



Economic Policy Papers

Public vs Private: Electricity and Telecommunications in Europe

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No. 05-14

July 2014

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Executive Summary

This paper investigates how the ownership - public and/or private - regime of the telecommunications and electricity industries relates to various indicators of economic performance in European countries. We measure economic performance by calculating total factor productivity, labour productivity and real unit labour cost. The empirical analysis, based on data drawn from Eurostat over the period 1996-2011, suggests that state ownership is associated with inefficiency. Government intervention should, therefore, be confined to promoting competition and discouraging practices that enable private firms to maximise profits at the expense of consumers.

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Κρατικές ή Ιδιωτικές Επιχειρήσεις: Οι Τομείς του Ηλεκτρισμού και των Τηλεπικοινωνιών στην Ευρώπη

Χαράλαμπος Καραγιαννάκης, Ελένα Κεττένη, Θεοφάνης Μαμουνέας, Πάνος Πασιαρδής

ΠΕΡΙΛΗΨΗ

Το άρθρο ερευνά πως το καθεστώς ιδιοκτησίας – δημόσιο και/ή ιδιωτικό- των επιχειρήσεων τηλεπικοινωνίας και παραγωγής ηλεκτρικής ενέργειας σχετίζεται με τους διάφορους δείκτες οικονομικής απόδοσης στις Ευρωπαϊκές χώρες. Η οικονομική απόδοση μετράται με βάση το δείκτη ολικής παραγωγικότητας, την παραγωγικότητα της εργασίας και το πραγματικό μοναδιαίο εργατικό κόστος το οποίο υποδηλώνει την ανταγωνιστικότητα του κλάδου. Η εμπειρική ανάλυση, βασίζεται σε δεδομένα από την Eurostat που καλύπτουν την περίοδο 1996-2011. Τα αποτελέσματα δείχνουν ότι η πλήρως ιδιωτική ιδιοκτησία είναι το καθεστώς με την καλύτερη απόδοση, σε όρους παραγωγικότητας και ανταγωνιστικότητας, στις τηλεπικοινωνίες και τον ηλεκτρισμό, ενώ η κρατική ιδιοκτησία σχετίζεται με αναποτελεσματικές επιδόσεις. Συνεπώς, η κρατική παρέμβαση, θα πρέπει να περιορίζεται στην προώθηση του ανταγωνισμού και στην παρεμπόδιση τακτικών των επιχειρήσεων που έχουν ως στόχο τη μεγιστοποίηση των κερδών εις βάρος των καταναλωτών.

1. INTRODUCTION

Until the late 70s state ownership was generally thought to be the only path to overcoming inefficiencies associated with natural monopolies. The utilities industry, in particular, have long been characterised by the presence of natural monopolies with new contenders facing formidable costs and other non-economic market entry obstacles. More recently, however, the argument gaining support is that by introducing sufficient (de)regulation measures creating a competitive environment substantial efficiency gains can be realised when the ownership of public enterprises is relinquished to private hands (Sheshinski and Lopez-Calva, 1999).

Many researchers have undertaken empirical work addressing the question of whether privatisation can significantly improve the economic performance of enterprises when some degree of market failure exists. The long literature on privatisation includes case studies of particular firms or, industries as a whole and range from utilities to airlines (Galal et al., 1994, Eckel et al., 1997) and from banking (Verbrugge et al., 2000) to expedition activities (Karpoff, 2001); and cover both emerging and developed economies. Most of these studies offer support to arguments in favour of privatisation, in the sense that they show that improvements in financial and operating performance can be realised when state owned firms turn private. Such improvements are usually manifested as increased sales per employee, operating profits and investment.

Privatisation can have a significant anticipation effect as one or more economic performance measures can be found to increase prior to divestiture. Moreover, higher post-privatisation performance is often observed when foreign investors participate in the ownership of newly privatised enterprises (Smith et al., 1997). On the other hand, Frydman et al (1999) argue that privatisation adds approximately 18 percentage points to the annual growth of firms when these are sold to a domestic firm and 12 percentage points when sold to a foreign buyer. Also noteworthy is the observation in the literature that higher performance is seen when new managers are hired by the privatised firm (Claessens and Djankov, 1999).

