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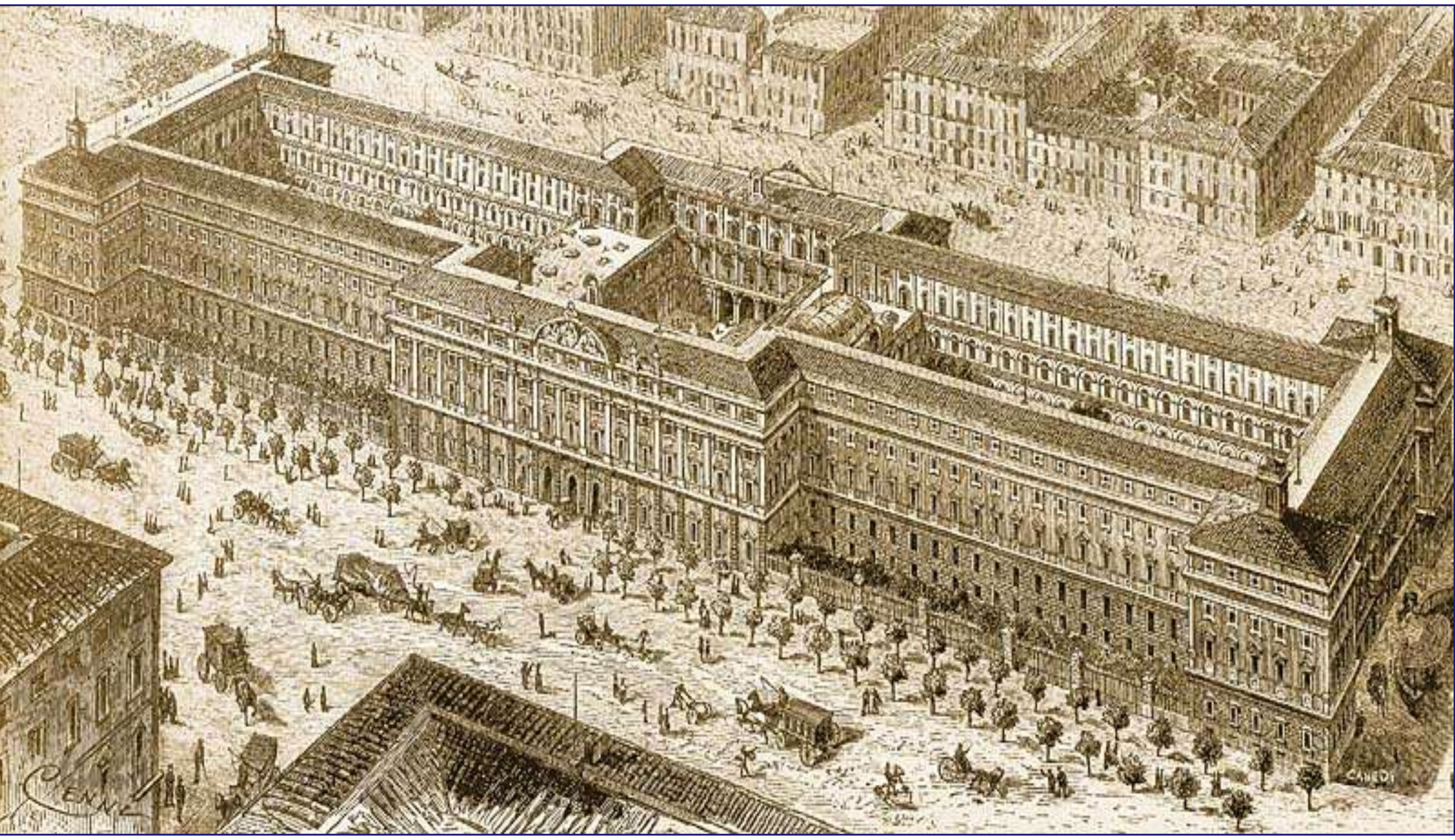

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Service deregulation, competition and the performance of French and Italian firms*

Francesco Daveri **, Rémy Lecat ***, Maria Laura Parisi ****

Abstract

We use firm-level data for France and Italy to explore the impact of service regulation reform implemented in the two countries on the mark-up and eventually on the performance of firms between the second half of the 1990s and 2007. We find that the relation between entry barriers and productivity is negative and is crucially intermediated through the firm's mark up. If both countries adopted OECD's best practices in terms of entry barriers, their TFP level would increase by 3% for Italy and 3.5% for France.

JEL Classification: D24, K20, L51, O40, O57
Keywords: regulation, services, performance, TFP

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1 INTRODUCTION

The OECD policy makers who slashed regulatory barriers in many countries over the thirty years preceding the current crisis acted under the assumption that lower regulation allows firms to achieve a better economic performance. The policy stance in favour of deregulation has generally been supported by a large body of literature pointing to negative effects of entry barriers, red-tape or legal requirements on economic performance and notably firm productivity. Yet, while considerable effort has been devoted to the search for significant correlation, less attention has gone to spell out the details of the transmission mechanism through which this relation between regulation and firm productivity is expected to materialize. Our paper lies in this area of empirical research. However, rather than concentrating the attention on a broad cross-section of countries and on deregulation as such, we study the details of this process looking at one specific - but in our view crucial - aspect of deregulation, namely the reduction of entry barriers in the service industries in two regulation-riddled countries, France and Italy. As of 1998, both countries posted the highest values (behind Greece) for the Product Market Regulation (PMR) index constructed by the OECD. Since then, extensive deregulation of professional business activities, network industries and retail have been implemented in both countries, although in a scattered fashion across industries and across countries. This process has occurred with special emphasis on the entry barriers' side to which we devote our attention. In our paper, we exploit this country-industry variation building time varying qualitative variables that summarize the implementation of reduction in entry barriers for retail, road freight, airlines, post, telecommunications and business services. We contrast this variation with firm-level variation over 1998-2007 in the behavior of total factor productivity, the most commonly accepted - though by no means perfect - measure of efficiency. If deregulation is aimed to be efficiency enhancing, it should positively affect total factor productivity. And indeed this is what Nickell (1996), Blundell, Griffith and van Reenen (1999) and Griffith, Harrison and Simpson (2010) have found: a negative relation between regulation and productivity. This also stems from the results of Schivardi and Viviano (2011) where barriers to entry in the Italian retail sector had been found to be positively related to profit margins and negatively to productivity.

2 BACKGROUND DISCUSSION ON REGULATION AND EFFICIENCY

In this section we provide some background discussion and show how our results complement those from previous studies within the already broad research agenda on regulation and productivity.

As discussed in Schiantarelli (2008), the negative relation between competition and efficiency stems from first principles. When regulatory reforms lead to more competitive output markets, the wedge between prices and marginal costs is reduced and the allocation of goods and resources, in the absence of other distortions, becomes more efficient in a static sense, due to the pressure triggered by fiercer competition onto individual firms. Additional efficiency gains may originate through economies of scale and scope.

