This draft: August 30, 2011

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

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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. In line with some previous studies, we find that the relation between entry barriers and productivity is negative. This relation is intermediated through the firm's mark up and is stronger in the long than in the short run.

This work is part of a research project on "Regulation and firm performance" funded by the Fondation Banque de France. We would like to thank, without implicating, Gilbert Cette, Jacques Mairesse, Cyrille Schwellnus and the seminar participants in the OECD-Banque de France workshop on "Structural reforms, crisis exit strategies and growth" and in an internal seminar at the Banque de France for their highly useful comments on a first draft of this paper. We are very grateful to Gilbert Cette for encouraging our collaboration. Our warm thanks also go to our very dedicated research assistants, Jocelyn Boussard and Alessia Savoldi.

1. Introduction

In recent years the alleged growth-enhancing effects of a broad range of reform measures have been extensively investigated with aggregate, cross-country or cross-industry data as well as with firm-level data. This strand of research has produced a vast array of correlations between policy variables – the input side of the analysis – and firm, industry and country performances – the output side of the analysis. One of such investigated patterns of correlation is the one between product and service market regulation and productivity growth and levels.

Investigating the impact of "reforms" on economic performance may be problematic, though. Reforms are often multi-dimensional measures and the economic counterpart of their different dimensions may go through separate but hard-to-disentangle channels. Different bits of reform programs may be collinear with each other, thereby making the task of identifying the effect of each bit separately a daunting one. An early description and documentation of this problem with reference to the role of policy variables in cross-country growth regressions was in Levine and Renelt (1992). More recently, Griffith and Harrison (2004, Appendix D, Table 30-33) exemplified these problems with reference to the estimated coefficients of electricity, gas and water supply in employment and productivity industry regressions.

In a nutshell, it would be desirable to know more on the quantitative consequences of reforms on performance, but this is not easy to grasp. To gain some insights on this, we follow the deliberate strategy of cutting a small slice of the overall issue in such a way to be able to provide a relatively specific - and hopefully meaningful - answer to the big question of whether market reforms are good for growth. We look at regulation of service industries

By contrasting the experience of two regulation-riddled countries such as France and Italy, we aim to provide two-step empirical evidence on whether reform in the service industries - the least exposed to globalization winds and therefore the more prone to be plagued by protection and barriers to entry - has affected firm performance, and notably total factor productivity. In the second half of the 1990s through the early 2000s both France and Italy have been swept by a wave of product and - notably - service market reforms. Yet aggregate data indicate that this wide-ranging set of reforms has not been paralleled by faster growth and not even by positive productivity developments in either country. International comparison shows that the growth and productivity performance of Italy has been particularly wanting in those years. But even in the French economy, whose overall growth rate has proved more resilient, productivity performance

from the second half of the 1990s onwards has been disappointing compared to the distant and even the close past. This begs the question of whether the overall focus on product and service market reform to enhance productivity - a topic of contention in public discussion in Europe at large, not just in France and Italy - has been perhaps misplaced.

This is not the only possibility, though. It might be that the positive results of reforms on economic performance have been so localized in certain industries that they have been unable to offset other negative contingencies. Or rather it might be that the beneficial effects from product and service market liberalization have only partially materialized so far.

In any case, after 2007 the post-Lehman-bankruptcy crisis hit the two economies thereby mixing up the overall picture in recent years. Yet before the crisis, as indicated by the various industry panels in Figure 1, the pair-wise within correlation between deregulation and productivity in the service industries object of the deregulation is there both in Italy and France.

This encouraged us to pursue our strategy of confining our attention to a small part of the overall picture to start with. In practice, we use firm-level panel data merging two separate and novel data sets for France and Italy to explore the impact of the extent of service deregulation implemented in the two countries on the performance of firms in the industries where reform took place. We proceed in two steps. We first 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 ask ourselves whether the induced changes in mark-ups originated from diminished barriers to entry have translated into TFP and labor productivity changes.

Our data set spans from 1998 to 2007 – an appropriate time span in principle. During this period of time, reforms have in fact been implemented with the goal of (de)regulating professional business activities, network industries and retail in France and Italy, although in a scattered fashion across industries and across countries. In both countries, service deregulation was the key element in an overall trend towards market liberalization. Yet this overall trend was not uniform either across countries or across industries within each country (again, see Figure 1). We exploit this country-industry variation and contrast it with firm-level variation in performances, as intermediated by changes in the firm mark up, for those firms active in the service industries directly affected by product market reforms.

To carry out our exercise, we have constructed time-varying qualitative variables that summarize the implementation of service deregulation for retail, road freight, airlines, post, telecommunications and business services. As a result, the industries included in our sample provide service inputs to manufacturing and other service industries as well as to consumers.

To be specific we refer to one main area of regulation: barriers to entry. This area appears to be the most directly linked to the firm mark up, as opposed to public ownership. Public ownership may be bad for productivity but not through a higher markup (if anything, the relation should be the opposite). Barriers to entry, instead, are supposed to be in most cases associated to higher mark ups.

The importance of the link between barriers to entry and the mark up is indeed at the center of the literature in this area. The main channel through which regulatory reform feeds into enhanced or stifled firm performance is by affecting the level of economic rents available in the market. This fact in turn affects the discrepancy between prices and marginal costs, the reallocation of inputs and outputs and incentives to engage in efficiency-enhancing activity and innovation, at the firm as well as the industry level. Regulation is often associated to higher mark-ups because erecting barriers to entry is in general the most common form of restricting competition. And restricting competition would typically result in higher margins for the incumbent firms, while potential innovators are artificially kept outside the market. This relation does not necessarily hold in network industries, however, if average cost curves are negatively sloped. In these industries the nature and quality of regulation may perhaps affect the industry outcome more crucially than the actual extent of regulation. As summarized by Griffith and Harrison (2004), however, allocative efficiency gains would arise as prices are brought more in line with marginal costs. Additional productive efficiency gains may originate through economies of scale and scope as the composition of output shifts towards more profitable uses. Finally, dynamic efficiency gains may eventually originate if in a more competitive environment the pace of innovation accelerates. Distinguishing between these various effects – and notably between productive and dynamic efficiency gains – has proved difficult in the empirical literature.

