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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 very different in the short and the long run.

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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, such as the one between product market regulation and productivity growth and levels.[1]

Investigating the impact of "reforms" on productivity growth may be problematic, though. Reforms are often multi-dimensional measures and the economic counterpart of their different dimensions may go through separate 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.[2] Griffith and Harrison (2004, Appendix D, Table 30-33) nicely exemplify 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 with the empirics so far employed. 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.

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 - 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 market reform measures. 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 growth rate has been more resilient, the productivity developments of the 1990s have been disappointing compared to the distant and even the close past. This begs the question of whether the overall focus on product market reform to enhance productivity - a topic of contention in public discussion - has been perhaps misplaced. This is not the only option. It might be that the positive results of reforms on

[1] Nicoletti and Scarpetta, 2003; Alesina, Ardagna, Nicoletti and Schiantarelli, 2005; See also Schiantarelli, 2008, for a recent survey

[2] An early description and documentation of this problem with reference to the role of policy variables in cross-country growth regressions can be found in Levine and Renelt (1992).

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 market liberalization have only partially materialized so far.

In any case, in the years 2008-10, crisis had hit the two economies thereby mixing up the overall picture for the years after 2007. 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 originating changes in mark-ups have translated into TFP and labor productivity's change.

Our data set spans from 1998 to 2007. During this period of time, reforms have been implemented with the goal of (de)regulating professional business activities, network industries and retail, both in Italy and France, although in a scattered fashion. In both countries, service deregulation was the key element in an overall trend towards liberalization of markets. 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 intended purpose, we have constructed time-varying qualitative variables that summarize the implementation of service deregulation for retail, road freight, airlines, post, telecommunications and business services. Hence our list of services industries chiefly includes but is not exhausted by network industries. 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. Barriers to entry are supposed to be in most cases associated to higher mark ups. This is why we

concentrate on this fairly limited number of variables as opposed to looking at the much broader set of variables extensively employed by Giuseppe Nicoletti and Stefano Scarpetta in their OECD long-standing research project on regulation and economic performance (and the long list of papers that followed up their initial contributions.[3])

The importance of the link between barriers to entry and the mark up is indeed at the center of the literature in this area (as surveyed, among others, by Fabio Schiantarelli, 2008). This indeed suggests that the main way in which regulations and reforms feed 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.

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

[3] OECD officially publishes a non-manufacturing index (NMR), that can be divided into three sub-indicators:
- Energy, transport and communication (ETRC)
- Retail distribution and business services (RBSR)
- Regulatory impact (RI)

We are interested in ETRC and RBSR and use all available information and legislation sources to update these indicators for each year in 1998-2007, both for France and Italy. The variables have been computed in three different ways:
1. according to the specific OECD sub-indicator (e.g. ETRC for network industries);
2. according to PMR questions. In this latter case, variables correspond to low level indicators;
3. according to questions of PMR and some changes in the coding of answers.

We end up with 3 indicators of PMR: barriers to entry (BAR), public ownership (PUB), price control (PRI), which are sector specific. Our final decision is to keep BAR as our best index to instrument the mark-up. See Appendix A for further details.

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.

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 a recent paper, Bourlès, Cette, Lopez, Mairesse and Nicoletti (2010) has 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 a bigger size for France than for Italy. This result withstands changes of specification concerning the choice of the instruments and of the dependent variable. We also find an inverted-U curve between mark-up and productivity, but when the two slopes are allowed to differ across countries, the quadratic formulation does not deliver good statistical results (the Sargan test is not passed), although it appears in the OLS formulation. 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 concludes.

2. Data and indicators

We use firm level data on France and Italy for the 1998-2007 period[4] to compute a productivity indicator (TFP) and 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 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 poor for small firms. AIDA and FiBEn allows calculating firm-level value added (Q), capital (K) and employment (L) volumes:

- Value added (Q) is computed as follows:

Q = sales of merchandises - cost of merchandises - change in merchandise inventory + production sold + production stocked + production incorporated in the capital stock – cost of raw materials – change in raw material inventories – other costs and external charges (including wages of external workers) + production subsidies – production taxes.

The volume of value added is calculated by dividing value added in value by a national accounting index of value added price at the industry level (two digit decomposition 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 is at historic cost, the gross value 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 can then derive Total factor productivity (TFP) calculated according to a growth accounting methodology, with factor shares equal to the share in revenue in a Cobb-Douglas, constant return to scale framework.

We then use competition indicators: barriers to entry, as a regulatory indicator, and mark-ups, as the main channel through which regulatory impediment to competition impacts productivity.

Barriers to entry are derived from OECD's product market regulation database. For each country, we built this indicator on the basis of the OECD Regulatory Indicators methodology (Woefl A., Wanner I., Kozluk T., Nicoletti G. 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). We either took directly the OECD indicators if they were computed for each year of the period (1998-2007) or we started from the basic questionnaire to compute the indicator between two computation dates. The sectors were selected for having regulatory barriers to entry and hence for having a potentially significant impact of product market regulation on performance.

For all information not available through the OECD database, we referred to official laws and to documents and publications of: the appropriate Department, the Regulation Authority (if it exists), the Antitrust Authority in Italy, associations (in particular, for professional services, we referred to *professional registers*), Bank of Italy, the appropriate European DG, the MICREF database and OECD.

[4] This period was selected as the maximum extent of the AIDA database.

Contrary to OECD though, which uses low level indicators as average of all the sectors, we use the same questions and weights to compute the low level indicator for each sector separately (see Appendix A on Data Methodology and note 3).

Mark-ups are computed as:

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

With Capital Costs = net rate of returns X (capital stock + inventories) and net rates of returns as interest rates on benchmark 10-year government bonds.

