.424** (12.88)	0.0000	0.02	0.139 (1412)
Furbishing of finished buildings 51 (212 obs.)	**0.198** (7.77)	0.0000	0.00	0.106 (486)
Cars: sales, repair & maintenance 53 (560 obs.)	**0.249** (8.44)	0.0000	0.03	0.235 (1123)
Wholesale trade 56 (3657 obs.)	**0.287** (22.87)	0.0000	0.00	0.273 (6535)
Retail trade (except car dealerships) 57 (744 obs.)	**0.205** (9.46)	0.0000	0.02	0.216 (1378)
Other passenger transport 59 (165 obs.)	**0.437** (5.74)	0.0000	0.00	0.198 (284)
Merchandise transport by road 60 (185 obs.)	**0.689** (6.00)	0.0000	0.03	0.242 (398)
Activities related to air & sea transport 65 (134 obs.)	**0.377** (3.16)	0.0000	0.02	0.461 (208)
Agricultural & livestock production 70 (194 obs.)	**0.309** (3.31)	0.0058	0.40	0.162 (423)
Hotels & catering 73 (557 obs.)	**0.418** (13.30)	0.0000	0.14	0.221 (1060)
Other business services 79 (375 obs.)	**0.393** (6.79)	0.0000	0.00	0.176 (863)
Social & cultural activities 82 (200 obs.)	**0.539** (3.42)	0.0000	0.00	0.250 (421)
Correlation between accounting margins and TSLS estimates (full sample): 0.63 **Correlation between accounting margins and TSLS estimates (industry only):** 0.90				

Note: The number of observations in the first and last columns do not coincide, since I use lags and first differences in the estimation, while I have the full sample to compute accounting margins.

Table 3: Estimation of (10), with annual time-dummies and interacted step-dummies, manufacturing and services & utilities. TSLS estimates with t-statistics in parenthesis.
I) Cut-off year for defining the step dummy: 1988
II) Cut-off year for defining the step dummy: 1989
III) Cut-off year for defining the step dummy: 1990

	Manufacturing (13548 obs.)			**Services (8873 obs.)**		
Regressors	**I**	**II**	**III**	**I**	**II**	**III**
$\Delta q_{i,t}$	0.311 (25.62)	0.307 (31.81)	0.297 (36.50)	0.335 (13.91)	0.333 (17.84)	0.335 (19.16)
$SD88 \times \Delta q_{i,t}$	-0.025 (-1.77)	.	.	0.002 (0.06)	.	.
$SD89 \times \Delta q_{i,t}$	.	-0.022 (-1.75)	.	.	0.005 (0.24)	.
$SD90 \times \Delta q_{i,t}$	.	.	-0.009 (-0.77)	.	.	0.004 (0.17)
TD85	0.019 (2.74)	0.019 (2.74)	0.019 (2.72)	0.029 (1.87)	0.029 (1.88)	0.029 (1.87)
TD86	-0.027 (-3.72)	-0.027 (-3.76)	-0.028 (-3.87)	-0.022 (-1.40)	-0.022 (-1.42)	-0.022 (-1.41)
TD87	-0.008 (-1.23)	-0.008 (-1.22)	-0.009 (-1.24)	0.001 (0.04)	0.001 (0.04)	0.001 (0.04)
TD88	-0.009 (-1.33)	-0.008 (-1.10)	-0.008 (-1.23)	0.016 (1.14)	0.016 (1.14)	0.016 (1.14)
TD89	-0.008 (-1.23)	-0.008 (-1.23)	-0.008 (-1.21)	0.003 (0.24)	0.003 (0.24)	0.003 (0.23)
TD90	-0.000 (-0.00)	-0.000 (-0.01)	-0.000 (-0.01)	-0.011 (-0.73)	-0.010 (-0.73)	-0.010 (-0.73)
TD91	0.002 (0.27)	0.002 (0.27)	0.002 (0.27)	0.022 (1.47)	0.022 (1.47)	0.022 (1.48)
TD92	-0.022 (-3.03)	-0.022 (-3.03)	-0.022 (-3.03)	-0.017 (-1.22)	-0.017 (-1.22)	-0.017 (-1.21)
TD93	-0.010 (-1.41)	-0.010 (-1.43)	-0.010 (-1.42)	0.002 (0.17)	0.002 (0.17)	0.002 (0.17)
TD94	-0.014 (-1.98)	-0.013 (-1.96)	-0.014 (-1.99)	0.014 (1.03)	0.014 (1.03)	0.014 (1.03)
TD95	-0.025 (-3.56)	-0.026 (-3.55)	-0.025 (-3.56)	-0.012 (-0.89)	-0.012 (-0.89)	-0.012 (-0.89)
TD96	0.000 (0.06)	0.000 (0.07)	0.000 (0.05)	-0.012 (-0.91)	-0.012 (-0.91)	-0.012 (-0.91)
Joint sig. test TD	0.00	0.00	0.00	0.00	0.00	0.00
Ind. Dummies (ID)	YES	YES	YES	YES	YES	YES
Joint sig. test ID	0.49	0.49	0.49	0.17	0.17	0.18
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note: The industry dummies included in all the regressions are defined at the three digit level

Table 4: Behaviour of mark-ups pre and post competitive shock. TSLS estimates with t-statistics in parenthesis.

I) Cut-off year for defining the step dummy: 1988

II) Cut-off year for defining the step dummy: 1989

III) Cut-off year for defining the step dummy: 1990

	Manufacturing (13548 obs.)			**Services (8873 obs.)**		
Regressors	**I**	**II**	**III**	**I**	**II**	**III**
$\Delta q_{i,t}$	0.388 (18.20)	0.390 (22.61)	0.351 (23.11)	0.409 (12.86)	0.373 (11.78)	0.368 (13.58)
$SD88 \times \Delta q_{i,t}$	-0.136 (-5.56)	.	.	-0.062 (-1.61)	.	.
$SD89 \times \Delta q_{i,t}$	.	-0.146 (-6.57)	.	.	-0.047 (-1.16)	.
$SD90 \times \Delta q_{i,t}$	.	.	-0.097 (-4.36)	.	.	-0.058 (-1.52)
SD88	-0.005 (-2.25)	.	.	-0.000 (-0.01)	.	.
SD89	.	-0.006 (-3.25)	.	.	-0.009 (-2.50)	.
SD90	.	.	-0.004 (-2.41)	.	.	-0.009 (-2.90)
Constant	-0.005 (-0.77)	-0.003 (-0.47)	-0.006 (-0.84)	-0.003 (-0.22)	0.005 (0.35)	0.004 (0.32)
Ind. Dummies (ID)	YES	YES	YES	YES	YES	YES
Joint sig. test ID	0.61	0.52	0.60	0.23	0.21	0.20
R squared	0.46	0.45	0.46	0.47	0.46	0.46
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note: The industry dummies included in all the regressions are defined at the three digit level