We chose to investigate the mechanism that should in principle more likely deliver the results emphasized in previous studies. If regulation is bad for productivity growth, this should be immediately visible in the industries where regulation is imposed, more so for the specific regulation mode represented by barriers to entry and it should go through the mark up. This may

not be the only reason why regulation is bad for productivity: in recent papers, Bourlès, Cette, Lopez, Mairesse and Nicoletti (2010) and Barone and Cingano (2011) have brought to bear substantial evidence that the indirect damaging effects of regulation onto productivity may be more important than the direct ones. But, if they are there, the negative effects of regulation on productivity should start from there: at the firm level, in the very industry where regulation is introduced, through the mechanism of transmission that goes from policy to performance through rents. This may or may not be the main thing going on, but if this direct effect is not there, any other effect of regulation is at least more complicated to grasp.

Our results indicate that the link we have been searching for is there. We find that barriers to entry are associated to higher mark-ups, and in turn higher mark-ups are statistically related to economic performance as proxied by total factor productivity. Whether the relation between rents and productivity is a negative relation or an inverted U is slightly more controversial. Our preferred empirical formulation delivers a negative and strongly statistically significant coefficient of the mark-up in productivity equation, with an overall impact of barriers to entry on productivity stronger in France than in Italy. This result withstands changes of specification, changes of instruments and exclusion of specific observations. We also find an inverted-U curve between mark-up and productivity, but when the two slopes are allowed to differ across countries, we do not find a similar relationship for Italy, although it appears in the "Within" formulation (with no instruments). Hence we are inclined to conclude that in France and Italy barriers to entry are just bad for productivity for they are associated to higher mark ups.

Our paper is structured as follows. In section 2, we describe our data set and indicators. In section 3, we describe our empirical strategy. In section 4 we present our main results and the related robustness checks. Section 5 briefly summarizes the relations between our research questions and findings and the literature on regulation, productivity and growth. Section 6 concludes.

2. Data and indicators

2.1 Data

To study the relation between regulation in services and productivity we use firm level data on France and Italy for the 1998-2007 period to compute a productivity indicator (TFP) and we use

the OECD product market regulation database to derive barrier-to-entry indicators. The length of our period of analysis is dictated by data availability in the AIDA database. The period of analysis is long enough to include a few regulatory policy changes taking place in both countries.
We work on nine service sectors inclusive of utilities as well as retail and business services (see the list in Table 1) for which there are barriers to entry due to regulatory constraints. In the other sectors of the economy, regulatory barriers to entry were 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 behaviour 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.
Our empirical analysis merges two firm-level annual datasets, FiBEn for French firms, constructed by the 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.
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 15070 firms over the 1998-2007 period, against 13349 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 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.
Table 1.1 also shows that the two data sets 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 small firms

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

2.2 Productivity and regulation indicators

AIDA and FiBEn allows one to calculate firm-level value added (Q), capital (K) and employment (L) volumes. 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[1]. The volume of value added is then calculated by dividing value added in value by a national accounting index of value added price at the two-digit industry level.

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 price). We then use the perpetual inventory method to compute the capital stock after the date of entrance in the database. The average employment level (L) is directly available in FiBEn and AIDA. We do not have data for hours worked.

We can then derive a measure of total factor productivity (TFP) calculated according to a growth accounting methodology in 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, whether letting labor and capital vary freely without constraining them to add to one as is the case under constant returns to scale changes our results. It seems it does not.

1 Clearly, not all of these items (e.g. "production stocked") are equally relevant for the various service sub-sectors.

We adopt this admittedly restrictive formulation for lack of better of alternatives. The methodology of Olley and Pakes (1996) is not problem free either for it implies restricting the analysis to those firms which exhibit non-zero investment flows. In most databases, this boils down to a substantial loss of observations, which is clearly not desirable. This problem is even more serious in our own database, given that FiBEn does not report investment flows whatsoever. For us, then, the Olley-Pakes methodology is simply not an option. Levinsohn and Petrin (2003) offer a potentially more palatable alternative. Instead of investment, they suggest the use of 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 it seems that 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[2] 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.

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 the high 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 differences 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 and the median firm as well as for the entire firm size distribution of the French firms when compared to the Italian firms. When we look at productivity growth rates, instead, a result more in line with common sense comes out of the summary data: 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

2 For the FiBEn database, intermediate consumptions represented 74% of turnover in 2009. For accounting, in our database, they represented 24%.

from the time series variation in the data (we will see this in the next section), the summary features of our sample appear to satisfactorily replicate common sense, which is reassuring.

The other 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-ups which, in line with some previous studies, we take as the main channel through which regulatory impediments to competition impact productivity.

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, electricity, gas, post, rail, air passenger transport, and road freight). 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); and (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 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.

The variables have thus been computed in three different ways: (i) according to the specific OECD sub-indicator (e.g. ETRC for network industries); (ii) according to the PMR questions. In this latter case, variables correspond to low level indicators; or (iii) according to the PMR questions and some changes in the coding of answers.

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 so as to be able to evaluate the within-industry correlation between product market regulation and performance as proxied by productivity.

For the information pieces not available through the OECD database, we referred to official legislation and to 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 the OECD. Unlike the OECD, though, we use the same questions and weights to compute the low level indicator for each sector separately rather than the average for all sectors.

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:

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

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.