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

The main descriptive statistics for the database are presented in table 1. The characteristics of the two databases are quite different: AIDA is a larger database with 15 070 firms over the 1998-2007 period against 13 349 for FiBEn, but the share of small firms is larger in AIDA with 80% of firms with less than 20 employees as compared to 50% in FiBEn. This implies that firms are more short-lived in AIDA. This is partly a database bias but it also reflects the underlying composition of firm by size in both countries. As a result, we control for firm size in all our regressions. The sector composition of both databases is similar, with a large domination of retail trade firms in the database.

3. Empirical strategy

We use the following log-linear form for productivity:

$$\ln TFP_{itc} = f_1(\hat{\mu}_{itc}) + \delta_{1,c} \ln TFP_{it-1c} + \delta_{2,c} DS_{itc} + \delta_{3,c} Z_{ijtc} + t_t + r_c + j_j + \varepsilon_{itc} \qquad (1)$$

With TFP, total factor productivity, μ, mark-up, t, time, DS, demand shifter, Z, a vector of control variables, r, country dummies, i, firm, c country, j industry.

TFP depends on the level of competition, as reflected by mark-ups, lagged TFP, demand shifters (firm turnover at current prices) and controls. As competition acts through time, altering gradually market structure and firm behaviour such as innovation policy, it is

desirable to allow exogenous variables to have a lasting impact on TFP through the lagged endogenous variable. Unobservable industry, year and country-specific effects are controlled for.

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

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

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.

Following previous research in this field (Griffith, Harrison and Simpson, 2010; Ospina and Schiffbauer, 2010), we adopt a two-step empirical strategy (instrumental variables) to identify the parameters of interest that are valid under certain assumptions. We estimate in the first stage the effects of product market reforms on the level of rents, and then estimate the effect of the level of rents on firm performance. We capture the level of rents available using an estimate of the mark-up. We instrument the mark-up using, among others, barrier to entry indicators. The main instruments are thus sector specific and time and country-varying. The lagged dependent variable is instrumented as well. We control for unobservable characteristics by including industry, year, country and size specific effects in both steps. For robustness, other controls are introduced (cf. 4.3). We also control for business cycle effects appending a demand shift (the growth of firm turnover in current prices).

Our first stage equation is thus the following:

$$\mu_{ijtc} = \beta_{1,c}PMR_{jtc} + \beta_{2,c}\Delta DS_{ijtc} + \beta_{3,c}\Delta TFP_{ijt-1c} + \beta_{4,c}Z_{ijtc} + r_c + t_t + j_j + \varepsilon_{\mu,ijtc} \quad (3)$$

i = firm, t = year, c = country, j = sector, DS = demand shift, Z = control variables, t_t = year fixed effects; j_j industries fixed effects, r_c = country fixed effects, where PMR represents the sector level of barriers to entry. Control variables also include firm size.[5]

[5] Size dummies correspond to four categories of firms: those with a number of employees ranging between zero and twenty, those with 20-50 employees; those with 50-250 employees and the "large" firms with 250+ employees.

Our main identifying assumption that makes equation (3) qualitatively different from equation (1) is that PMR affects TFP only through the mark-up and not directly: PMR is our excluded instrument. This is consistent with theoretical considerations. 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 increase in cyclical activity, as reflected by turnover, tends to support use of capacity and hence mark-ups. As the group of instrumented variables in stage 2 also includes the lagged dependent variable, we use other controls in column 2. Results do not change.

As far as our main variables of interest are concerned, when we constrain their 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 0.08. Yet when the two slope coefficients are allowed to differ between the two countries, it turns out that the estimated coefficient for France is more than twice as large as the estimated coefficient for Italy: 0.095 as opposed to 0.042. Based on our estimates, the impact of barriers to entry on mark-ups may be seen large, at least for some industries: a 1.5-point decrease in the entry barriers – i.e. the actually observed decline in the PMR indicator for Post in France over the period - would have chopped off more than 12 points in mark-up.

Also, the statistical significance and size of the intercept country dummy for Italy indicates that Italy's average mark up is on average much higher than in France in our sample.

4.2 Second stage and OLS results

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

Irrespective of whether we use OLS or IV, the lagged dependent variable of log TFP is statistically significant and fairly sizable on the right hand side. The point-wise OLS estimates are around 0.75, while the IV estimates are in excess of 0.80. They are in both cases 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) are very different and that product market regulation tends to result in highly persistent outcomes. Based on our estimates, the order of magnitude of this difference between the short and the long-run correlates of mark-ups and productivity may be as high as 6.7 (one divided by 0.15), if we trust the IV estimates as the most plausible ones.

As expected, the demand shift has a positive impact on TFP, as a greater use of capacity increases efficiency, for it reduced the overall degree of X-inefficiency.

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

In the linear formulation of our equation, whose results are reported in column 1 and 2, the level of mark-ups turns out positively correlated with TFP with the OLS estimates and negatively with the IV estimates. This change of sign is not very surprising given that both mark-up and TFP are highly pro-cyclical, as indicated by the estimated positive coefficients of the demand shifters. After correcting for this source of endogeneity, the expected negative overall impact of mark-ups on TFP seems to show up. This is consistent with the results in Nickell (1996), Blundell, Griffith and van Reenen (1999) and Griffith, Harrison and Simpson (2010). If this specification is correct, the point-wise estimate for the mark-up is negative (-0.14). When multiplied by 0.08 (the average counterpart of entry barriers for the mark-up), this would in turn give 0.011 for the short-run effect of entry barriers on TFP and 0.07 for its long-run effect. This is a large effect, as a 1.5 reduction in barrier, such as the one experienced by Post in France, would increase TFP in the long run by 10%.