Over time, a more competitive climate will also drive the less efficient firms to exit and, through this channel, market shares will shift from lower to higher productivity firms, leading to a more efficient factor allocation in the industry. Yet, as discussed by Nickell, Nicolitsas, and Dryden (1997), the details of the transmission mechanism through which competition raises efficiency are not always clear-cut. The literature on corporate governance and firm performance[1] has shown that in a more competitive environment owners may more easily monitor and compare managers' performance and enhance their incentives. Incentive realignment is not the only potential mechanism of transmission between competition and efficiency, though. Managers may also be induced to work harder as increased competition triggers the threat of bankruptcy. In a nutshell, the more competition the less managerial slack. At the same time, however, a higher bankruptcy threat reduces equilibrium profits, which may reduce the scope for granting monetary incentives to managers, which - as shown by Schmidt (1997) - makes the relation between competition and efficiency through bankruptcy threats ambiguous. Altogether, on the theory side, there are sufficient ambiguities or caveats, concerning the direction of the effect of regulatory reform on firm efficiency, that empirical research in this area is essential to reach definite conclusions about the impact of product market regulation. On the empirical side, there is an established tradition of firm and industry studies investigating the direct effects of regulation on the performance of firms in the regulated sector. Sector-specific restrictions, such as those prevailing in utilities and services, have been shown to decrease productivity growth (Nicoletti and Scarpetta, 2003), investment (Alesina, Ardagna, Nicoletti and Schiantarelli, 2005) and employment (Bertrand and Kramartz, 2002), as well as to increase prices (Martin, Roma and Vansteenkiste, 2005) in the regulated sectors with both firm-level and industry data.[2] Of particular relevance for the issues we are discussing here is the paper by Nickell (1996), where firm-level data for the UK have been employed to investigate whether changes in competition affect productivity levels and growth rates. In Nickell's study, competition was measured in several ways, including industry level measures of monopoly rents, concentration, import penetration, and number of competitors. By estimating a dynamic production function with the competition variables as additional regressors, and allowing for endogeneity of input choices, Nickell found that greater competition has a positive effect both on the level and the growth of productivity.[3] The results in Nickell have been confirmed by Disney, Haskel, and Heden (2000), with a bigger UK data set. Apart from the direct effects on the firms within the same industry where the regulatory measure is enacted, regulation may also have relevant indirect effects on resource allocation in downstream industries. Barone and Cingano (2011) and Bourles, Cette, Lopez, Mairesse and Nicoletti

[1] Holmström (1982) and Nalebuff and Stiglitz (1983) showed that perfect competition reveals full information about the occurrence of common cost shocks to shareholders and therefore enables shareholders' monitoring. The result that competition reduces the amount of managerial slack is also confirmed by Hart (1983), with the caveat set forth by Scharfstein (1988): if risk-averse managers are allowed to respond to monetary incentives, the effort enhancing effect of competition becomes ambiguous. Hermalin (1992) studies the influence of product market competition on managerial performance and shows that under certain conditions increased competition reduces agency costs.

[2] Barriers to entry have also been shown to reduce the growth in the number of firms (Klapper, Laeven and Rajan, 2006) and increase industry concentration (Fisman and Sarria-Allende, 2004) in developed countries and - in a particularly distorting extent - output, employment and investment in developing countries (Besley and Burgess, 2002, and Djankov, La Porta, Lopez de Silanes and Shleifer, 2002).

[3] In Nickell's paper, firm-level variables are instrumented within a dynamic panel GMM approach while competition variables are not. However, if fast-growing firms gain market shares, the market becomes more concentrated and less competitive. Hence this may cause a downward bias to the estimates of the effect of competition on productivity. In this case, the estimated effect represents a lower bound on the true effect of competition on productivity.

(2010) - with some methodological differences - have employed input-output matrices to construct indicators of dependence of downstream activities (typically manufacturing) on upstream industries (typically services). They were thus able to study how regulation in the supply of a variety of services (energy and utilities, professional services) affects the economic performance of downstream manufacturing industries. Their results indicate that the indirect costs of regulation are the bulk of the costs of regulation. Our analysis is narrower in scope and therefore we cannot calculate these second-round effects. Yet, by specifically addressing one aspect of regulation such as entry barriers, our study can keep track of the transmission mechanism through which regulation may affect performance. This is instead hidden in a black box in such broader and more ambitious studies.

The elusiveness of the empirical relation between competition and efficiency has also to do with measurement and specification issues. Investigating the impact of deregulation on economic performance may be problematic for, as discussed by Winston (1993), regulation is inherently multidimensional. It involves pricing, entry and exit decisions within an industry as well as health and safety of workplaces and products, and the accuracy of the information being disseminated about such products. Different bits of deregulation may be successful in one respect and less in others. It has also been shown that the different bits may be collinear with each other, thereby making the task of identifying the effect of each bit, separately, a daunting one. Griffith and Harrison (2004, Appendix D, Table 30-33) have shown that the estimates of coefficients of electricity, gas and water supply are heavily specification-dependent in industry's employment and productivity regressions. Finally, while the expected correlation between the extent of regulation and the mark up is relatively clear-cut and positive in most cases, the expected sign of the relation between mark-up and economic performance is more ambiguous. Lower mark-ups may indeed be associated to better economic performance but only if the static efficiency gains brought about by deregulation more than offset the scope for funding the fixed costs of research and innovation, enabled by the extra profits originating in a close-to-monopoly setting. Within the so called Neo-Schumpeterian tradition (Aghion and Howitt (1998) and Aghion, Bloom, Blundell, Griffith and Howitt (2005)), the relation between competition and productivity is assumed and empirically shown to take an inverted U form because of the interplay between the so called “escape competition” and “Schumpeterian” effects.

When regulation is high, more competition through lower mark-ups fosters innovation, as firms are encouraged to innovate in order to escape competition. As competition becomes fiercer and average profits decrease, the benefits from catching-up with the average firm diminish for laggards, which are then discouraged from the fact that convergence has largely taken place. Hence, from a certain degree of competition, the latter effect dominates the former and the relation between competition and efficiency becomes negative. This effect is more likely to be observed for innovation-related variables but it may be there for productivity as well.

3 DATA AND INDICATORS

3.1 Data

To study the relation between regulation in services and productivity we use firm level data on France and Italy in 1998-2007 to compute a productivity indicator (TFP) and other control variables from two different data sets, and we use the OECD product market regulation database to derive barrier-to-entry indicators. Our empirical analysis merges two firm-level annual datasets, FiBEn for French firms, constructed by Banque de France, and AIDA for Italian firms, a Bureau van Dijk database. Both databases contain individual accounts (as opposed to consolidated accounts for groups), based on the balance sheets provided by firms to the tax administration. FiBEn includes most French firms with sales exceeding €750,000 per year or with credit outstanding of at least €380,000 and some firms below; hence its coverage is excellent for large firms but rather limited for small firms. AIDA has a better coverage of small firms, with no minimum limit for sales, but only limited companies and limited liability companies are included.[4] Our period of analysis is long enough to include a few regulatory policy changes taking place in both countries. Its length is dictated by data availability in the AIDA database. The firms whose behavior we aim to investigate belong to nine service sectors that include retail, freight road and passenger air transportation, post, telecommunications and professional services (see the detailed list in Table 1). In all these sectors there are barriers to entry due to regulatory constraints. In the other sectors of the economy, regulatory barriers to entry are estimated to be non-existent by the OECD over the estimation period. This by no means implies overall absence of barriers to entry: these sectors, particularly the manufacturing ones, may in fact face other kind of barriers to entry due to strategic behavior of competitors or a very high minimum scale of production to reach a break-even point (natural monopoly case). Yet these barriers are largely not policy-induced and are therefore outside the domain of this work.