3. Empirical strategy

We use the following log-linear form for productivity:

$$\ln TFP_{itc} = f_d(\hat{\mu}_{itc}) + \delta_1 \ln TFP_{it-1c} + \delta_2 DS_{itc} + \delta_3 Z_{ijtc} + b_{tc} + \eta_i + \varepsilon_{itc} \quad (1)$$

With TFP indicating total factor productivity, μ indicating the mark-up, DS indicating a demand shifter, Z a vector of control variables, b a set of country-year dummies, η a set of firm fixed effects, and the *i*, *c*, *j* and *t* subscripts being there for – 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 mark-ups, lagged TFP, demand shifter (firm turnover/sales at current prices) and controls. As competition acts through time, altering gradually market structure and firm behavior such as innovation policy, it is desirable to allow exogenous variables to have a lasting impact on TFP through the lagged endogenous variable. The impact of demand on TFP through unmeasured use of 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.

Unobservable firm-specific effects are controlled for capturing heterogeneity due to firm size, geographic location, industry or management quality, and by using the appropriate "within estimator" method.

We are not fully capturing the impact of competition as we are not taking into account firm entry/exit. Competition may indeed act by forcing unproductive firms to exit and allowing new firms to enter (allocative efficiency effect). It is however not possible to take into account that channel because we do not know if a firm enters/exits the market or our databases.

The empirical specification of the mark-up may be linear or quadratic[3]:

$$f_d(\hat{\mu}_{itc}) = \beta_{0,d} + \beta_{1,d}\hat{\mu}_{itc}$$
$$f_d(\hat{\mu}_{itc}) = \beta_{0,d} + \beta_{1,d}\hat{\mu}_{itc} + \beta_{2,d}\hat{\mu}^2_{itc} \quad (2)$$

Indeed, the literature has emphasized a potential quadratic impact of competition on innovation (Aghion, Bloom, Blundell, and Howitt, 2005). Up to a certain degree, competition 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, as from a certain degree of competition, the latter effect dominates the former.

There is a source of endogeneity though: both (current) mark-up and TFP are highly pro-cyclical, such that the estimates of the mark-up coefficient would be biased upward in equation (1). Following previous research in this field (Griffith, Harrison and Simpson, 2010; Ospina and Schiffbauer, 2010), we adopt a two-step empirical strategy to identify the parameters of interest that are valid under certain assumptions. We estimate in the first stage the effects of product market regulation on the level of rents, and in the second stage the effect of the level of rents on firm performance. We capture the level of rents available using the predicted mark-up from the first stage. We instrument the mark-up using, among others, barrier to entry indicators. The main instruments are thus sector specific as well as time and country-varying. The lagged dependent variable and the

[3] *d* indicates linear or quadratic function. The mark up effects on TFP are either estimated as averages or as country slopes.

demand shifter are instrumented as well. We control for unobservable characteristics by including firm fixed effects in both steps, and using the appropriate estimation method to treat them. We also control for business cycle effects appending a demand shift (the growth of firm turnover in current prices) and Country by Year dummies. To take into account the potential serial correlation and heteroskedasticity of the error term, generalized method of moments estimator and robust standard errors (appropriately corrected for the IV framework) are presented.

Our first stage equation is thus the following:

$$\mu_{ijtc} = \lambda_{1,c} BAR_{jt-1c} + \lambda_2 DS_{ijtc} + \lambda_3 Z_{ijtc} + b_{tc} + \alpha_i + u_{ijtc} \qquad (3)$$

i, t, c, j are the former unit indicators, DS = demand shifter, Z = control variables, α firm fixed effects, b_{tc} = country by year fixed effects, where BAR represents the sector level of barriers to entry. We allow the coefficient of BAR to vary for each country or we take it as a whole average effect. As we have individual-firm mark-up regressed on a "barriers to entry" index at the sectoral level, we correct the standard errors for the clustering problem (Moulton, 1990).

Our main identifying assumption that makes equation (3) qualitatively different from equation (1) is that BAR affects TFP only through the mark-up and not directly: BAR is our excluded instrument. This is confirmed by our estimate of an alternative specification where BAR enters directly into the second stage. This also implies that the full-fledged – impact and long-run - 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.

4. Results

We present the first stage results from our analysis first, then we move to presenting the second stage results together with the OLS ones. Finally we present the results from some robustness checks.

4.1 First stage results

As shown in Table 2 and as 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 shift variable is

positively correlated to mark-ups as increasing cyclical activity, as reflected by turnover growth, tends to support the use of capacity and hence mark-ups. As other excluded instruments are used (lagged differenced dependent variable and employment), we integrate them into the first stage equation but our results do not change.

As far as our main variable of interest is concerned, when we constrain the coefficient to be the same in the two countries, its estimated value is strongly statistically significant and not too far from a point-wise estimate of almost 0.035. Yet when the two slope coefficients are allowed to differ between the two countries, it turns out that the estimated coefficient for France is much larger than the estimated coefficient for Italy: 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 (see table 1.1) and the barriers to entry coefficient is significantly larger for 250 employees or above firms (0.039) compared with 20 employees or less firm (0.028). Based on our estimates, the impact of barriers to entry on mark-ups may be seen as large, at least for some industries: a 5-point decrease in the entry barriers – i.e. the actual decline in the barriers to entry indicator for Telecom in France over the 1995-2007 period - would have chopped off more than 17 percentage points in the mark-up.

4.2 Second stage

The second stage equation results for equation (1) are reported in Table 3. The list of instruments includes the entry barrier indicator, the lagged first-differenced employment and TFP (and squared barriers to entry for the quadratic specification). All tests show that we have strong and valid instruments for the equations. Results are robust to changes in instruments, specifications and exclusion of extreme values (see section 4.3).

The lagged dependent variable - log TFP_{t-1} - is statistically significant and fairly sizable on the right hand side. The point-wise estimates are around 0.3, bounded away from one. This confirms the well-known and expected results that the short-run and long-run correlations of mark up (and entry barriers) and 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 between the short and the long-run correlates of mark-up and productivity may be as high as 1.5.

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 to our main variable of interest, we tried two different specifications, somewhat in line with previous studies.

In the linear formulation, whose results are reported in column 1 and 2 of Table 3, the level of mark-up turns out to be negatively correlated with TFP[4]. 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 in turn give in the short run -0.007 estimated effect of entry barriers on TFP and -0.010 for their long-run effect. This is a large effect, as 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.