As in the mark up equations, the estimated slope coefficients appear in fact not to be the same in the two countries (see Table 4). The IV mark up coefficient is much bigger - in absolute value - for Italy than for France: -1.8 as opposed to -0.15.

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 0.071 (=-1.78*0.04) for Italy and a smaller value of negative 0.014 (=-0.15*0.09) for France. This much is for the impact effect. The long-run effect should instead be multiplied by some 6.6 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 innovating may be relaxed. When we allow a linear and a quadratic term for the mark up to appear together in our regression, we cannot reject the conclusion that an inverted-U shape is there (see Figure 2 and 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 (the Sargan test is not passed), although it appears in the OLS formulation.

4.3 Robustness checks

We perform a few robustness checks of our main results.

Robustness is first tested by experimenting with some of the dummies:

- column 1 reproduces the main results, with country, size, year and industry dummies (column 2, table 2);
- columns 2 and 3 also include (country times year) dummies to allow for a specific country cycle;
- columns 4 and 5 exclude industry dummies, as barriers to entry are industry-specific;
- column 6 includes (industry times year) dummies, to allow for an industry-specific business cycle.

Equations are instrumented in the same way as column 1 as long as the Sargan test is passed. Then, if the Sargan test fails, the age of the firm is included.

The results in Table 5 indicate that the estimated coefficients are robust to all these changes: the mark-up coefficient remains negative and with a similar order of magnitude, as long as the Sargan test is passed. The coefficient of the lagged dependent variable is positive and significantly below 1; the demand shift coefficient is positive and with the same order of

magnitude as in the main regression. The specific choice of dummies does not significantly affect the R^2, an indication that the selected dummies tend to have a large explanatory power.

The second set of robustness checks concerns the choice of the instruments.

We test robustness in a second way, by changing the instruments (see Table 6).

In the main results (column 1), we used barriers to entry as excluded instruments, as a competition indicator, twice lagged differenced dependent variable, in an Arellano-Bond style instrumentation of the lagged dependent variable, and twice lagged differenced turnover, as a demand shifter.

In order to test 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 the turnover or lagged dependant variable instruments, and the Sargan test remains valid. When removing barriers to entry, the mark-up coefficient is no longer significant, although the Sargan test is still valid. This shows that the efficiency of the instrumentation of the mark-up depends heavily on this instrument, which captures the intensity of competition.

Then we use twice differenced lagged turnover and TFP. The coefficients are rather robust to the change but the Sargan test fails.

Finally, we test robustness to the exclusion of some observations (see Table 7). Column 1 presents the main regression. Column 2 presents the regression removing the top and bottom 10% of TFP. Column 3-8 presents the regression removing one by one sectors representing more than 2% of the observations.

Coefficient signs appear robust to all of these exclusions. In terms of magnitude, the demand shifter and lagged dependent variable coefficients are barely affected. 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. Column (1) instruments are kept for other regressions ; the Sargan test are still valid for all regressions but (8). R^2 are stable across regressions.

We conclude that our specification withstands most although not all sensitivity and robustness checks. Yet our preferred linear formulation appears to be quite robustly estimated.

5. Conclusions

In this paper, we have studied the relation 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 in turn 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 much smaller (by about seven times) than its long-run effects.

Whether the partial correlation between our variable 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 more likely, 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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Tables 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
Employees	Average number of employees per firm and per year, not corrected for part-time	France	10,0	19,0	39,0	63,0
		Italy	3,0	6,0	15,0	25,8
Turnover	'000 € per firm and per year	France	1 461	2 640	6 309	9 768
		Italy	700	1 509	3 762	6 639
Labor productivity	Value added in volume (in '000 €) per employee	France	31,0	39,4	50,0	42,0
		Italy	31,7	41,6	54,7	45,2
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
		Italy	- 11,6	2,7	17,4	2,3
Mark-up	Rate, %	France	12,3	19,2	33,7	27,3
		Italy	26,7	41,9	69,1	48,7
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
		Italy	3,6	4,0	4,0	3,7

Table 2 - First Stage equations

Dependent variable: Mark-ups $\mu_{}$

	(1)	(2)	(3)
Barrier to entry	0.0808***	0.0779***	-
	(0.00258)	(0.00258)	
Barrier to entry - France	-	-	0.0950***
			(0.00290)
Barrier to entry - Italy	-	-	0.0425***
			(0.00452)
Demand Shift: Δturnover(-1)	0.0865***	0.0859***	0.0848***
	(0.00610)	(0.00609)	(0.00608)
Demand Shift: Δturnover(-2)	-	0.0298***	-
		(0.00572)	
Lagged dependant variable: ΔTFP(-2)	-	0.0646***	-
		(0.00323)	
Dummies:			
Country (1 for Italy)	0.214***	0.213***	0.408***
	(0.00215)	(0.00216)	(0.0185)
Year	Yes	Yes	Yes
Industries	Yes	Yes	Yes
Size	Yes	Yes	Yes
Observations	87 074	87 074	87 074
R^2	0.362	0.366	0.363

All variables in log, but mark-ups and PMR indicators. Constants are included but not reported.

(1) is the basic estimate; (2) is the first stage equations of column 2 in table 3.