In this paper we focus on the effect of privatisation on the economic performance of telecommunications and electricity, two industries of particular interest due to their historic character as natural monopolies. Since 1984, when the UK government launched the privatisation of British Telecommunications, publicly owned telecommunications enterprises have been privatised in many countries; and their effects are widely investigated in the literature (Wallsten, 2000; Petrazzini and Clark, 1996; Ramamurti, 1996; Boles de Boer and Evans, 1996). Most studies

also consider issues of market (de)regulation and stress the importance of generating a competitive environment for the realisation of economic gains from privatisation. Similar conclusions are reached in the case of privatisations in the electricity industry (Newberry and Pollitt, 1997). These results echo the recommendation by Wallsten (2000) that privatising a monopoly without regulatory reforms so as to ensure competition should be avoided.

We measure the impact of privatisation on the economic performance of the telecommunication and electricity industries using two indicators: productivity and competitiveness. Specifically, we investigate the relationship between the extent of state ownership and the aforementioned performance indicators in the two utility sectors using data drawn from Eurostat and the OECD for a number of European countries. First, we construct indicators of productivity and competitiveness; and then estimate how these indicators are affected by the public-private ownership mix for each industry and European country in our sample.

Study of the privatisation of utilities has gained popularity in recent years due to the structural adjustment programs which are imposed on several European countries (Ireland, Greece, Portugal, Cyprus etc) by international lenders. Several questions arise in the context of these studies ranging from how privatisation should be designed and implemented to deliver significant economic benefits to who will be the gainers and losers of the resulting change in the utilities' ownership. This paper, by documenting the experience of European countries vis-à-vis the productivity and competitiveness effects of privatisation of the telecommunications and electricity utilities, aims at helping countries considering the option of privatisation make more informed decisions.

The rest of this paper is structured as follows. The next section describes the methodology and data used for the empirical analysis. Section 3 presents the constructed measures of economic performance in the telecommunication and electricity industries in European countries; and reports empirical results regarding how these measures are associated with alternative state-private ownership regimes. Section 4 concludes the paper.

2. METHODOLOGY AND DATA

In this section we describe the economic performance indicators used in our analysis. The emphasis here is to convey the information content of these indices using a simple language. A technical description of how these indices are constructed is given in the Appendix.

2.1 Indicators of economic performance

The two performance indicators used in our analysis are Total Factor Productivity (TFP) and labour productivity.

- TFP measures the change in output which cannot be attributed to changes in the factors of production (capital and labour). As such, it is a measure of economic performance that does not pertain to a particular input, but rather shows how effectively the inputs are combined to generate value added. TFP growth is usually attributed to technology improvements, broadly interpreted to include phenomena such as advances in general knowledge, improved management and generally anything affecting output levels other than the inputs used. In the analysis below we often refer to TFP as productivity.
- Labour productivity is measured by the ratio of the output of goods and services to the labour hours required for their production. Unlike TFP, it pertains to labour input alone and shows the value of the additional goods and services produced per work hour. Labour productivity is a key determinant of living standards, as measured by the per capita income of a country and, from this perspective, is of important policy relevance.

Another measure of economic performance with particular interest to competitiveness is the unit labour cost, which is obtained from subtracting the growth of real wages from the growth rate of labour productivity. The unit labour cost provides an indication of how competitive an economy is with respect to labour. For example, if the wages grow faster than labour productivity the unit labour cost increases making the economy less competitive in terms of its labour input.¹

2.2 Data description

As noted earlier, this paper focuses on the economic performance of electricity and telecommunications. Data availability, however, is different for each of these two

¹ The unit labour cost is a measure for assessing how far labour reaps the benefits of rising productivity. It is basically the rate of compensation of employees divided by productivity and as long as this compensation increases at the same rate as productivity unit labour costs should remain constant (Cashell, 2004).

industries in European countries. Time series data allowing a complete analysis of economic performance are available for electricity in 13 and for telecommunications in 10 European countries. Data for both industries are available for Austria, Belgium, Cyprus, Finland, Germany, Greece, Netherlands, Italy, Slovakia and Slovenia; whereas, data for the electricity industry are also available for France, Portugal and Spain.