These results may be affected by the fact that we take into account the impact of barriers to entry only indirectly, through the mark-up. Barriers to entry may 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. Hence, mark-ups seem to capture most of the impact of barriers to entry. This also suggests that our identifying assumption is not rejected by the data.

As in the mark-up equation, the estimated slope coefficients in the second stage appear in fact not to be the same in the two countries (see Table 4). The mark-up coefficient is much bigger - in absolute value - for Italy than for France: -0.5 as opposed to -0.2.

Taking these estimates at face value, one can obtain the short-run and the long-run impact of entry barriers for TFP. This impact would amount to a total TFP correlate of negative 0.05 (=-0.5*0.01) for Italy and negative 0.08 (=-0.2*0.04) for France. This much is for the impact effect. The long-run effect should instead be multiplied by some 1.5 times.

The linear formulation is not the only game in town, though. Based on Aghion, Bloom, Griffith and Howitt, a quadratic effect may also belong to this specification. As competition is introduced from scratch, the incentives to escape competition by innovating are very high for the rents to be reaped are high. Hence as competition is introduced in a very uncompetitive environment, innovation is likely to be spurred. But then, as free entry triggers fiercer competition, the profits to be reaped become smaller and so even the incentives to exert more effort may be relaxed.

4 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.

When we add a quadratic term for the mark up, we cannot reject the conclusion that an inverted-U shape is there (see Table 3). Yet, when the two slopes are allowed to differ across countries as in Table 4, the quadratic formulation does not deliver good statistical results for Italy, although it appears in the FE formulation. Hence, our preferred formulation is the linear one, which appears more robust.

4.3 Robustness checks

We perform a number of robustness checks of our main results.

First, we test robustness to the exclusion of specific observations (see Table 5). 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 (see Table 6).

In the reference result (column 1), we used barriers to entry as the excluded instrument, as a competition indicator, the lagged differenced dependent variable, in an Arellano-Bond style instrumentation of the lagged dependent variable, 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, and in particular the mark-up coefficient, are robust to removing employment or 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). 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 (see Table 7). 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.

The GMM estimation technique barely affects the estimation, 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 labour 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 but the demand shifter has a higher coefficient, reflecting a more pro-cyclical TFP. In line with Aghion and 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 still 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. Hence our preferred linear formulation appears to be robustly estimated.

5. Relations with the literature

In this section we briefly take stock of our results and emphasize whether and how they complement or differ from previous studies within the already broad research agenda on regulation, productivity and growth. Schiantarelli (2008) reviews this literature more extensively and in a more detailed way.

As explained in previous sections, we chose to analyze the impact of one specific type of regulation (barriers to entry) and investigated whether this is detrimental to firm productivity in that particular industry, through a specific mechanism of transmission, the firm's mark up.

We are clearly not the first to study the direct effects of regulation on firms in the regulated sector. If anything, this has actually been the most active and perhaps most natural research area in this field. 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.

Barriers to entry are supposed to be in most cases associated to higher mark ups. Other measures of regulation, such as public ownership, may reduce the own-industry mark up. This is why we concentrate on barriers to entry as opposed to looking at the much broader set of variables extensively employed by Nicoletti, Scarpetta and coauthors in their long-standing OECD research project on regulation and economic performance. Obviously, there are pros and cons in taking one route or the other.

In addition to this, 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 instead uncertain a priori. Whether a positive or a negative sign between mark-up and economic performance prevails depends on whether the static inefficiency effects brought about by regulation more than offsets the incentives to innovate and the broader scope for funding the fixed costs of research typically enabled in a close-to-monopoly setting. Among others, Nickell (1996), Blundell, Griffith and van Reenen (1999) and Griffith, Harrison and Simpson (2010) found a negative relation between the mark up and productivity. Yet, as emphasized by Aghion, Bloom, Blundell, Griffith and Howitt (2005), the average empirical relation between the mark up and the efficiency indicators most directly related to innovation - such as R&D spending and the growth rates of labor and total factor productivity – has been found to take an inverted U shape. In our French-Italian data set, we found only weak evidence in favor of an inverted U relation between the mark up and productivity.

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 (2010) - with some methodological differences of implementation - 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. We miss the calculation of these effects in our narrower–in-scope exercise. Yet, being specific, we 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.

Finally, somehow more generally, barriers to entry have also been shown to hamper entrepreneurship by reducing the growth in the number of firms (Klapper, Laeven and Rajan, 2006) and by increasing industry concentration (Fisman and Sarria-Allende, 2004) in developed countries and - more generally and in a particularly distorting extent - output, employment and investment in developing countries (Besley and Burgess, 2002, with Indian manufacturing data, and Djankov, La Porta, Lopez de Silanes and Shleifer, 2002).

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.

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 - First stage equations
Dependent variable: Mark-up μ

	(1) Basic	(2) 1st stage	(3) with country slopes
Barrier to entry$_{t-1}$	0.0349**	0.0357**	
	(0.00755)	(0.00749)	
Barrier to entry-Italy			0.00977**
			(0.00232)
Barrier to entry-France			0.0447***
			(0.00654)
Δ.Turnover	0.0593**		0.0654**
(demand shifter)	(0.0144)		(0.0140)
Δ².Turnover		0.0362***	
(demand shifter)		(0.00683)	
Δ.Total Factor Productivity$_{t-1}$		0.0568***	0.0504***
		(0.00852)	(0.00611)
Δ.Employment$_{t-1}$		0.0436***	0.0325***
		(0.00357)	(0.00111)
N	105 969	105 969	105 969
r2	0.192	0.200	0.205

Standard errors in parentheses
All variables in log, but mark-ups and barrier to entry indicators. Fixed effect estimates with clustering by sector. Constants and country*year dummies are included but not reported. (1) is the basic estimate; (2) is the first stage equations of column 1 in table 3; (3) includes country slopes for barrier to entry.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3 - Second Stage equations
Dependent variable: Total Factor Productivity