The main descriptive statistics for the database are presented in Table 1, in turn sub-divided in two panels describing summary data for firms and variables. From the upper panel (also labeled Table 1.1), one learns that Italy's AIDA is a larger database, with 15 070 service firms over the 1998-2007 period, against 13 349 firms for FiBEn over the same period of time. This table shows that the two datasets are rather similar in their industry composition. More than 90 per cent of the firms in both datasets are from just three sectors: retail (some two thirds of the total firms in each sample), road freight transports (some 20 per cent of the total in both datasets) and accounting services (about 5 per cent of the total). As to the other business services, a bigger share of engineering and consultancy services firms in France is by and large offset by a bigger share of architectural services in Italy. In order to control for these differences in sample, we use firm fixed effect and country- year dummies throughout the estimates.

Table 1.1 also shows that the two datasets closely conform to expectations in terms of firm size distribution. Eighty per cent of the firms in the AIDA sample are small firms, i.e. employing less than twenty employees. In France this share is slightly above one half of the total, instead. This is partly the result of a database bias (the French database under-estimates the share of

[4] In 2008, there were 1215585 firms registered in AIDA, whose legal form was SPA, SRL, and cooperatives (other forms are present but residuals). No individual firms are present. The former two legal forms allow a responsibility regardless companies debts, limited to their equity. Unlike SRL ("Società a Responsabilità Limitata"), SPA ("Società Per Azioni") is a public company.

small firms in the total population) but it also reflects the actual underlying firm size distribution in the two countries.

3.2 Productivity and regulation indicators

Productivity

AIDA and FiBEn allows one to calculate firm-level value added (Q), capital (K) and employment (L).

These are the ingredients to calculate productivity indicators – our output variables of interest.

Value added (Q) is computed as follows: Q is equal to the sales of merchandises minus the cost of merchandises minus the change in merchandise inventory plus the amount of production sold (goods and services) plus the amount of production stocked plus the amount of production incorporated in the capital stock minus the cost of raw materials minus the change in raw material inventories minus the other costs and external charges (including wages of external workers) plus net-of-tax production subsidies.[5] The volume of value added is then calculated by dividing it by a national accounting index of value added price at the two-digit industry level. As we do not have prices at the firm level, we may wrongly measure - and thus misinterpret - an increase in the firm's relative price of output with an increase in firm's productivity; our control for changes in turnover should however limit this bias. The initial total capital stock is estimated as the gross value of all non-financial assets, deflated by an appropriate deflator from the national accounts. Since the gross value of capital is at its historical cost, it is adjusted to correct for the age of the stock. Gross capital at historical price is divided by a national index for investment price, lagged by the average age of gross capital (itself calculated from the share of depreciated capital in gross capital at historical prices). The average employment level (L) is directly available in FiBEn and AIDA, while data for hours worked or temporary workers employed by Temporary Work Agencies are not provided. Our data include workers on fixed-term contracts as long as they are hired by the firm and not by a Work Agency. For France, data on costs of using temporary work agencies are available. A correction of employment on the basis of an average wage showed a very limited impact of temporary workers on TFP. With these data we derived a measure of total factor productivity (TFP). When evaluating the consequences of deregulation, employing a productivity concept that is invariant to the intensity of use of observable factor inputs is advisable. Ours is calculated according to a growth accounting methodology within a Cobb-Douglas framework, with factor shares equal to the share in revenue, perfect competition in factor and product markets and constant returns to scale. We do test these assumptions in the robustness check part, where labor and capital are allowed to vary freely without constraining them to sum to one as is under constant returns to scale. Our results do not change.

We adopt this admittedly restrictive formulation for lack of better of alternatives. The alternative methodology of Olley and Pakes (1996) would not be problem free in our framework for it implies restricting the analysis to those firms which exhibit non-zero investment flows. In most databases and more particularly in the service sector, this boils down to a substantial loss

[5] Clearly, not all of these items (e.g. “production stocked”) are equally relevant for the various service sub-sectors.

of observations, which is clearly not desirable. This problem is even more serious in our database, given that FiBEn does not report investment flows whatsoever, and we have to infer investment data taking time difference for capital stocks. The Olley-Pakes methodology is simply not an option. Levinsohn and Petrin (2003) offer a potentially more palatable alternative. Instead of investment, they use intermediate inputs as a proxy for unobserved productivity shocks. This is potentially good because typically many datasets will contain significantly less "zero observations" in materials than in firm-level investment. Yet the use of intermediate inputs as a proxy for unobserved productivity shocks does not appear appropriate in our service sector database: for most sectors we cover (accounting, legal, architecture, engineering,…), intermediate inputs (raw materials, supply…) represent only a small share of turnover[6] and are weakly correlated to production (sales in professional services may change without any change to their intermediate inputs). Hence, the monotonicity condition required by Levinsohn and Petrin is not fulfilled for these sectors.[7] The lower panel in Table 1 (also labeled Table 1.2) contains some slightly surprising data. It is shown that, as expected, the turnover of Italian firms is on average much lower than the turnover of French firms. This is consistent with a higher frequency of small firms in AIDA. Yet, when looking at productivity, one finds that labor productivity levels are actually lower in France than in Italy (about 5% lower for the median). This somewhat unexpected result stems from the fact that the average number of employees is also comparatively very small in Italy. So we have that both numerator and denominator - the average turnover and the average number of employees - are much smaller in Italy than in France but the denominator more than offset the numerator differences. As a result, the unconditional measure of average labor productivity reported in Table 1.2 - based on gross output and on a rough indicator of the labor input - is smaller for the average, the median firm and the entire size distribution of French firms when compared to Italian firms (although the dispersion around the mean is very high). When we look at productivity growth rates, anyway, our summary data present evidence more aligned with common sense: French firms exhibit definitely higher TFP growth rates than Italian firms. Differences between the two databases are partly controlled for by firm fixed effects. Therefore, as long as our results stem from the time series variation in the data, the summary features of our sample appear to satisfactorily replicate common sense, which is reassuring.

Regulation

The second half of our data set concerns competition indicators. This is essentially made of two main variables: barriers to entry, as a regulatory indicator, and mark-up which, in line with some previous studies, we take as the main channel through which regulatory impediments to competition impact productivity. Recalling the chronology and objectives of all pieces of regulative activity is a complex task that goes beyond the scope of this paper. To make just an example, both Italy and France absorbed the 96/19/EC to reform the Telecommunication industry. After adopting this directive, France and Italy continued the liberalization process of the market by privatizing the incumbent France Telecom[8] and Telecom Italia in 1997, releasing

[6] In our sample, intermediate consumptions represented 71% of turnover, but only 33% in the accounting sector and 38% in the legal sector.

[7] Correlation between changes in value added and in intermediate consumption stands at 33% only.