We have computed the performance indicators described above for the telecommunications and electricity industries for each year and each country in our sample using the growth accounting methodology described in the Appendix.² Data on prices and quantities of output and inputs are obtained from Eurostat. The variables used are the gross value added in current and constant prices, the number of employees, the total hours worked, investment in current and constant prices, and the compensation of employees. The data cover the period from 1995 to 2011 and the prices are expressed in euros at constant 2000 prices. In the remainder of this section we describe how the aforementioned variables are used to obtain the information required for the construction of TFP and labour productivity (also see Appendix).

The value of output is constructed as the value added in current prices; while the value added in constant prices is taken to be the quantity of output. To obtain the price of output we divide the current with the constant value of output. Regarding labour, the compensation of employees was used as the value of labour, adjusted to include those who are self-employed, a procedure also followed by the EU. Having obtained the value of labour and hours worked, the price of labour was calculated and expressed in 2000 prices. The quantity of labour is then calculated from the price and value of labour.

The capital stock is constructed using investment data in current and constant prices. The value of capital is taken to be the value added in current prices; while the perpetual inventory method is used with a constant depreciation rate of 5% to construct the capital stock. For the value of capital in the initial period, we use the investment in this period divided by the depreciation rate plus the growth rate of output.

² Growth accounting dates back to 1930s and concepts developed by Tinbergen (1942) and others; but the essential attributes were first presented by Solow (1957), Kendrick (1961), Denison (1962), and Jorgenson and Griliches (1967, 1996). More recently, among others, Diewert (2002) has integrated national accounting with index number and production theory.

Data for the ownership regime in each of the two industries under investigation and in each country in our sample have been drawn from the OECD's non-manufacturing regulation indicators for energy transport and communication industries, commonly known as the ETCR indicators (Conway and Nicoletti, 2006). The ETCR database contains indicators that cover regulatory and market conditions in a number of different segments of each industry for 21 OECD countries over the period 1975 to 2007. For each of the two industries considered in this paper, the ETCR database provides separate indicators of public ownership, in ways that are appropriate to each industry. In particular,

- for electricity the indicator records the prevailing ownership structure of the largest companies in the various segments of the industry (i.e. generation, transmission, distribution, and supply of electricity) ranging from fully private to fully public; whereas,
- for telecommunication the indicator records the proportion of the operator shares that are owned by government.

In terms of country availability, data exist about the extent of state ownership of the electricity and telecommunications industries in all countries that belong to the euro area, plus the Czech Republic, Denmark, Hungary and UK.³ For cross-country and cross-industry comparability we have consider five ownership structures each indicating a different level of state participation: private, mostly private, mixed, mostly public and public.

3. Empirical results

In this section we present the constructed indices that measure the performance of each of the two industries, namely (total factor) productivity and labour productivity. We also report results about the unit labour cost and real wages to indicate the role played by the cost of labour in shaping the aforementioned performance indicators. Furthermore, for illustration purposes we have divided the time period into three sub-periods, namely, 1996-2001, 2002-2007, and 2008-2011. The ranking of countries is based on the economic performance in the most recent period, 2008-

³ For the electricity industry, however, Finland, France, Portugal, Slovenia and Spain have data coverage limitations and are excluded from the analysis.

2011. The average economic performance of the two industries in the euro-area is also reported for comparison purposes.

3.1 Analysis of economic performance

Figure 1 depicts productivity of the electricity and telecommunications industries, as measured by the growth accounting technique. As regards the electricity industry Germany enjoys the highest productivity growth among the European countries in our sample; while Portugal is at the bottom end. Across time the relative ranking between the various countries seems to be consistent with only slight deviations, mostly during 1996-2001, i.e. the early part of the period covered by our empirical analysis. The situation in the telecommunications industry, however, is different. During the period 2008-2011 Finland has the highest productivity growth, while Cyprus is at the opposite end.⁴

In general, comparison of the economic performance of the two industries across countries shows substantial diversity. For example, in Germany the telecommunications top the productivity league among the European countries in our sample, but the productivity growth of the electricity industry is only about average. Also, countries like Austria and Netherlands seem to enjoy rapid productivity growth in electricity, but have below average productivity growth in telecommunications. The opposite is true for other countries, e.g. Greece performs well in Telecommunications but has below average productivity growth in electricity.

⁴ It should be noted here that we do not have data available for the Portugal telecommunications sector.