	(1)	(2)	(3)
	...with mark-ups in level		...with squared mark-ups
mark-up μ	-0.202**	-0.331**	1.510**
	(0.0619)	(0.126)	(0.484)
Squared mark-up μ^2			-1.186***
			(0.342)
Total Factor Productivity$_{t-1}$	0.310***	0.320***	0.275***
	(0.0124)	(0.0142)	(0.0163)
Δ.Turnover	0.266***	0.275***	0.247***
(demand shifter)	(0.0129)	(0.0148)	(0.0126)
Barrier to entry		0.00896	
		(0.00504)	
Observations	105 969	105 969	105 969
R^2	0.0898	0.0181	0.228
Sargan statistic	0.564	3.686	1.029
(p-value)	0.453	0.158	0.310

Standard errors in parentheses
All variables in log, but mark-ups and barriers to entry indicators. 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 1. Instruments are barrier to entry indicator (plus squared barrier to entry for column 2 and 3), lagged TFP, twice differenced turnover 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 4 - Second Stage equations with country slopes
Dependent variable: Total Factor Productivity

	(1) 2SLS+FE	(2) 2SLS+FE	(3) FE
mark-up μ - France	-0.187**	4.056***	2.701***
	(0.0704)	(0.420)	(0.0205)
mark-up μ - Italy	-0.532***	-3.792*	1.982***
	(0.109)	(1.779)	(0.0197)
Squared mark-up μ² - France		-2.993***	-1.253***
		(0.308)	(0.0149)
Squared mark-up μ² - Italy		2.608	-0.745***
		(1.660)	(0.0140)
Total Factor Productivity$_{t-1}$	0.320***	0.255***	0.167***
	(0.0134)	(0.0266)	(0.00271)
Δ.Turnover	0.278***	0.246***	0.223***
(demand shifter)	(0.0138)	(0.0246)	(0.00418)
Observations	105 969	105 969	105 969
R^2	-0.0325	-0.236	0.480
Sargan statistic	2.494	0.277	
(p-value)	0.114	0.599	

Standard errors in parentheses
All variables in log, but mark-ups. Estimation by two-stage least square (but for column 3), with GMM estimators, robust standard errors and individual fixed effects. Constants and Country-Year dummies are included but not reported. Instruments are barrier to entry indicator, lagged mark-up, TFP, twice differenced turnover and employment in first difference. First-step estimates' F tests indicate that instruments are strongly significant for column 1 but weaker for column 2. 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 (in level and squared) for France and Italy.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5 - Robustness - Sensitivity to specific observations

Dependent variable: Total Factor Productivity

Excluding…	(1) Reference equation	(2) 10% extreme values of TFP above and below	(3) Sector NACE 4711 Retail-food	(4) Sector NACE 4759 Retail-furniture	(5) Sector NACE 4771 Retail-clothing	(6) Sector NACE 4941 Freight-road	(7) Sector NACE 6920 Accounting	(8) 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 (demand shifter)	0.266***	0.185***	0.266***	0.257***	0.270***	1.898***	0.271***	0.267***
	(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 6 - 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

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.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7 - 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) in 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)	
Δ².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 (demand shifter)	0.240*** (0.00440)	0.243*** (0.00439)	0.224*** (0.00419)	0.237*** (0.00440)	0.223*** (0.00418)
mark-up μ	1.045*** (0.00560)	1.057*** (0.00562)	2.328*** (0.0143)		
Total Factor Productivity$_{t-1}$	0.190*** (0.00284)	0.190*** (0.00284)	0.172*** (0.00271)	0.186*** (0.00285)	0.167*** (0.00271)
Barrier to entry		-0.0400*** (0.00188)			
Squared mark-up μ²			-0.988*** (0.0102)		
mark-up μ - France				1.149*** (0.00948)	2.701*** (0.0205)
mark-up μ - Italy				0.991*** (0.00685)	1.982*** (0.0197)
Squared mark-up μ² - France					-1.253*** (0.0149)
Squared mark-up μ² - 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[5]) indicator and the FDI-restrictiveness indicator. The NMR comprises network sectors (ETRC indicator[6]), 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", PMR weighted index is computed as[7]:

½ entry regulation in gas, electricity, rail, air, road, post and TLC +

½ vertical integration in gas, electricity and rail.

With respect to the specific sector, we decided to change it as:

- 1/2 Entry regulation + 1/2 Vertical integration for gas, electricity and rail
- Entry regulation only for air, road, post and TLC

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

⅓Licenses or permits needed to engage in commercial activity+

⅓Specific regulation of large outlets+

⅓Protection of existing firms

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

⅓Licensing+

⅓Education requirements+

⅓Quotas and economic needs tests

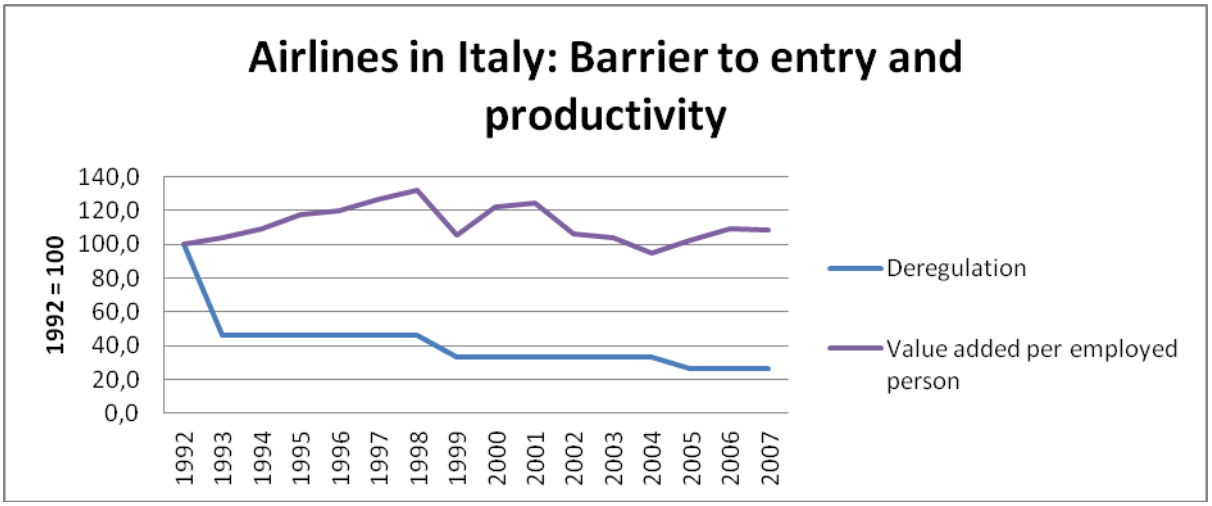
Further detailed information on the specific questions used to build the indexes are available upon request to the authors.