OLS estimates with robust t-stat

* p<0.05, ** p<0.01, *** p<0.001, standard errors in parentheses

Table 3 - Second Stage equations

Dependent variable: TFP (growth accounting method)

	...with mark-ups in level		…with squared mark-ups	
	(1)	(2)	(3)	(4)
Estimation method	OLS	2SLS	OLS	2SLS
Lagged dependant variable: TFP(-1)	0.761***	0.849***	0.755***	0.815***
	(0.00158)	(0.0155)	(0.00371)	(0.0213)
Demand Shift: ΔTurnover	0.119***	0.241***	0.183***	0.226***
	(0.00376)	(0.00665)	(0.0127)	(0.00916)
Mark-ups: μ	0.383***	-0.136***	0.877***	0.647*
	(0.00327)	(0.0301)	(0.0155)	(0.363)
Squared mark-ups: μ^2	-	-	-0.447***	-0.661**
			(0.0121)	(0.309)
Dummies:				
Country (1 for Italy)	-0.536***	-0.292***	-0.591***	-0.397***
	(0.00360)	(0.0324)	(0.00866)	(0.0561)
Year	yes	yes	yes	yes
Size	yes	yes	yes	yes
Industry	yes	yes	yes	yes
Sargan statistic	-	2.076	-	0.0510
(p-value)	-	0.150	-	0.821
Observations	87 074	87 074	87 074	87 074
R^2	0.948	0.938	0.949	0.940

All variables in log, but mark-ups. Constants are included but not reported. First stage equation of (2) is reported in table 1. Instruments are barrier to entry indicator, twice lagged turnover, TFP and employment (for 4) 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 tests of exogeneity reject the null hypothesis of exogeneity of mark-ups.

*p<0.10, ** p<0.05, *** p<0.01, standard errors in parentheses

Table 4 - Second Stage equations - with country slopes
Dependent variable: TFP (growth accounting method)

	(1)	(2)	(3)
Estimation method	OLS	2SLS	OLS
Lagged dependant variable: TFP(-1)	0.779***	0.327***	0.754***
	(0.00354)	(0.0343)	(0.00365)
Demand Shift: ΔTurnover	0.192***	0.274***	0.181***
	(0.0130)	(0.0135)	(0.0127)
Mark-ups: μ – France	0.326***	-0.149**	0.757***
	(0.00591)	(0.0644)	(0.0160)
Mark-ups: μ – Italy	0.400***	-1.781***	1.325***
	(0.00862)	(0.184)	(0.0321)
Squared mark-ups: μ^2 France			-0.408***
			(0.0142)
Squared mark-ups: μ^2 Italy			-0.717***
			(0.0242)
Dummies:			
Country (1 for Italy)	-0.552***	-0.436***	-0.760***
	(0.00911)	(0.0853)	(0.0129)
Year	yes	yes	yes
Size	yes	yes	yes
Industry	yes	yes	yes
Sargan statistic	-	4.459	-
(p-value)	-	0.216	-
Observations	87 074	87 074	87 074
R^2	0.948	0.774	0.950

All variables in log, but mark-ups. Constants are included but not reported. Instruments are barrier to entry indicator, lagged turnover, TFP and employment in second 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 tests of exogeneity reject the null hypothesis of exogeneity of mark-ups.

*p<0.10, ** p<0.05, *** p<0.01 ; standard errors in brackets

Table 5 - Robustness - changes in dummies
Dependent variable: TFP (growth accounting method)

	(1)	(2)	(3)	(4)	(5)	(6)
Lagged dependant variable: TFP(-1)	0.849***	0.828***	0.952***	0.812***	0.974***	0.846***
	(0.0155)	(0.0145)	(0.0276)	(0.0209)	(0.0446)	(0.0126)
Demand Shift: ΔTurnover	0.241***	0.255***	0.256***	0.240***	0.257***	0.245***
	(0.00665)	(0.00700)	(0.00670)	(0.00769)	(0.00691)	(0.00626)
Mark-ups: μ	-0.136***	-0.232***	-0.147***	0.0251	-0.146***	-0.146***
	(0.0301)	(0.0353)	(0.0283)	(0.0491)	(0.0396)	(0.0231)
Dummies:						
Country (1 for Italy)	-0.292***	No	No	-0.397***	-0.0624	-0.294***
	(0.0324)			(0.0470)	(0.0893)	(0.0247)
Size	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	No	No	Yes	Yes	No
Industry	Yes	Yes	Yes	No	No	No
Country X Year	No	Yes	Yes	No	No	No
Industry X Year	No	No	No	No	No	Yes
Instruments						
Barrier to entry	Yes	Yes	Yes	Yes	Yes	Yes
Lagged dependant variable: ΔTFP(-2)	Yes	Yes	No	Yes	No	Yes
Demand Shift: Δturnover(-2)	Yes	Yes	Yes	Yes	Yes	Yes
Age of firm	No	No	Yes	No	Yes	No
Sargan statistic	2.076	6.179	0.606	7.214	0.726	1.180
(p-value)	0.150	0.0129	0.436	0.00723	0.394	0.277
Observations	87 074	87 074	86 525	87 074	86 525	87 074
R^2	0.938	0.935	0.938	0.940	0.935	0.938

All variables in log, but mark-ups. Constants are included but not reported. First stage equation of (1) is reported in table 1. 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, but for (2) and (4). Hausman tests of exogeneity reject the null hypothesis of exogeneity of mark-ups.
*p<0.10, ** p<0.05, *** p<0.01

Table 6 - Robustness - changes in instruments
Dependent variable: TFP (growth accounting method)