FIGURE 1

Multifactor productivity growth rate (country ranking, ascending)

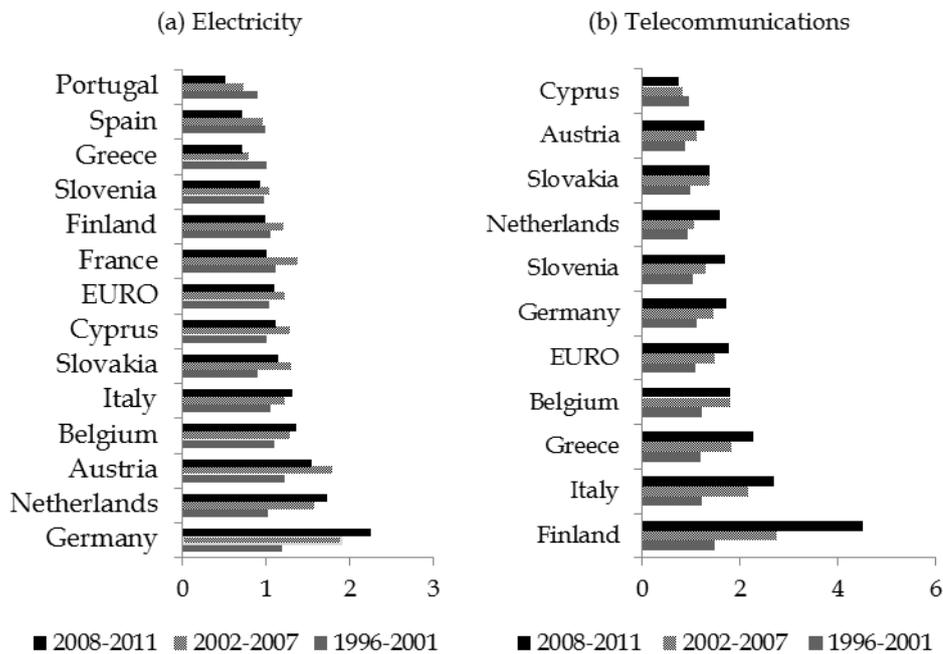


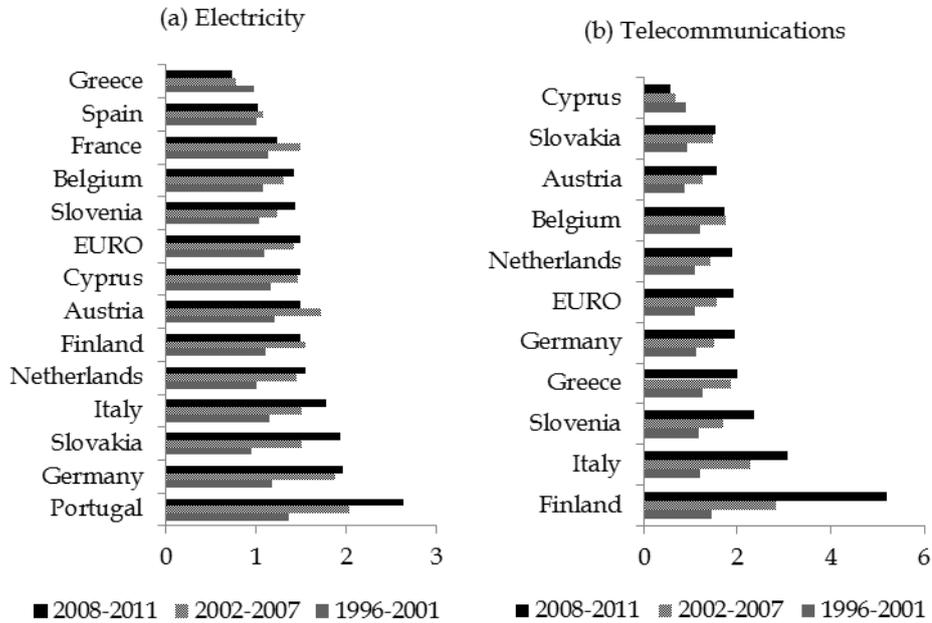
Figure 2 shows that, overall, the labour productivity ranking of countries remains stable over time, especially during the period from 2002 to 2011. Greece and Cyprus have the lowest labour productivity growth among the European countries in our sample in electricity and telecommunications, respectively. The electricity industry in Portugal enjoys the highest labour productivity growth during the period 2002-2011; while the same is true for the telecommunications industry in Finland.