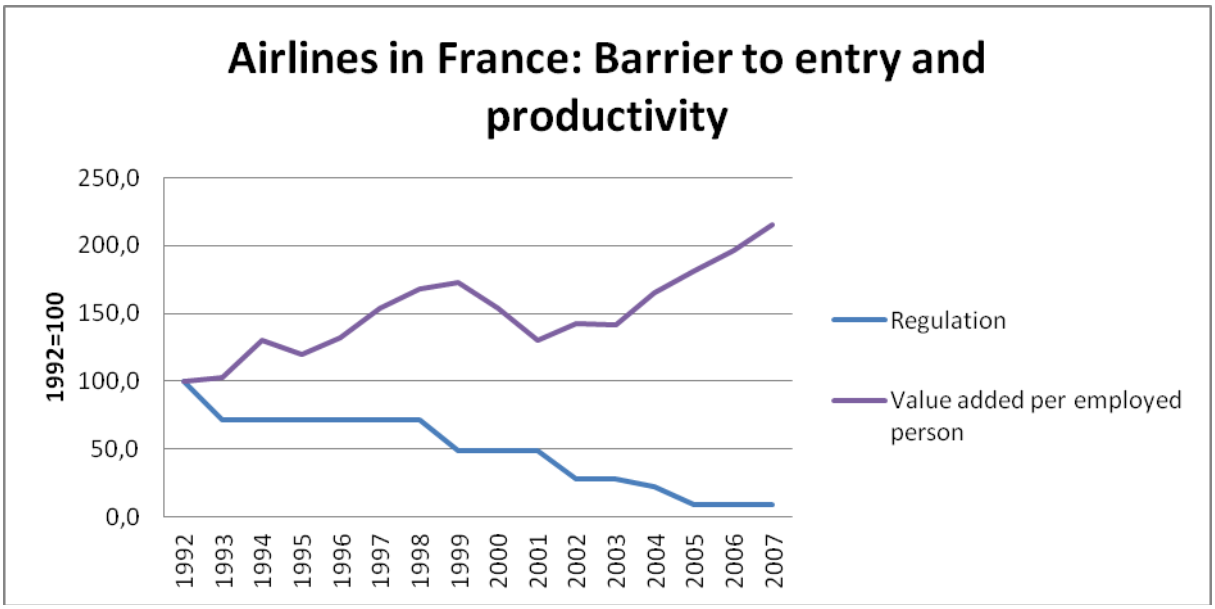
[5] For a complete list of the questions and coding of answers of the indicators, see Conway P., Nicoletti G., Product market regulation in non-manufacturing sectors of OECD countries: measurement and highlights, 2006, ECO/WKP(2006)58 (No. 530).

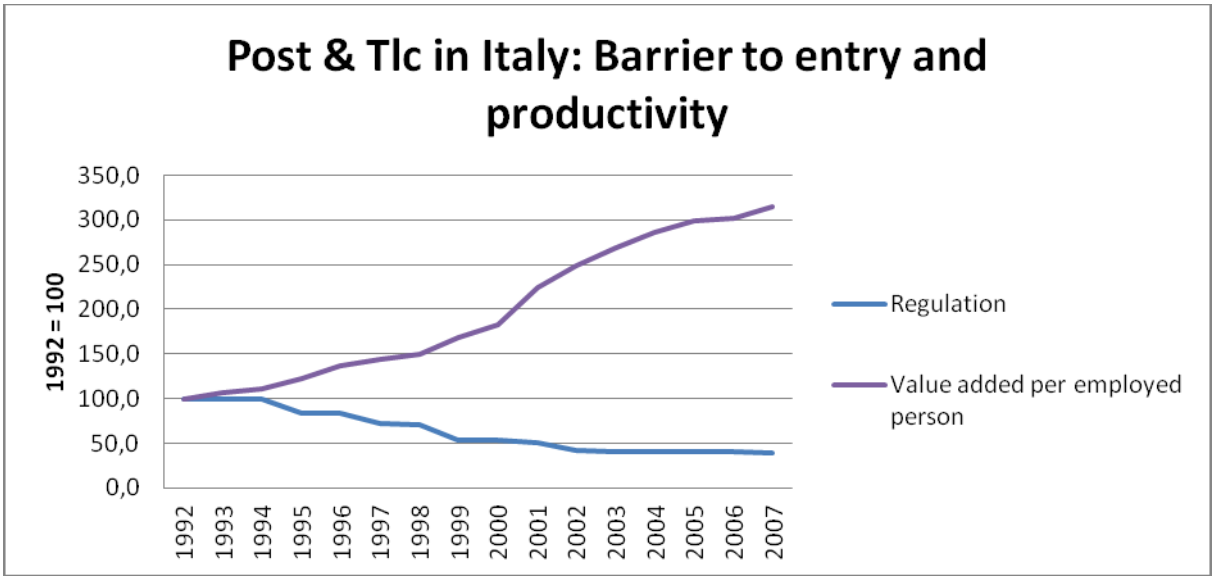
[6] ETRC indicator refers to electricity, gas, air transport, rail, road freight transport, post and telecommunications.