	(1)	(2)	(3)	(4)	(5)	(6)
Lagged dependant variable: TFP(-1)	0.849***	0.845***	0.925***	0.812***	0.801***	0.609***
	(0.0155)	(0.0154)	(0.0443)	(0.0247)	(0.0394)	(0.00861)
Demand Shift: ΔTurnover	0.241***	0.243***	0.249***	0.229***	0.238***	0.220***
	(0.00665)	(0.00651)	(0.00751)	(0.00870)	(0.00720)	(0.00692)
Mark-ups: μ	-0.136***	-0.121***	-0.151***	-0.0290	-0.135***	-0.0425
	(0.0301)	(0.0270)	(0.0318)	(0.0614)	(0.0314)	(0.0315)
Dummies:						
Country (1 for Italy)	-0.292***	-0.303***	-0.150	-0.382***	-0.379***	-0.752***
	(0.0324)	(0.0321)	(0.0860)	(0.0567)	(0.0758)	(0.0213)
Size	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Instruments						
Barrier to entry	Yes	Yes	Yes	No	Yes	Yes
Lagged dependant variable: ΔTFP(-2)	Yes	Yes	No	Yes	No	Yes
Demand Shift: Δturnover(-2)	Yes	No	yes	Yes	Yes	No
Age of firm	No	Yes	Yes	Yes	No	No
Lagged dependant variable: ΔΔTFP(-1)	No	No	No	No	No	Yes
Demand Shift: ΔΔturnover(-1)	No	No	No	No	Yes	No
Sargan statistic	2.076	2.543	0.000477	1.574	7.378	293.9
(p-value)	0.150	0.111	0.983	0.210	0.00660	6.97e-66
Observations	87 074	86 525	86 525	87 535	87 074	87 074
R^2	0.938	0.938	0.937	0.942	0.937	0.931

All variables in log, but mark-ups. Constants are included but not reported. First stage equation of (1) is reported in table 1. 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, but for (2) and (4). Hausman tests of exogeneity reject the null hypothesis of exogeneity of mark-ups.
*p<0.10, ** p<0.05, *** p<0.01

Table 7 - Robustness - sensitivity to specific bservations
Dependent variable: TFP (growth accounting method)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Excluding…		10% extreme values of TFP above and below	Sector NACE 4711	Sector NACE 4759	Sector NACE 4771	Sector NACE 4941	Sector NACE 6920	Sector NACE 7490
Lagged dependant variable:TFP(-1)	0.849***	0.808***	0.851***	0.839***	0.848***	0.848***	0.845***	0.848***
	(0.0155)	(0.0196)	(0.0170)	(0.0161)	(0.0158)	(0.0182)	(0.0192)	(0.0153)
Demand Shift: _Turnover	0.241***	0.227***	0.221***	0.228***	0.239***	0.264***	0.245***	0.220***
	(0.00665)	(0.00773)	(0.00713)	(0.00700)	(0.00673)	(0.00782)	(0.00762)	(0.00673)
Mark-ups:_	-0.136***	-0.273***	-0.115***	-0.148***	-0.132***	-0.0950*	-0.154***	-0.128***
	(0.0301)	(0.0483)	(0.0301)	(0.0319)	(0.0297)	(0.0373)	(0.0454)	(0.0303)
Dummies:								
Country (1 for Italy)	-0.292***	-0.225***	-0.289***	-0.305***	-0.295***	-0.315***	-0.295***	-0.294***
	(0.0324)	(0.0419)	(0.0345)	(0.0328)	(0.0324)	(0.0414)	(0.0437)	(0.0318)
Size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sargan statistic	2.076	0.170	2.635	2.290	1.737	0.00474	1.039	4.218
(p-value)	0.150	0.680	0.105	0.130	0.188	0.945	0.308	0.0400
Observations	87074	70481	70495	78975	81090	67723	82597	84212
R^2	0.938	0.910	0.939	0.937	0.938	0.945	0.935	0.937

All variables in log, but mark-ups. Constants are included but not reported. First stage equation of (1) is reported in table 1. 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, but for (8). Hausman tests of exogeneity reject the null hypothesis of exogeneity of mark-ups.

*p<0.10, ** p<0.05, *** p<0.01 ; standard errors in parentheses

Appendix A: Data methodology

The OECD PMR incorporates two distinct indexes: the non-manufacturing sectors (NMR[6]) indicator and the FDI-restrictiveness indicator. The NMR comprises network sectors (ETRC indicator[7]), 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[8]:

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

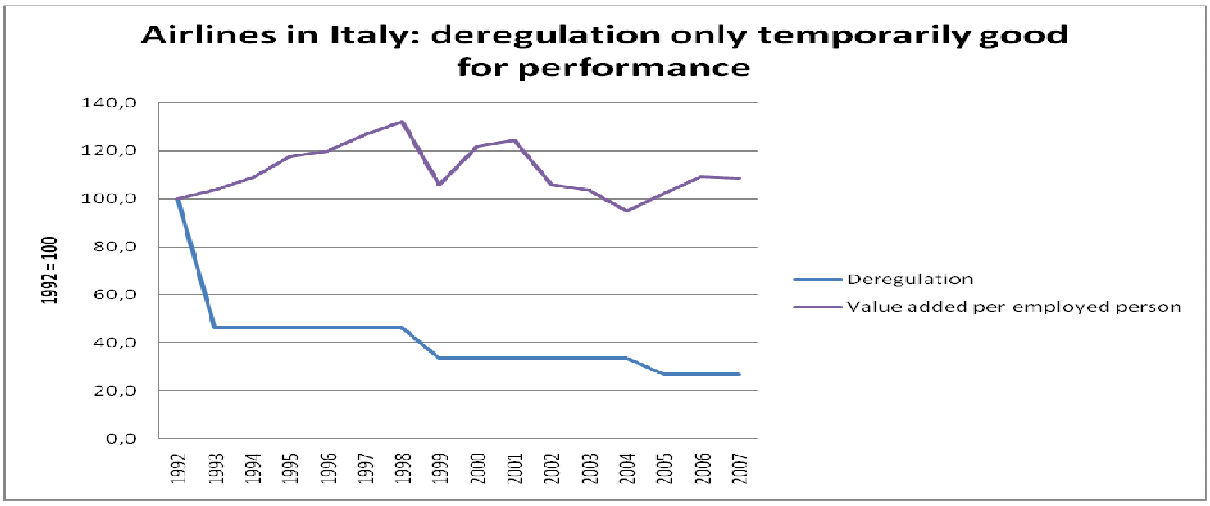
Further detailed information on the specific questions used to build the indexes are available upon request to the authors.