Interestingly, earlier Portugal was found to have the lowest productivity (TFP) increase in the electricity industry during 2008-2011. This suggests that labour productivity growth in this country is mainly explained by increases in capital deepening.⁵ In other words, the electricity industry in Portugal invests more in capital rather than employment, i.e. the growth of capital is greater than the growth of labour.

⁵ As explained earlier, labor productivity is equal to TFP plus capital deepening

FIGURE 2

Labour productivity growth rate (country ranking, ascending)



As shown in Figure 3, Italy and Finland have the lowest unit labour cost growth in the electricity and telecommunication industries, respectively. On the other hand, both industries in Cyprus and Slovakia are the least competitive in terms of labour usage.

Recalling that the unit labour cost is equal to the wage minus labour productivity, one can conclude that the decrease in competitiveness of the electricity industry in Cyprus is mostly due to large increases in real wages; while the adverse position of Cyprus in the telecommunications industry originates mostly from low productivity growth. For Slovakia the source of the increased unit labour cost is mainly the high salaries in both industries; the problem is more pronounced in the telecommunications industry, where labour productivity growth is also relatively low.

FIGURE 3

Real unit labour cost growth rate (country ranking, ascending)

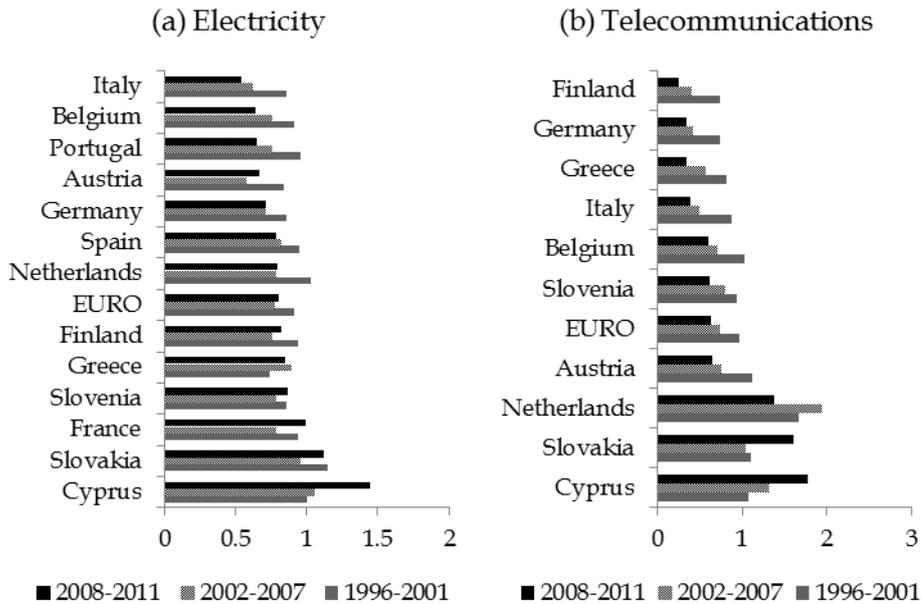
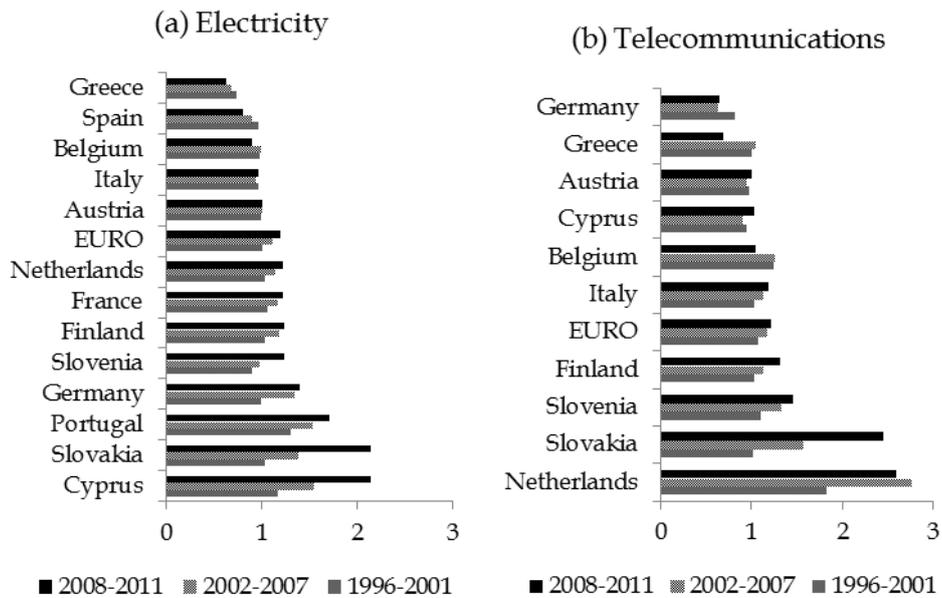