[8] However, only in September 2004 did the share of the French State in France Telecom go below 50%.

licences for mobile telephone, opening up the fixed line segment, and instituting the independent “Authorities” for Telecommunications (ART/now ARCEP in France and AGCOM in Italy), ruled by Law n° 96-659 in France and by Law 481/1995 and 249/1997 in Italy. In 2003 for Italy and 2004 for France, Codes for Electronic Communications were approved, encompassing all the most recent European directives in terms of electronic transmissions and communications, in particular broad band diffusion. The extent of market openness in each sector is summarized in our PMR index.[9] Barriers to entry are industry-wide indicators derived from the OECD PMR (Product Market Regulation) database. For each of the two countries, we built this indicator on the basis of the OECD Regulatory Indicators methodology as detailed in Woelfl, Wanner, Kozluk and Nicoletti (2009). We use Conway and Nicoletti (2006) to derive barrier to entry indicators for retail, professional services (legal, accounting, engineering, and architecture professions) and network industries (telecoms, post, air passenger transport, and road freight).[10] The OECD officially releases a non-manufacturing index (NMR), that can be divided into three sub-indicators: (1) Energy, transport and communication (ETRC); (2) Retail distribution and business services (RBSR); (3) Regulatory impact (RI). Being interested in ETRC and RBSR, we used all available information and legislation sources to update these indicators for each year in the interval 1998-2007, both for France and Italy. Of the three available indicators of sector-specific PMR (barriers to entry, public ownership, price controls), we kept Barriers to entry as our index to instrument the mark-up. We took directly the OECD indicators when available in the period of analysis (1998-2007) or we filled the blanks starting from the basic questionnaire so as to compute the indicator between two computation dates. The sectors were selected based on the availability of non-zero indices of regulatory barriers to entry in order to evaluate the within-industry correlation between product market regulation and performance, proxied by productivity.

For the information pieces not available through the OECD database, we referred to official legislation and documents and publications of: the appropriate Department or Regulation Authority (if it exists), the Antitrust Authority in Italy, associations (in particular, for professional services, we referred to professional registers), the Bank of Italy, the appropriate European DG, the MICREF database and OECD. Unlike the OECD, we use the same questions and weights to compute the low level indicator for each sector separately rather than the average for all sectors. More details are given in the Data Appendix.

Mark-up

Barriers to entry as such are not enough to hamper the productivity performance of purchasing firms unless the high barriers translate into high mark-ups. This is why we constructed firm-level measures of mark-ups. They are computed as follows:

$$\text{Mark-up} = \mu = \frac{Value \quad Added}{Labor \quad Costs + \quad Capital \quad Costs}$$

[9] As an example, the Italian index for Telecom market changed from 5.4 (highly regulated) in 1996 to 0 (unregulated) in 2000. The French index changed from 5.1 in 1995 to 0 in 1998.

[10] The OECD list of network industries would also include electricity, gas and rail. We left them out for we had too few observations for these industries.

where “capital costs” are computed multiplying a measure of the net rate of returns - the interest rates on ten-year Government bonds - times the sum of capital stock and inventories. The mark-ups computed like this are much higher on average in Italy than in France.

The extreme values for all of the main variables are cleaned using Tukey’s method, as recommended by Kremp (1995), i.e. removing those firms whose value in logs of a variable is greater than the third quartile plus three times the inter-quartile gap or is less than the first quartile minus three times the inter-quartile gap.

4 EMPIRICAL STRATEGY

To analyze the relationship between deregulation and firm productivity, we use a two-stage estimation strategy. In the first stage we investigate whether changes in regulation - in most cases deregulation - has changed the mark-up of firms in the industry where reform took place, and in the expected direction (deregulation bringing about less rent). In the second stage, we test whether the induced changes in markups, originated from diminished barriers to entry, have translated into TFP changes.

We assume that total factor productivity is related to rents as measured by the mark-up according to the following log-linear form:

$$\ln TFP_{itc} = \beta_{0,cl} + \beta_{1,cl}\mu_{itc} + \delta_1 \ln TFP_{it-1c} + \delta_2 DS_{itc} + b_{tc} + \eta_i + \varepsilon_{itc} \qquad (1)$$

where TFP indicates the level of total factor productivity, μ is the mark-up, DS is a demand shifter at the firm level (the growth rate of turnover at current prices), b_{tc} is a matrix of country-year dummies, η_i is a vector of firm specific fixed effects, and the i, c, j and t subscripts indicate - respectively - firm, country, industry and time. Finally, ε is an idiosyncratic shock to productivity. Equation (1) says that TFP depends on the level of competition, as reflected by the mark-up, lagged TFP, a demand shifter (firm turnover/sales at current prices) and country-year and firm fixed effects aimed at capturing residual firm heterogeneity.

The inclusion of lagged TFP is motivated by the fact that, as competition acts through time only gradually altering market structure and firm behavior, it is desirable to allow exogenous variables to have a lasting impact on TFP through the lagged endogenous variable.[11]

The impact of demand on TFP through unmeasured factor utilization (see Cette, Dromel, Lecat and Paret, 2011) is controlled for by the use of firm-level demand shifters and, at the macroeconomic level, through Country by Year dummies, b, to account for the business cycle.

The firm-specific fixed effects are meant to capture residual heterogeneity in firm size, geographic location, industry or unobserved management quality. Nonetheless, like in a typical linear dynamic panel data model, by construction, unobserved fixed effects are correlated with the lagged dependent variable.

Thus, we will estimate the parameters by the consistent GMM estimator, paying attention to the choice of the weighting matrix in the variance/covariance of the residuals (Windmeijer, 2005).

[11] We ought to say that equation (1) is not fully reflecting the impact of competition as we are unable to take firm entry/exit into account. Competition may indeed act by forcing unproductive firms to exit and allowing new firms to enter as predicted through the so called allocative efficiency effect discussed in our survey section. Yet our samples do not embody information on whether a firm enters/exits the market or our databases.

Finally, there is another source of simultaneity that we are going to control for: both (current) mark-up and TFP are highly pro-cyclical, such that the estimate of the mark-up coefficient (without instruments) would be biased upward. Following previous research in this field (Griffith, Harrison and Simpson, 2010; Ospina and Schiffbauer, 2010), we adopt a two-step empirical strategy with the purpose of solving the latter problem, paying attention to identify the parameters of interest that are valid under certain assumptions.

We therefore estimate a first stage equation, with the mark-up as the dependent variable and the index of product market regulation an some controls among the regressors, and a second stage (equation 1) where we use the (predicted) level of rents as our main variable of interest.

Equation (2) is indeed the first stage specification of our model:

$$\mu_{ijtc} = \lambda_{1,c} BAR_{jt-1c} + \lambda_2 DS_{ijtc} + \lambda_3 Z_{ijtc} + b_{tc} + \alpha_i + u_{ijtc} \qquad (2)$$

In the baseline specification, our main instrument for the mark-up is BAR, the indicator of barriers to entry (as measured by the PMR index). The main instrument is thus sector specific, as well as time and country-varying. Hence, when estimating this model, we need to correct the standard errors for clustering (Moulton, 1990). We do it at the sector level.

Even in the first stage, we control for economy-wide and firm-specific business cycle effects through DS, the demand shifter (the growth of current-price firm turnover)[12] and b, the country-by-year dummies.

In the set of controls Z, we include the squared turnover growth, the lagged TFP growth, and the change in employment at the firm level. This is to account for the fact that mark-up is likely higher in more successful firms in productivity and employment creation terms. Unobserved firm fixed effects are also allowed to characterize the mark-up.

We will use both the within-group or GMM consistent estimators to predict the mark-up in equation (2).