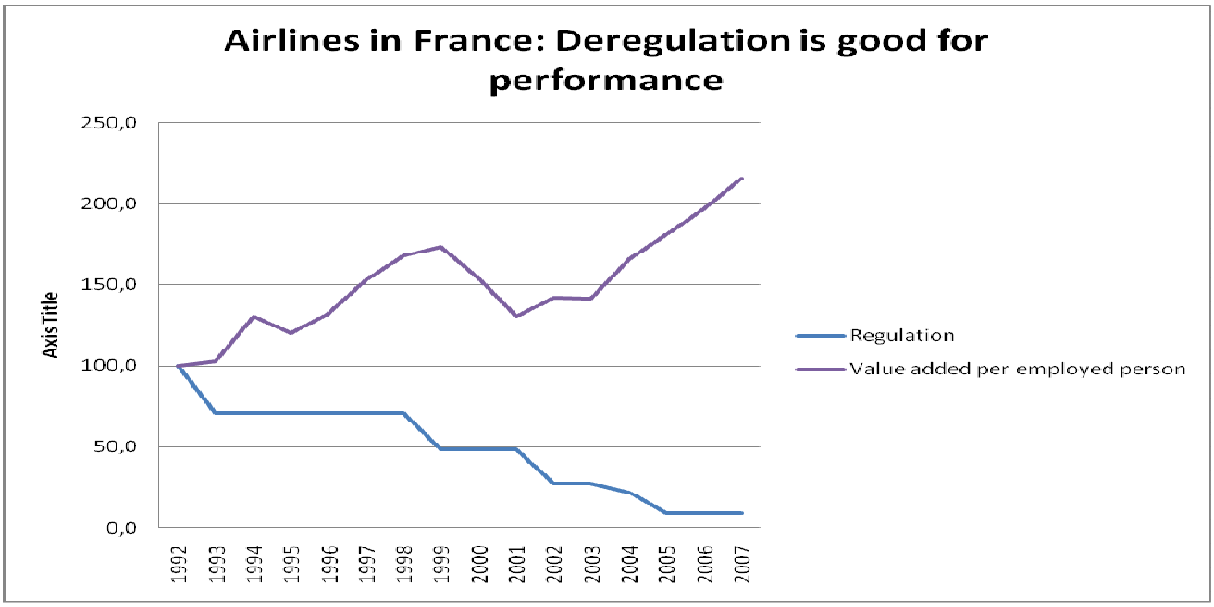
[6] For a complete list of the questions and coding of answers of the indicators, see Conway P., Nicoletti G., Product market regulation in non-manufacturing sectors of OECD countries: measurement and highlights, 2006, ECO/WKP(2006)58 (No. 530).

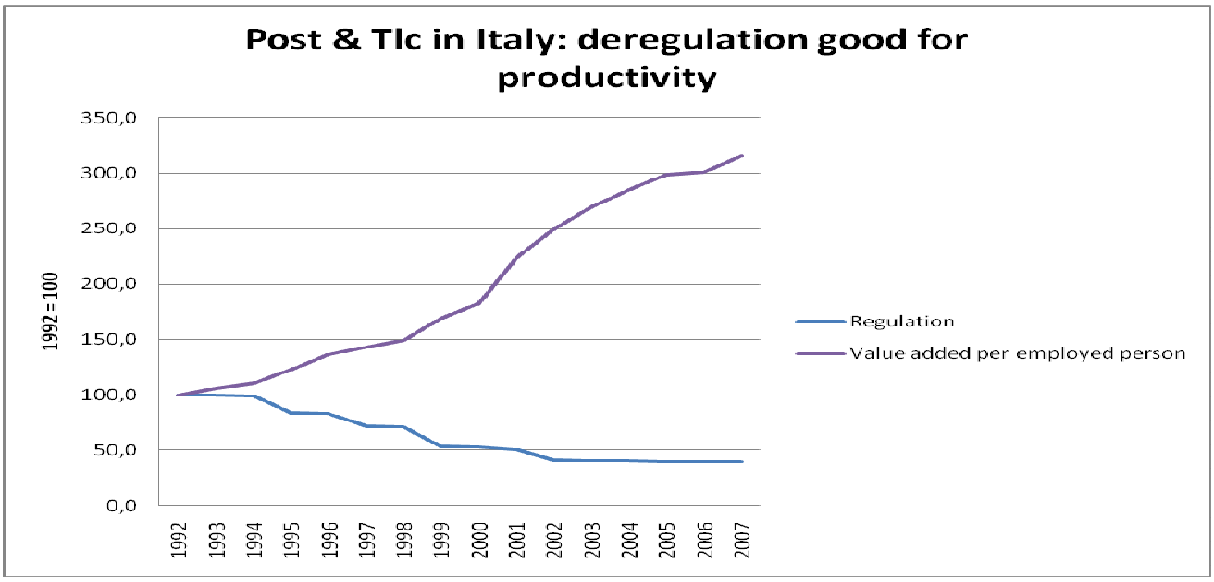
[7] ETRC indicator refers to electricity, gas, air transport, rail, road freight transport, post and telecommunications.