FIGURE 4

Real wages growth rate (country ranking, ascending)



3.2 Ownership structure and economic performance

Using data indicating the ownership structure in telecommunications and electricity among European countries in our sample we examine the relationship between economic performance (as measured by productivity and real unit labour cost) and the ownership regime prevailing in these industries. In doing so we use dummy variables to represent the five ownership structures mentioned earlier in the paper, i.e. public, mostly public, mixed, mostly private and private.

Figures 5 and 6 below show how the real unit labour cost and productivity, respectively, vary with the share of state in ownership. As benchmark we consider the mixed ownership structure, where the industry is divided more or less equally between the state and the private sector. Notably, Figure 5 shows competitiveness measured in terms of unit labour cost, therefore a positive number indicates worsening and a negative number improvement of economic performance. In contrast, Figure 6 measures changes in productivity and positive numbers indicate improvement and negative numbers worsening of economic performance.⁶

From figure 5 we can conclude the following.

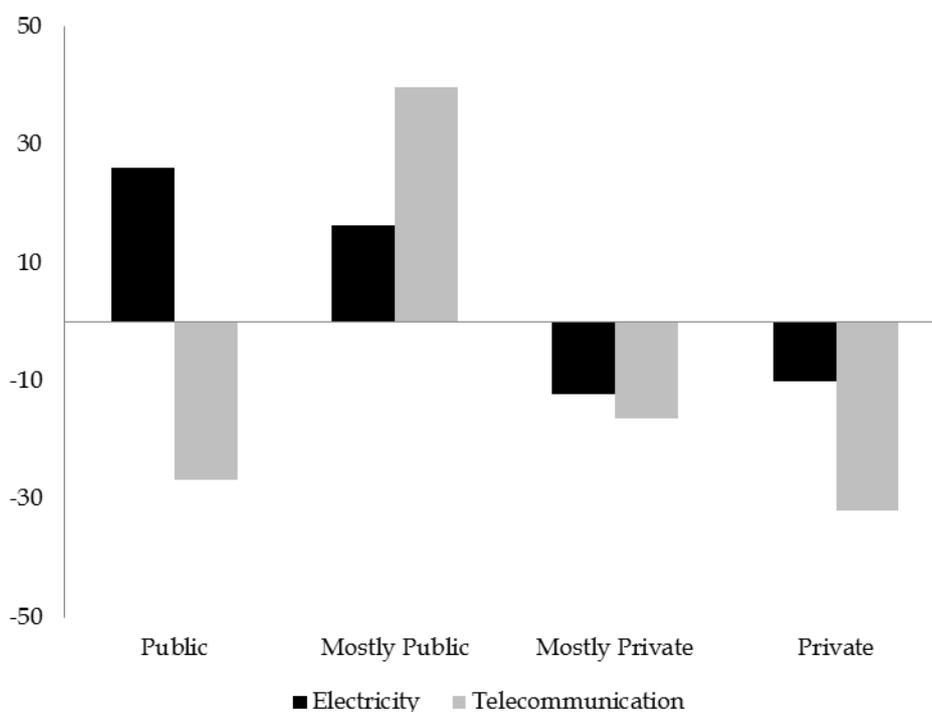
- In the electricity and, particularly, the telecommunications industry fully private is the most competitive ownership regime, in the sense that it is associated with reduced unit labour cost.
- The worst regimes in terms of labour competitiveness are fully state ownership in the electricity industry and mostly state ownership in the telecommunications industry.
- In the case of the telecommunications industry the second best regime in terms of labour competitiveness is fully public ownership.