To sum up, in our two-stage model, the list of our excluded instruments includes BAR at t-1, the growth rate of contemporaneous squared turnover, lagged TFP growth and the lagged change in employment, while the endogenous variables to be instrumented are the mark-up, the demand shifter and lagged TFP.

Note that, being excluded from the second stage, BAR affects TFP only through the mark-up and not directly.[13] Our assumption on BAR implies that the full-fledged (impact + delayed) effect of liberalizing entry on productivity can be computed by combining the estimated coefficients from the first and the second stage of our empirical exercise. In one of our robustness checks, we allow for an alternative specification where BAR enters directly into the second stage. We also implement the C-test of endogeneity of excluded instruments which confirm the exogeneity of BAR as well as the other instruments. Both eq.(1) and (2) will be tested under a robustness check process, as explained the next section.

[12] Notice that the demand shifter is also instrumented through the lagged change in employment, as in the second stage.

[13] It would be possible to argue that barriers to entry are themselves not exogenous: however, Sargan-Hansen tests confirm the exogeneity of this instrument; one source of reverse causality would be the fact that sectors with low mark-up or low TFP ask to be protected by barriers, but in that case, λ_1, the barrier coefficient, would be biased downward; hence as long as this coefficient is positive, our qualitative results remain robust.

5 RESULTS

We present the first stage results from our analysis, then we discuss the second stage results together with the OLS estimates. Finally we present the results from some robustness checks.

5.1 Baseline regressions (table 2)

As shown in Table 2, expected from our previous discussion, mark-up levels appear to depend positively on the level of barriers to entry: this is consistent with the idea that barriers to entry protect the incumbents and make them benefit from rents. The demand shifter variable is positively correlated to mark-ups as increasing cyclical activity, reflected by turnover growth, tends to support the use of capacity and hence mark-ups. Other excluded instruments are used in the second stage equation (lagged differenced dependent variable and employment). We integrate them into the first stage equation but our evidence do not change. The barrier-to-entry coefficient is strongly statistically significant and not too far from a point wise estimate of almost 0.035. Therefore, the impact of barriers to entry on mark-ups is large, at least for some industries: a 5-point decrease in entry barriers - i.e. the actual decline in the barriers to entry indicator for Telecom in France over the 1995-2007 period - would chop off more than 17 percentage points in the mark-up. The results for equation (1) are reported in column (3) of Table 2. The list of instruments includes the entry barrier indicator, the lagged first-differenced employment and TFP. All tests show that we have strong and valid instruments for the equation. As shown in the next sections, results are robust to changes in instruments, specifications and exclusion of outliers. The lagged dependent variable - log TFP_{t-1} - is statistically significant and fairly sizable. The point-wise estimates are around 0.3, bounded away from one. This confirms that the short-run and long-run correlations of mark up (and entry barriers) with TFP are different, and that product market regulation tends to result in persistent outcomes.

Based on our estimates, the order of magnitude of this difference is as high as 1.5 pp. As expected, the demand shift has a positive impact on TFP, as greater use of capacity is not fully captured in our measure of TFP. As far as our main variable of interest is concerned, the level of mark-up is negatively correlated with TFP.[14] This is consistent with the results in Nickell (1996), Blundell, Griffith and van Reenen (1999) and Griffith, Harrison and Simpson (2010). The point-wise estimate for the mark-up is negative (-0.202).

When multiplied by +0.0349 (the average counterpart of entry barriers on the mark-up), this would give an estimated effect of entry barriers on TFP of -0.007 in the short run and -0.010 in the long-run, a significant effect. A 5-point reduction in barriers, such as the one experienced by Telecom in France, would increase TFP in the long run by 5 per cent. If both countries were to adopt OECD's countries best practices for service sector regulations, it would increase services' TFP in the long run by 3.5 per cent in France and 3 per cent in Italy. We believe that this effect is even underestimated, as we do not take into account the fact that lower barriers to entry will lead productive firms to enter the market and unproductive ones to exit (allocative efficiency effect). Our results may have a caveat: we take into account the impact of barriers to entry only

[14] In the annex, the within FE results are presented. As expected, an upward bias shows up in the estimates of the coefficient of the mark-up, as both TFP and mark-up are highly pro-cyclical, as emphasized by the coefficient of the demand shifter.

indirectly, through the mark-up. Barriers to entry could have a direct, independent effect on TFP, for example by enabling shareholders to better monitor the performance of managers (Holmström, 1982). However, the coefficient of barriers to entry, when directly introduced into the second-stage, is not significant and, moreover, the C-tests of individual instrument validity (cf. section 5.6 and Table 7) confirm the exogeneity of barriers to entry. Hence, mark-up seems to capture most of the impact of barriers to entry. This also suggests that our identifying assumption is not rejected by the data. The linear formulation is not the only game in town, though. Based on Aghion, Bloom, Griffith and Howitt, we test for a quadratic impact. However, Askenazy, Cahn and Irac (2013) showed that the quadratic relationship between competition and R&D held mostly for large firms, while the relationship was largely linear for smaller firms. Moreover, it may not hold in the service sector, which relies less on R&D than manufacturing sectors. In this new specification, we could not identify correctly and separately the linear and the quadratic terms and the results were very fragile. Hence, our preferred formulation is the linear one, which appears more robust.

5.2 Country heterogeneity (table 3)

In Table 3, we allow the slope to differ between the two countries, both for barriers to entry and the markup. For barriers to entry, it turns out that the estimated coefficient for France is much larger than the Italian one: 0.045 as opposed to 0.010. This is partly due to a composition effect of the two databases: the Italian database includes a bigger proportion of small firms than the French one (Table 1.1) and the barriers to entry coefficient is significantly larger for 50 employees or above (cf. section 5.3 and Table 4).

As in the mark-up equation, the estimated slope coefficients of the second stage appear in fact not to be equal in the two countries. The mark-up coefficient is much bigger - in absolute value - for Italy than for France: -0.5 as opposed to -0.2. We conjecture that this is due to the fact that firms, when faced with stringent regulation, may divert a bigger fraction of their value added into the black market in Italy than in France. Taking these estimates at face value, one can obtain the short-run and the long-run impact of entry barriers for TFP. The long-run effect of a one-point increase in barriers to entry would amount to a TFP variation of -0.75% for Italy and -1.2% for France.

5.3 Size heterogeneity (table 4)

In Table 4, we let the slopes differ according to firm size. The relevant threshold was found at 50 employees which, at least in France, triggers many regulatory constraints (creation of work councils, Hygiene and Security Council, etc.). Small firms may have a different sensitivity to competition and regulation, although it is hard to determine theoretically in which direction. Bankruptcy is more threatening for small firms, which should make them more sensitive to the impact of competition (Nickel et alii, 1997); on the other hand, small firms suffer less from manager-shareholders agency problems as there is a larger proportion of small firms owned by their managers (Hölmstrom, 1982). Our results reflect this balanced theoretical analysis: barriers to entry tend to have a smaller impact on mark-up for small firms, although the difference is not very large; no significant effect is found on mark-up.