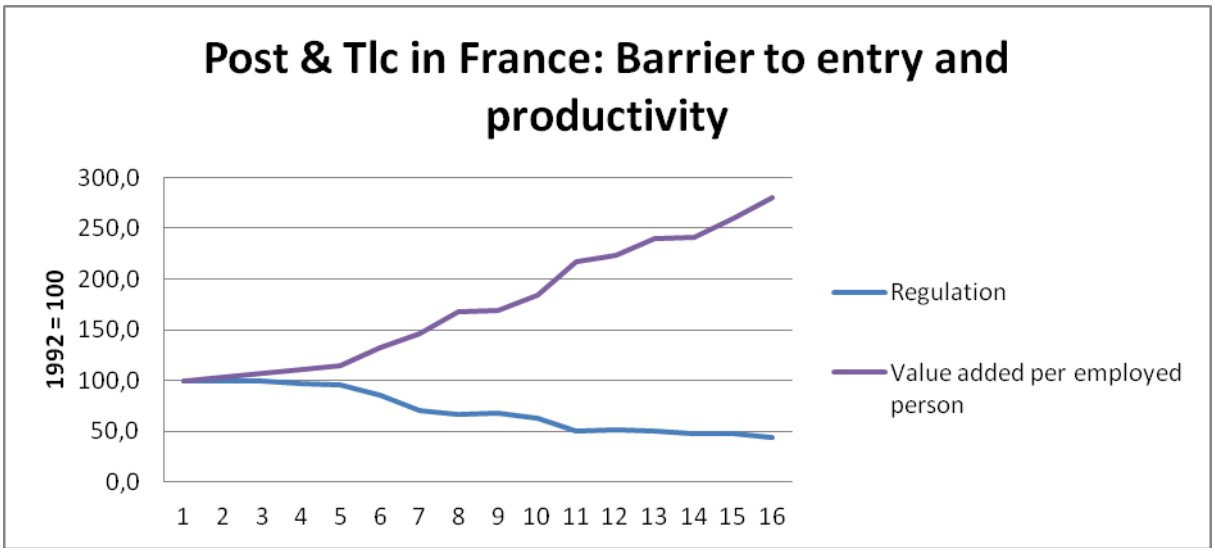
[7] See table 13 page 51 of Woefl A., Wanner I., Kozluk T., Nicoletti G. (2009).

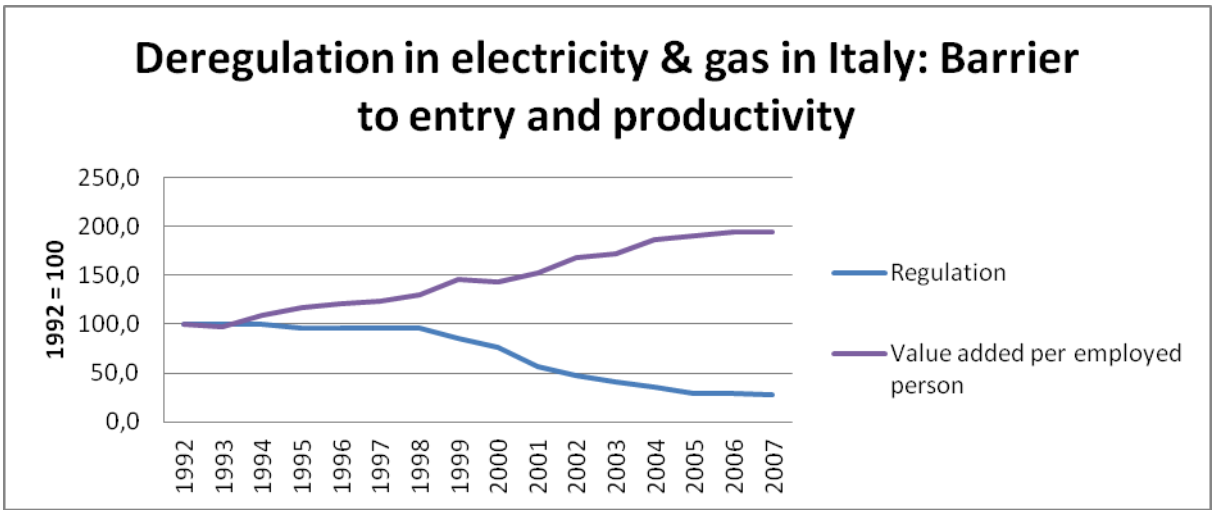
Figure 1 - Deregulation and productivity in France and Italy: the big picture






Post & Tlc in Italy: Barrier to entry and productivity
1992 = 100
350,0
300,0
250,0
200,0
150,0
100,0
50,0
0,0
1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007
Regulation
Value added per employed person


Post & Tlc in France: Barrier to entry and productivity
1992 = 100
300,0
250,0
200,0
150,0
100,0
50,0
0,0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Regulation
Value added per employed person