The latter result is possibly due to the fact that under a mixed public-private ownership regime the government is itself a stakeholder in the profits generated by the telecommunications industry. Therefore, it may not have strong incentives to introduce sufficient regulation to limit monopoly practices and improve competition in the industry because this would reduce its own profits.

⁶ The estimated parameters on the basis of which Figures 5 and 6 are constructed can be found in the Appendix.

FIGURE 5

Effect of Ownership on Real Unit Labour Cost

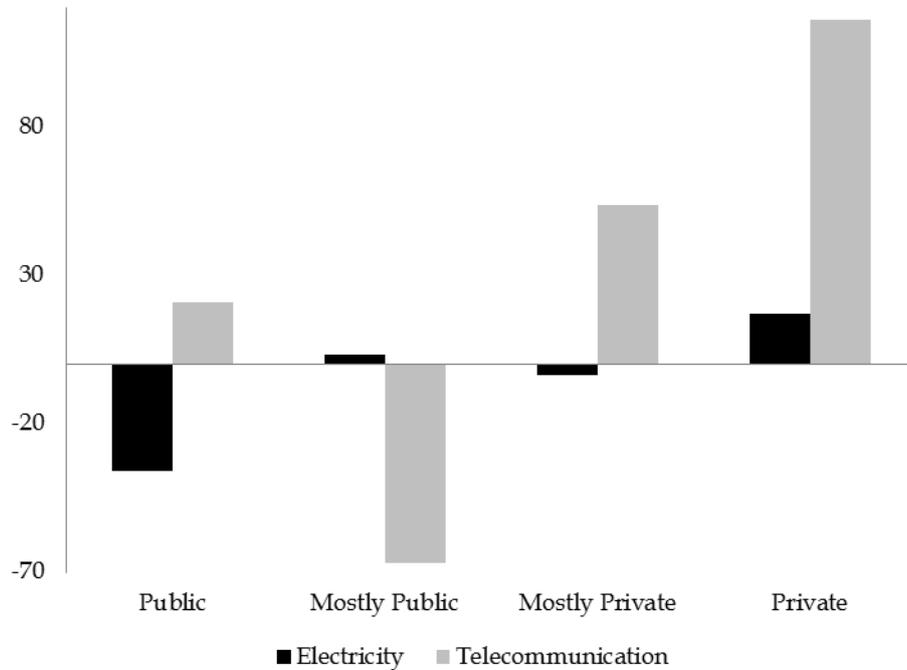


Similar results are also obtained from looking at the relationship between productivity and state ownership in Figure 6. In particular:

- both the telecommunications and the electricity industries realise substantially higher productivity growth under private rather than state ownership;
- in the electricity industry, the worse regime is having fully public ownership, as is true for the case of labour competitiveness seen in Figure 4;
- the worse regime in the telecommunication industry is mostly public ownership, with fully state ownership being the second worse; and
- the second best regime is mostly private ownership in the telecommunications and mostly public ownership in the electricity industry.

FIGURE 6

Effect of Ownership on Productivity



The relationship between state ownership and economic performance is also investigated using regression analysis to estimate the effect of government share on the productivity and unit labour cost. This estimation is performed only for telecommunications as the required data are not available for the electricity industry. The results obtained are reported in Table 1 and confirm the negative effect of state ownership on economic performance. In particular, a 1% increase of government's ownership in telecommunications accounts for reduction in the growth rate of (i) competitiveness by 0.53%, (ii) total productivity by 1.52%, and (iii) labour productivity by almost 2%.

TABLE 1

Effect of state ownership on the performance of telecommunications

	Real Unit Labour Cost		Productivity	
	Coefficient	t-statistic	Coefficient	t-statistic
Gov. Share	0.53	6.87	-1.52	-8.30
Constant	66.8	7.27	242.1	11.0

4. POLICY CONCLUSIONS

Government intervention, either through regulation or through state ownership, has been traditionally seen as an acceptable practice for combating the inefficiency associated with natural monopolies. This paper considers the effectiveness of the state ownership option by examining how various measures of economic performance in the electricity and telecommunications industries in European countries are affected by the extent of this type of ownership.