5.4 Industry heterogeneity: Retail sector evidence (table 5)

The firms in the retail sector represent two thirds of our sample. Hence, in order to test whether the estimated relationships hold true for this sector in some special way, we add a Retail sector dummy interacted with barrier to entry in equation 2 and with mark-up in equation 1. A statistically significant interaction term would imply that firms in the retail sector display a different elasticity from the rest of the sample. The results are presented in Table 5. For the first stage, the retail sector mark-up is significantly more sensitive to barriers to entry than other sectors: a one-point decrease in Retail barrier to entry leads to a 6.5 percentage points decrease in mark-up, compared to 2.5 points elsewhere. This result is quite appealing as there are lower fixed costs in entering this sector compared to other sectors (in particular network industries). Entry is easier when regulatory barriers are lifted. In the second stage, the retail dummy coefficient is not significant, showing that it does not differ from other sectors with regard to the impact of mark-up on performance.

5.5 Robustness checks (table 6, 7 and 8)

We perform a number of additional robustness checks of our main results. First, we test for robustness to the exclusion of specific observations (Table 6). Column 1 presents the reference regression. Column 2 presents the regression removing the top and bottom 10% of TFP values for each firm. Columns 3-8 present regressions removing one by one the sectors representing more than 2% of the total observations.

Coefficient signs appear robust to all of these exclusions. The mark-up coefficient is stronger when removing the top and bottom 10%, which is a particularly good sign of robustness, but lower when removing some sectors. The Sargan tests are still valid for all regressions. The second set of robustness checks concerns the choice of the instruments (Table 7). In the reference result (column 1), we use barriers to entry as the excluded instrument, as a competition indicator, the lagged differenced dependent variable in an Arellano-Bond style, lagged differenced employment and twice differenced turnover, as demand shifters. In order to test for the robustness of this instrumentation, we first remove sequentially our instruments and replace them with the age of the firm, which is a more neutral instrument (column 2-4).

The results, in particular the mark-up coefficient, are robust to removing employment or the lagged dependent variable, and the Sargan test remains valid. When removing barriers to entry or the demand shifter (turnover), the mark-up coefficient is still negative but no longer significant, although the Sargan test is still valid (columns 5-6). A difference-in-Sargan or C-test is conducted to check the validity of instruments individually. None are rejected and in particular, the exogeneity of barriers to entry is confirmed, which supports our hypothesis of an intermediated impact of regulation on TFP through the mark-up. This shows that the efficiency of the instrumentation of the mark-up depends heavily on barrier to entry, which captures the intensity of competition, and correction for the firm-specific cycle.

Finally, we test robustness to changes in specification and estimation methods (Table 8). We first remove the firm-specific demand-shifter (turnover) and the lagged dependent variable (columns 2 and 3). The mark-up coefficient remains negative and significant, although it is lower. GMM estimator barely affects the results, as shown in column 4 (estimate without using GMM).

Then we change the way we compute TFP, by allowing non-constant returns to scale. This is not our preferred formulation as estimation techniques with free parameters for labor and capital tend to be either biased by unobserved productivity shocks or rely on proxies such as intermediate inputs (Levinsohn and Petrin, 2003), which are not relevant for the service sectors we cover. The coefficient of mark-up is barely changed by the use of this “free parameters” TFP, while the demand shifter has a higher coefficient, reflecting a more pro-cyclical TFP. In line with Aghion et alii (2009), we introduce a distance to frontier variable, based on mean TFP of the last sector-year decile of TFP. This variable is positive as expected and significant, and the mark-up coefficient is slightly higher but significant. Then we turn to a very different specification, in first difference. Equation (1) is taken in differences, thus removing firm-fixed effects. In the first stage equation, barriers to entry are not differentiated, as it is a rather inert indicator. The strength of the instruments is hence not as strong, as we regress changes in mark-up on the level of barriers to entry.

Coefficients have the expected signs, although the mark-up coefficient is not estimated as precisely, which could be sensible, given the loss of efficiency of the instruments. We conclude that our specification withstands most, although not all, the sensitivity and robustness analyses. Our preferred linear formulation appears to be robustly estimated.

6 CONCLUSIONS

In this paper, we have studied the relationship between one specific type of regulation, namely barriers to entry, and total factor productivity in the same industry where regulation is present. We find a negative relation between our main variables of interest: this is because entry barriers are associated to higher mark-up, which in turn is negatively correlated to productivity. The estimated relation appears to be crucially intermediated by the firm mark-up. As expected, our results indicate that the short run effect of entry barriers are smaller (by about one and a half times) than its long-run effects. If both countries were to adopt OECD countries’ best practice for services regulation, their long-run productivity in these sectors would increase by 3.5 per cent in France and 3 per cent in Italy. These estimates are however underestimated as we do not take into account the allocative efficiency effect from alleviating barriers to entry. Whether the partial correlation between our variables of interest is the result of a quadratic specification - measuring the so called “Aghion effect” - remains to be substantiated in further research.

This effect is more likely to materialize in high-tech industries, where the so called “escape competition” effect is plausible, rather than in the service industries we are looking at in our study. And it is also more likely to be important for variables measuring innovation efforts such as R&D and productivity growth, as opposed to productivity levels.

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Table 1 – Descriptive statistics

Table 1.1 Database statistics	FiBEn	AIDA
Number of firms	13 349	15 070
Size (number of employees)		
0-20	51%	80%
20-50	34%	12%
50-250	13%	7%
250 and more	2%	1%
Sectoral composition		
Retail trade, except of motor vehicles and motorcycles	67,1%	68,2%
Freight transport by road	21,5%	20,4%
Passenger air transport	0,1%	0,1%
Postal and courier activities	0,1%	0,4%
Telecommunications	0,0%	1,0%
Legal activities	0,3%	0,1%
Accounting, bookkeeping and auditing activities; tax consultancy	5,2%	5,1%
Architectural activities	0,5%	1,2%
Engineering activities and related technical consultancy	5,0%	3,4%

Table 1.2 Main variables statistics			Q1	Median	Q3	Mean	Standard error
Employees	Average number of employees per firm and per year, not corrected for part-time	France	10,0	19,0	39,0	63,0	1729,0
		Italy	3,0	6,0	15,0	25,8	152,5
Turnover	'000 € per firm and per year	France	1 461	2 640	6 309	9 768	150 052
		Italy	700	1 509	3 762	6 639	50 177
Labor productivity	Value added in volume (in '000 €) per employee	France	31,0	39,4	50,0	42,0	16,3
		Italy	31,7	41,6	54,7	45,2	21,0
Total factor productivity growth rate	Growth-accounting method in a Cobb-Douglas constant return to scale framework (yearly growth rate in %)	France	-6,7	3,2	12,7	2,6	21,6
		Italy	-15,7	2,0	18,7	1,7	41,7
Mark-up	Rate, %	France	12,3	19,2	33,7	27,3	22,7
		Italy	26,7	41,9	69,1	48,7	28,5
Barrier to entry	0-6 indicator (see Conway and Nicoletti, 2006), from the smallest to the the largest barrier to entry in the	France	3,5	3,5	4,0	3,7	0,66
		Italy	3,6	4,0	4,0	3,7	0,71