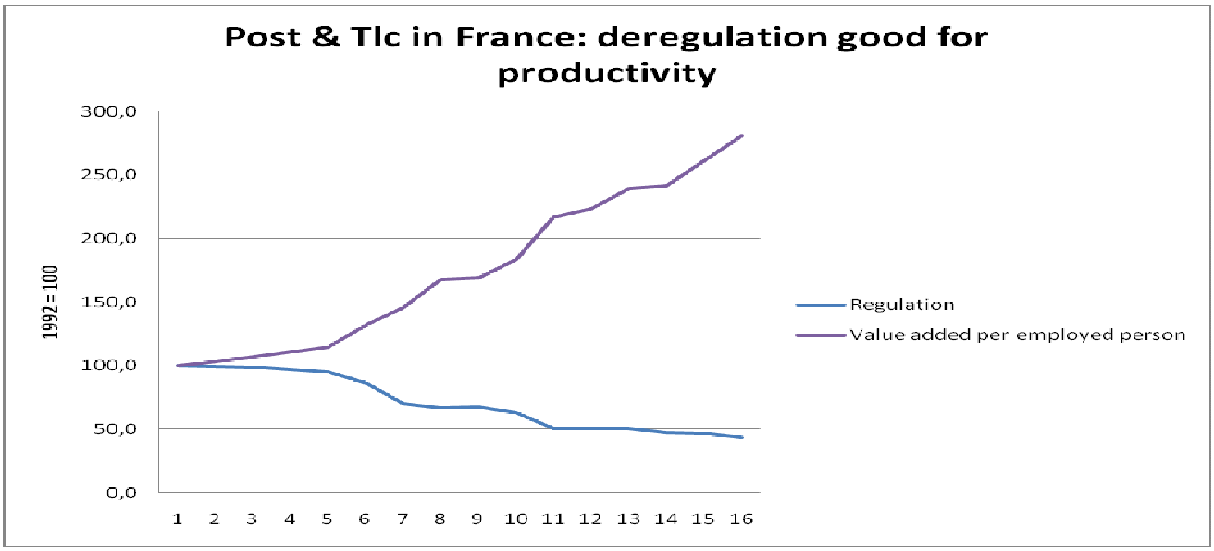
[8] See table 13 page 51 of Woefl A., Wanner I., Kozluk T., Nicoletti G. (2009).

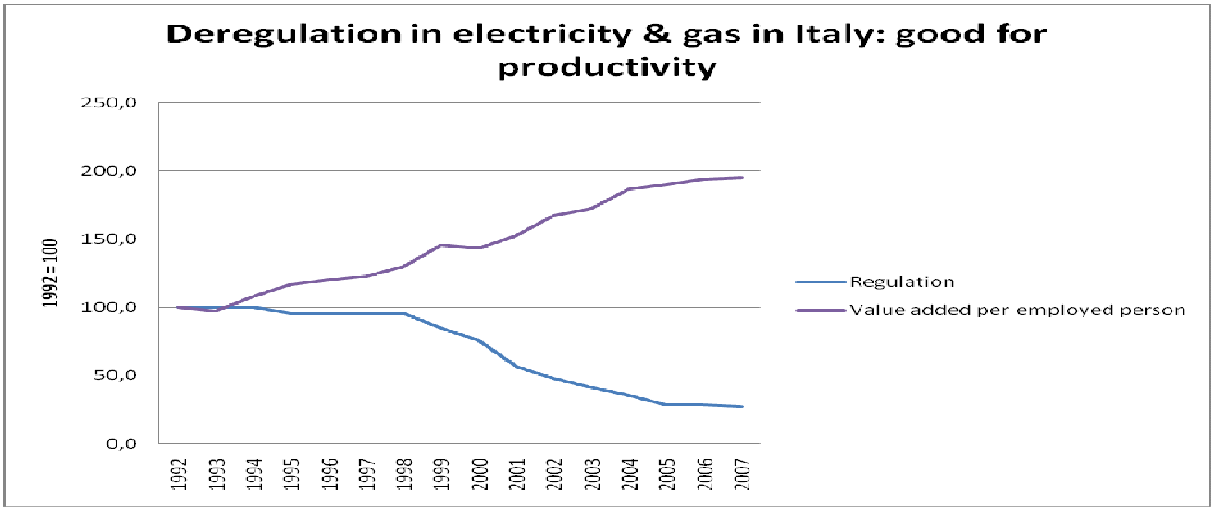
Figure 1 - Deregulation and productivity in France and Italy: the big picture