Deregulation in electricity & gas in Italy: Barrier to entry and productivity
1992 = 100
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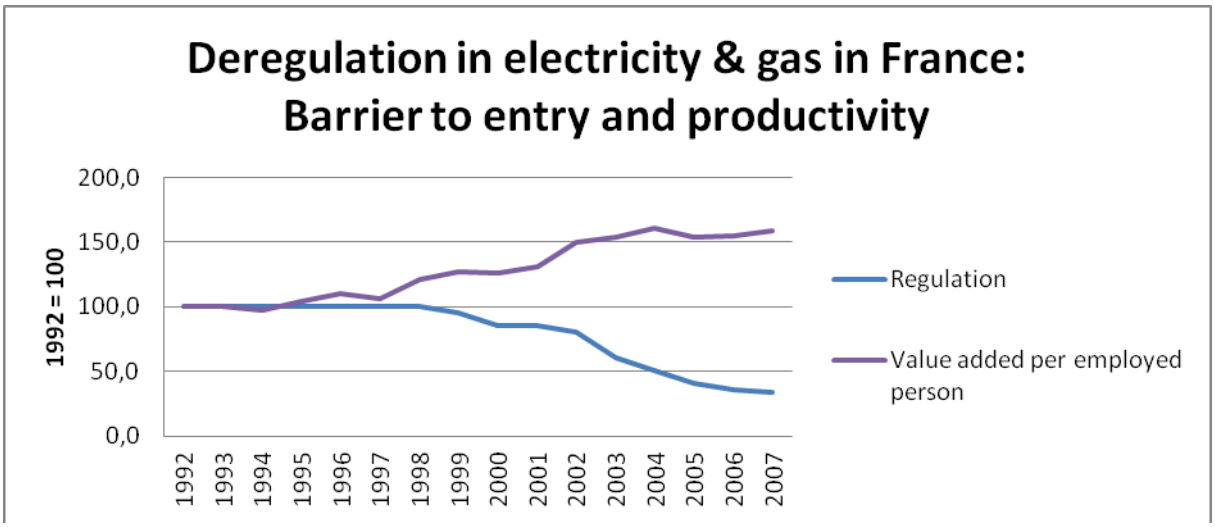
Regulation
Value added per employed person


Deregulation in electricity & gas in France: Barrier to entry and productivity
1992 = 100
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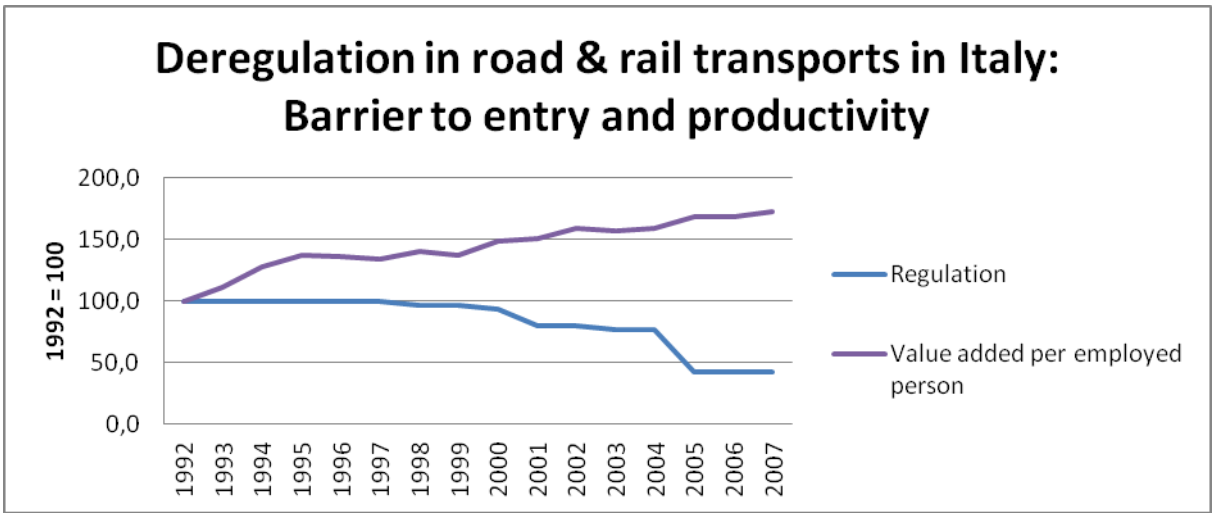
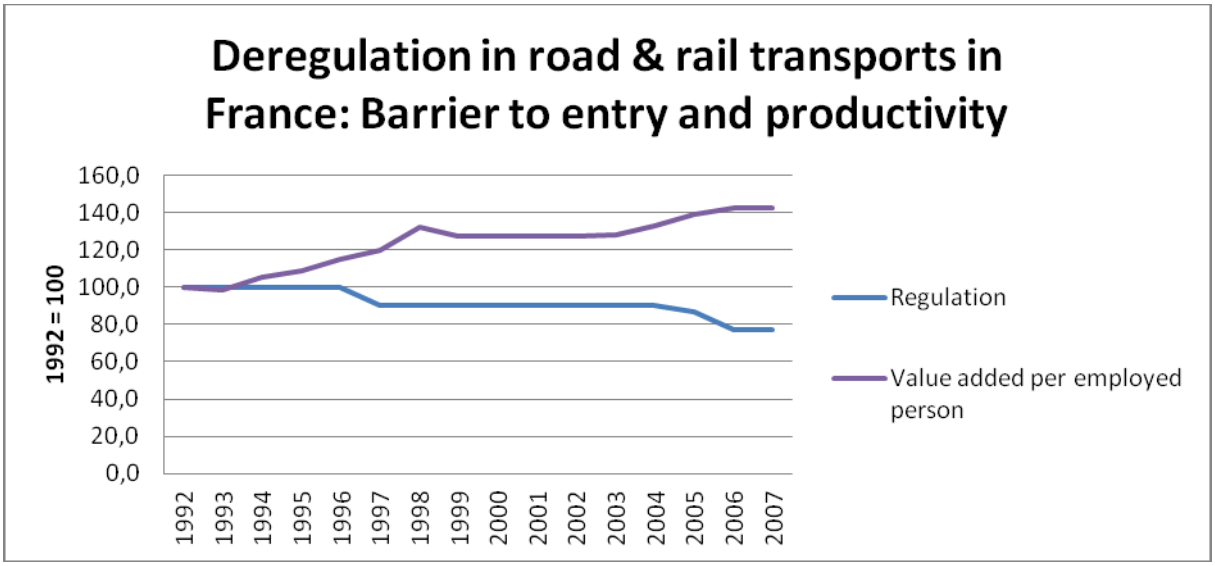
Regulation
Value added per employed person





Source: Conway and Nicoletti (2006) and computation of the authors based on national accounts.