Table 2 – Baseline regressions

Dependent variable:	(1) Mark-up μ	(2) Mark-up μ	(3) Total Factor Productivity	(4) Total Factor Productivity
Barrier to entry	0.0349**	0.0357**		0.00896
	(0.00755)	(0.00749)		(0.00504)
mark-up μ_t			-0.202**	-0.331**
			(0.0619)	(0.126)
Total Factor Productivity$_{t-1}$			0.310***	0.320***
			(0.0124)	(0.0142)
Δ.Turnover$_t$	0.0593** (0.0144)		0.266*** (0.0129)	0.275*** (0.0148)
Δ^2.Turnover$_t$		0.0362***		
(demand shifter)		(0.00683)		
Δ.Total Factor Productivity$_{t-1}$		0.0568***		
		(0.00852)		
Δ.Employment$_{t-1}$		0.0436***		
		(0.00357)		
N	105 969	105 969	105 969	105 969
r2	0.192	0.200	0.0898	0.0181
Sargan statistic			0.564	3.686
(p-value)			0.453	0.158

Standard errors in parentheses. All variables in log but mark-ups and barrier to entry indicators. Constants and country*year dummies are included but not reported. Columns (1) and (2): Fixed effect estimates with clustering by sector. Columns (3) and (4): estimation by two-stage least square, GMM estimators, robust standard errors and individual fixed effects. Column (2) is the first stage equation of column (3); for column (4), instruments include squared barrier to entry. First-step estimates' F tests indicate that instruments are strongly significant. Sargan-Hansen tests of over-identification do not reject the null hypothesis of orthogonality of instruments. Hausman test rejects the null hypothesis of exogeneity of mark-ups. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3 – Country heterogeneity

	(1) mark-ups μ	(2) Total Factor Productivity
Barrier to entry-Italy	0.00977**	
	(0.00232)	
Barrier to entry-France	0.0447***	
	(0.00654)	
mark-up μ - France		-0.187**
		(0.0704)
mark-up μ - Italy		-0.532***
		(0.109)
Δ.Turnover	0.0654**	0.278***
(demand shifter)	(0.0140)	(0.0138)
Total Factor Productivity$_{t-1}$		0.320***
		(0.0134)
Δ.Total Factor Productivity$_{t-1}$	0.0504***	
	(0.00611)	
Δ.Employment$_{t-1}$	0.0325***	
	(0.00111)	
Observations	105 969	105 969
R^2	0.205	-0.0325
Sargan statistic		2.494
(p-value)		0.114

Standard errors in parentheses. See note in Table 2. Column (2): Estimation by two-stage least square, with GMM estimators, robust standard errors and individual fixed effects. Instruments are barrier to entry indicator, lagged TFP, lagged differenced mark-up (interacted with country dummy), twice differenced turnover and employment in first difference. First-step estimates' F tests indicate that instruments are strongly significant. Hausman test rejects the null hypothesis of exogeneity of mark-ups.

Table 4 – Size heterogeneity: Small and medium enterprises - SME (<50 employees)

	(1) mark-ups μ	(2) Total Factor Productivity
Barrier to entry	0.0390**	
	(0.00825)	
Barrier to entry-SME	-0.00527**	
	(0.00125)	
		-0.312***
mark-up μ		(0.0800)
		0.125
mark-up μ - SME		(0.0757)
Δ.Turnover	0.0601**	0.265***
(demand shifter)	(0.0143)	(0.0127)
Total Factor Productivity$_{t-1}$		0.309***
		(0.0127)
Observations	105 969	105 969
R^2	0.193	0.0906
Sargan statistic		3.370
(p-value)		0.498

Standard errors in parentheses. All variables in log, but mark-ups and barriers to entry indicators. Fixed effect estimates with clustering by sector for column 1. Estimation by two-stage least square, with GMM estimators, robust standard errors and individual fixed effects for column 2. Constants and Country-Year dummies are included but not reported. Instruments are barrier to entry indicator, lagged differenced TFP, twice differenced turnover, firm age, lagged differenced mark-up for SMEs and employment in first difference. First-step estimates' F tests indicate that instruments are strongly significant. Sargan-Hansen tests of instruments over-identification do not reject the null hypothesis of orthogonality of instruments. Hausman test rejects the null hypothesis of exogeneity of mark-ups.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5 – Industry heterogeneity: Estimations for the retail sector

	(1) mark-ups μ	(2) Total Factor Productivity
Barrier to entry-Retail$_{t-1}$	0.0422***	
	(0.0118)	
Barrier to entry$_{t-1}$	0.0241***	
	(0.00503)	
Mark-up-Retail		-0.021
		(0.136)
Mark-up		-0.210***
		(0.0818)
Total Factor Productivity $_{t-1}$		0.312***
		(0.0151)
Δ. Turnover (Demand shifter)	0.0587***	0.267***
	(0.0141)	(0.0150)
Observations	105 969	105 969
R^2	0.194	0.0773
Sargan statistic		2.777
(p-value)		0.249

Standard errors in parentheses. All variables in log, but mark-ups and barriers to entry indicators. Fixed effect estimates with clustering by sector for column 1. Estimation by two-stage least square, with GMM estimators, robust standard errors and individual fixed effects for column 2. Constants and Country-Year dummies are included but not reported. Instruments are barrier to entry indicator, lagged TFP, twice differenced turnover, firm age and employment in first difference. First-step estimates' F tests indicate that instruments are strongly significant. Sargan-Hansen tests of instruments over-identification do not reject the null hypothesis of orthogonality of instruments. Hausman test rejects the null hypothesis of exogeneity of mark-ups. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6 - Robustness - Sensitivity to specific observations

Dependent variable: Total Factor Productivity	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Excluding…	Reference equation	10% extreme values of TFP above and below	Sector NACE 4711 Retail-food	Sector NACE 4759 Retail-furniture	Sector NACE 4771 Retail-clothing	Sector NACE 4941 Freight-road	Sector NACE 6920 Accounting	Sector NACE 7490 Engineering
mark-up μ	-0.202**	-0.482***	-0.155*	-0.249***	-0.200**	-0.252*	-0.310***	-0.238***
	(0.0619)	(0.0751)	(0.0679)	(0.0666)	(0.0632)	(0.114)	(0.0757)	(0.0674)
Total Factor Productivity$_{t-1}$	0.310***	0.249***	0.284***	0.325***	0.324***	0.464***	0.316***	0.313***
	(0.0124)	(0.00948)	(0.0137)	(0.0131)	(0.0123)	(0.0304)	(0.0131)	(0.0128)
Δ.Turnover	0.266***	0.185***	0.266***	0.257***	0.270***	1.898***	0.271***	0.267***
(demand shifter)	(0.0129)	(0.0109)	(0.0136)	(0.0136)	(0.0131)	(0.249)	(0.0136)	(0.0138)
Observations	105 969	85 593	86 070	96 155	98 502	81994	100 531	102 503
R^2	0.0898	-0.0708	0.0972	0.0687	0.0985	-0.683	0.0296	0.0676
Sargan statistic	0.564	0.165	0.383	2.384	0.263	3.085	1.984	0.631
(p-value)	0.453	0.685	0.536	0.123	0.608	0.214	0.159	0.427

Standard errors in parentheses. All variables in log, but mark-ups. Estimation by two-stage least square, with GMM estimators, robust standard errors and individual fixed effects. Constants and Country-Year dummies are included but not reported. First stage equation of (1) is reported in table 2. First-step estimates' F tests indicate that instruments are strongly significant. Sargan-Hansen tests of instruments over-identification do not reject the null hypothesis of orthogonality of instruments. Hausman test rejects the null hypothesis of exogeneity of mark-ups. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7 - Robustness - Sensitivity to changes in instruments