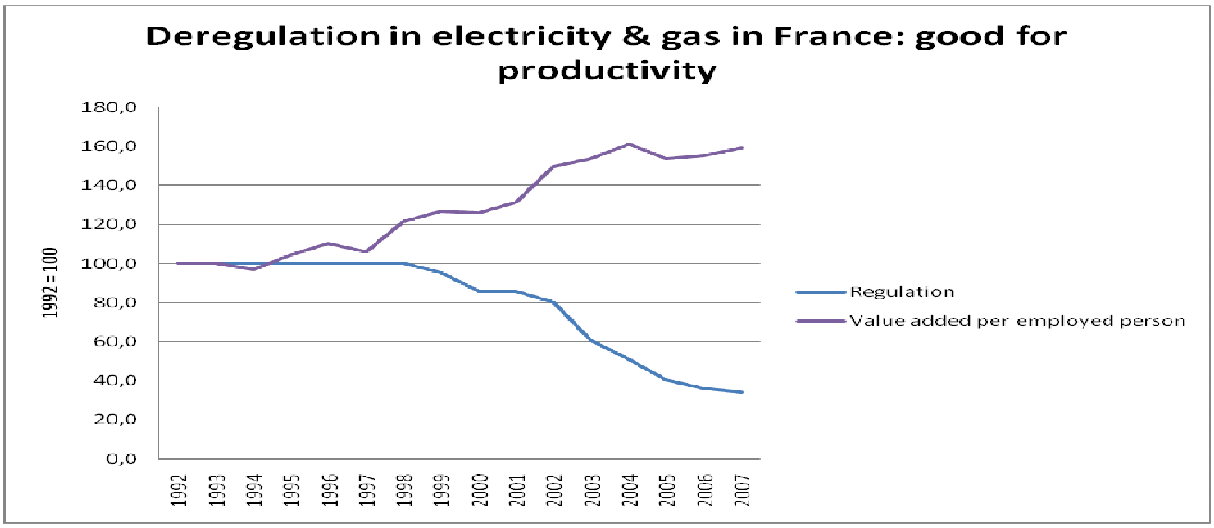


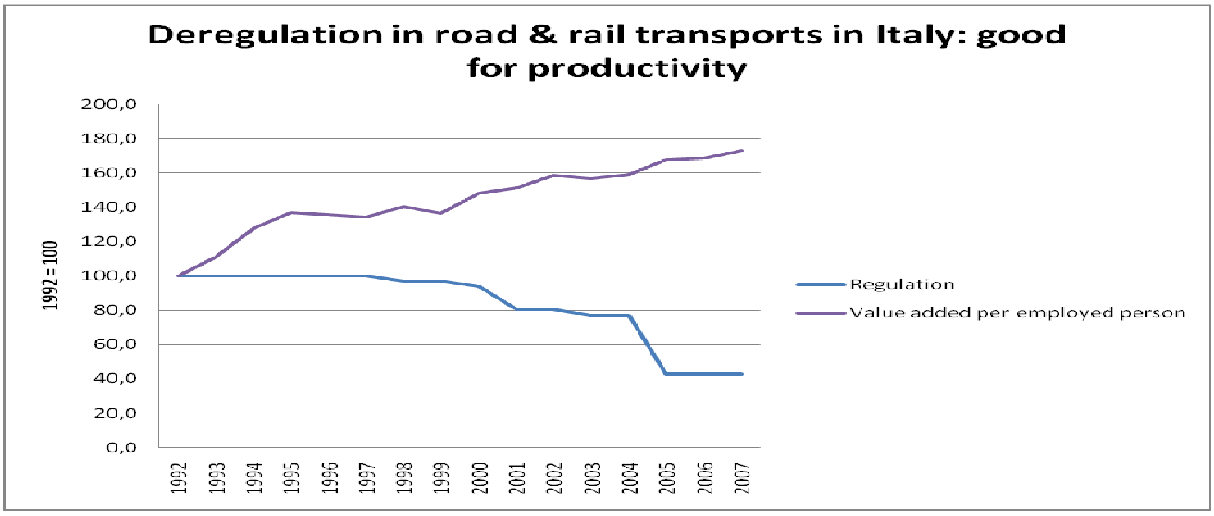


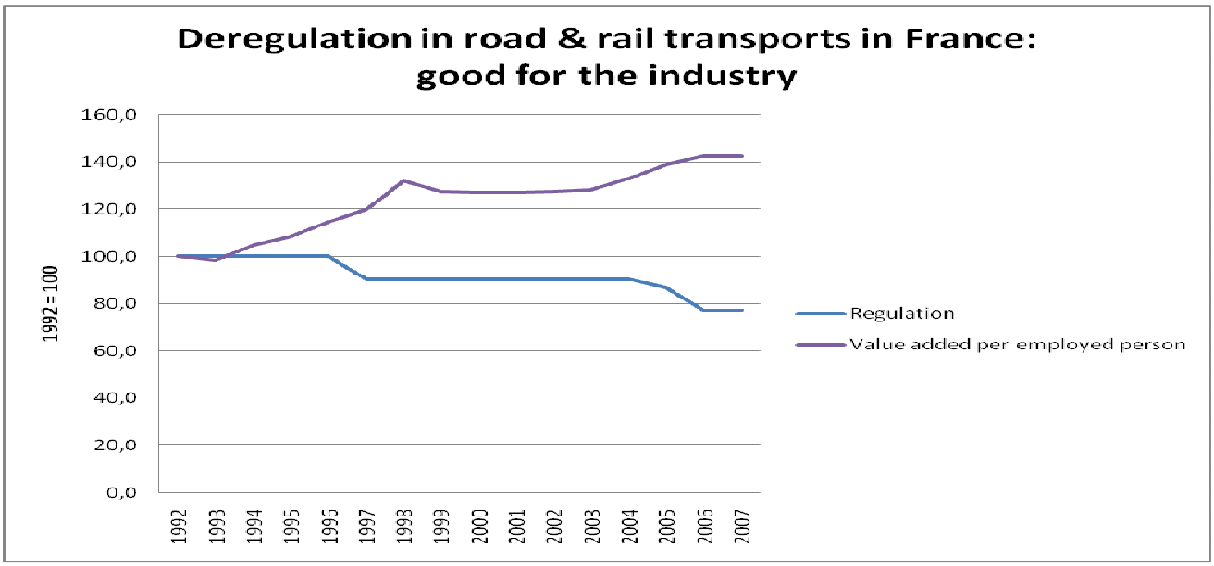

Post & Tlc in Italy: deregulation good for productivity
350,0
300,0
250,0
200,0
150,0
100,0
50,0
0,0
1992=100
1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007
Regulation
Value added per employed person


Post & Tlc in France: deregulation good for productivity
300,0
250,0
200,0
150,0
100,0
50,0
0,0
1992=100
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: good for productivity
250,0
200,0
150,0
100,0
50,0
0,0
1992=100
1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007
Regulation
Value added per employed person







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

Figure 2 – Quadratic impact of mark-up on TFP