Dependent variable: Total Factor Productivity	(1)	(2)	(3)	(4)	(5)	(6)
mark-up μ	-0.202^{**}	-0.203^{**}	-0.219^{***}	-0.215^{***}	-0.151	-0.0735
	(0.0619)	(0.0619)	(0.0662)	(0.0645)	(0.205)	(0.195)
Total Factor Productivity$_{t-1}$	0.310^{***}	0.310^{***}	0.314^{***}	0.297^{***}	0.293^{***}	0.302^{***}
	(0.0124)	(0.0124)	(0.0133)	(0.0219)	(0.0675)	(0.0170)
Δ.Turnover	0.266^{***}	0.266^{***}	0.266^{***}	0.259^{***}	0.109	0.257^{***}
(demand shifter)	(0.0129)	(0.0129)	(0.0130)	(0.0157)	(0.590)	(0.0177)
Instruments						
Barrier to entry$_{t-1}$	YES	YES	YES	YES	YES	NO
Δ².Turnover	YES	YES	YES	YES	NO	YES
Δ.Total Factor Productivity$_{t-1}$	YES	YES	YES	NO	YES	YES
Δ.Employment$_{t-1}$	YES	YES	NO	YES	YES	YES
Age of the firm	NO	YES	YES	YES	YES	YES
Observations	105 969	105 969	105 969	105 969	105 969	105 969
R^2	0.0898	0.0890	0.0804	0.0828	0.100	0.154
Sargan statistic	0.564	1.274	0.700	0.686	1.005	0.835
(p-value)	0.453	0.529	0.403	0.408	0.316	0.361
C-test (p-value)	-	-	0.450	0.446	0.893	0.502

Standard errors in parentheses. All variables in log, but mark-ups. Estimation by two-stage least square, with GMM estimators, robust standard errors and individual fixed effects. Constants are included but not reported. First stage equation of (1) is reported in table 2. First-step estimates' F tests indicate that instruments are strongly significant. Sargan-Hansen tests of instruments over-identification do not reject the null hypothesis of orthogonality of instruments. Hausman test rejects the null hypothesis of exogeneity of mark-ups. The C-test is a complementary test for the orthogonality of subsets of instruments: the statistics p-value is presented for the instrument which is not in the instrument list and do not reject the exogeneity of any instruments. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8 - Robustness - Sensitivity to different specifications

Dependent variable: Total Factor Productivity	(1) Reference equation	(2) without Δturnover	(3) without lagged TFP	(4) without GMM	(5) TFP with free parameters	(6) with Frontier TFP	(7) first difference
Mark-up μ	-0.202***	-0.113*	-0.139**	-0.183***	-0.197**	-0.172***	
	(0.0619)	(0.0599)	(0.0671)	(0.0593)	(0.0855)	(0.0613)	
ΔMark-up							-0.743**
							(0.375)
Total Factor Productivity$_{t-1}$	0.310***	0.280***		0.311***	0.423***	0.308***	
	(0.0124)	(0.0117)		(0.00754)	(0.0273)	(0.0125)	
Δ.Total Factor Productivity$_{t-1}$							0.306***
							(0.0320)
Δ.Turnover (demand shifter)	0.266***		0.143***	0.266***	1.545***	0.263***	
	(0.0129)		(0.0112)	(0.00864)	(0.221)	(0.0128)	
Δ^2.Turnover (demand shifter)							0.424**
							(0.133)
Frontier TFP $_{t-1}$						0.120***	
						(0.0188)	
N	105 969	105 969	105 969	105 969	105 274	105 675	86 525
r2	0.0898	0.0984	0.0488	0.0995	-0.4887	0.107	-0.661
J	0.564	0.133	0.409	1.280	0.047	0.460	2.957
Jp	0.453	0.715	0.522	0.258	0.8288	0.497	0.228

All variables in log, but mark-ups. Estimation by two-stage least square, with GMM estimators, robust standard errors and individual fixed effects, but for column 4 (without GMM estimators) and 7 (without fixed effect). Constants and Country-Year dummies are included but not reported. First stage equation of (1) is reported in table 2. First-step estimates' F tests indicate that instruments are strongly significant, although weaker in column 7. Sargan-Hansen tests of instruments over-identification do not reject the null hypothesis of orthogonality of instruments. Hausman test rejects the null hypothesis of exogeneity of mark-ups.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ - Standard errors in parentheses

Annex- Fixed effect estimates

Dependent variable: Total Factor Productivity

	(1)	(2)	(3)	(4)	(5)
Δ Turnover	0.240***	0.243***	0.224***	0.237***	0.223***
(demand shifter)	(0.00440)	(0.00439)	(0.00419)	(0.00440)	(0.00418)
mark-up μ	1.045***	1.057***	2.328***		
	(0.00560)	(0.00562)	(0.0143)		
Total Factor Productivity$_{t-1}$	0.190***	0.190***	0.172***	0.186***	0.167***
	(0.00284)	(0.00284)	(0.00271)	(0.00285)	(0.00271)
Barrier to entry		-0.0400***			
		(0.00188)			
Squared mark-up μ^2			-0.988***		
			(0.0102)		
mark-up μ - France				1.149***	2.701***
				(0.00948)	(0.0205)
mark-up μ - Italy				0.991***	1.982***
				(0.00685)	(0.0197)
Squared mark-up μ^2 France					-1.253***
					(0.0149)
Squared mark-up μ^2 Italy					-0.745***
					(0.0140)
N	108 575	108 575	108 575	108 575	108 575
r2	0.420	0.423	0.476	0.422	0.480

Standard errors in parentheses. All variables in log, but mark-ups. Fixed effects estimates. Constants and Country-Year dummies are included but not reported. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

APPENDIX A: DATA METHODOLOGY

The OECD PMR incorporates two distinct indexes: the non-manufacturing sectors (NMR[15]) indicator and the FDI-restrictiveness indicator. The NMR comprises network sectors (ETRC indicator[16]), retail trade and professional services. The indexes are built on the basis of codes associated to questions answered by each OECD member state – typically related to sector's entry regulation, ownership share of public authorities, and price controls.

We focus on the NMR index in the particular low level indicator of entry regulation called "Barriers to Entry". We use the same questions and weights of the OECD survey to compute the (low) level indicator for each sector separately, updating the value for each year in 1995-2007 period.

As for "Barriers in network sectors", the PMR weighted index is computed as entry regulation[17] for air, road, post and TLC.

The "Barriers in Retail sector" weighted index is calculated as:

⅓ Licenses or permits needed to engage in commercial activity+

⅓ Specific regulation of large outlets+

⅓ Protection of existing firms.

"Barriers in Professional Services sectors" are calculated on the basis of the following main issues:

⅓ Licensing +

⅓ Education requirements +

⅓ Quotas and economic needs test.

[15] For a complete list of the questions and coding of answers of the indicators, see Conway P., Nicoletti G., Product market regulation in non-manufacturing sectors of OECD countries: measurement and highlights, 2006, ECO/WKP(2006)58 (No. 530).

[16] ETRC indicator refers to electricity, gas, air transport, rail, road freight transport, post and telecommunications.

[17] See table 13 page 51 of Woefl A., Wanner I., Kozluk T., Nicoletti G. (2009).

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