The results obtained using data over the period 1996-2011 suggest that a fully private ownership regime yields the best productivity and competitiveness performance in both the telecommunications and electricity industries of European countries in our sample. Furthermore, the estimates suggest that when the state keeps for itself a share in ownership large enough to maintain control of the industry, the economic performance is worse than the fully state ownership regime.

In general, our empirical findings point to the conclusion that state ownership encourages inefficiency in both the telecommunications and electricity industries. A plausible explanation of this result is that public enterprises may have stronger incentives than private firms to engage in anti-competitive behaviour (Sappington and Sidak, 2003a, 2003b). This implies that government intervention should be restricted to promoting competition among private firms through regulation (free entry, price ceiling etc). This is particularly important in small countries, where privatisation can result in excessive control of the market. Appropriate regulation can ensure that this will not happen by encouraging private companies to abstain from monopoly practices that maximise profits at the expense of consumers.

A negative impact of privatisation on wages and, possibly, employment, is probably inevitable in the short run, because productivity gains and increased competitiveness are often realised through reduction in the cost of labour and other inputs. However, the long run benefits to the society from improved competitiveness are likely to be larger than the losses incurred by those benefiting from the existence of state owned utilities. Indeed, the fact that the employees of public utilities have been benefiting for many years at the expense of other sections of the population is a normative argument for, not against, privatisation.

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APPENDIX

Model description and results

A.1 Model description

Solow's (1957) seminal paper provides a useful context for introducing the basics of growth accounting, which has influenced numerous subsequent growth accounting studies. Following his notion, we define a production function as:

$$Y = F(K, L, t)$$

where Y is the quantity of output, K is the capital input, L is the labour input and t the level of technology (TFP). Differentiating with respect to time, dividing by Y and rearranging terms we obtain the growth rate of output as

$$\hat{y} = \frac{\partial F}{\partial K} \frac{K}{Y} \hat{k} + \frac{\partial F}{\partial L} \frac{L}{Y} \hat{l} + \frac{\partial F}{\partial t} \frac{1}{Y} \quad (1)$$

Then, TFP growth is calculated as a residual

$$\hat{\tau} = \frac{\partial F}{\partial t} \frac{1}{Y} = \hat{y} - \frac{\partial F}{\partial K} \frac{K}{Y} \hat{k} - \frac{\partial F}{\partial L} \frac{L}{Y} \hat{l} \quad (2)$$

To circumvent the problem arising from the fact that as the marginal products of capital, $\frac{\partial F}{\partial K}$ and labour, $\frac{\partial F}{\partial L}$, are unobservable we assume that firms maximise profits, so that the social marginal products must be equal to the observed factor prices. Then equation (2) becomes

$$\hat{\tau} = \hat{y} - s_K \hat{k} - s_L \hat{l} \quad (3)$$

where s indicates the output shares of capital and labour.

When production exhibits constant returns to scale labour productivity growth depends on TFP growth plus capital deepening, where capital deepening refers to the growth rate of per capita capital, measuring the substitution between capital and labour. Labour productivity can therefore be written as:

$$\hat{\ell} = \hat{\tau} + s_K (\hat{k} - \hat{l}) \quad (4)$$

Finally, using the labour productivity measure, one can calculate the unit labour cost as the difference between the wage growth rate and the labour productivity growth rate:

$$\hat{u} = \hat{w} - \hat{p}$$

where \hat{w} is the growth rate of wages and \hat{u} is the unit labour cost, or the real unit labour cost when \hat{w} is measured in real rather than nominal terms.

A.2 Estimations and results

TABLE A2.1

Effect of ownership on performance measures, electricity sector

	Unit Labour Cost		Productivity	
	Coefficient	t-statistic	Coefficient	t-statistic
Public	26.18	4.43	-35.80	-4.53
Mostly Public	16.42	3.26	3.35	0.50
Mostly Private	-12.15	-0.89	-3.79	-0.21
Private	-10.09	-1.00	17.06	1.26
Constant	76.77	10.96	149.4	15.95

* Country fixed-effects were also included in the estimations but were omitted for brevity. All results are available upon request.

TABLE A2.2

Effect of ownership on performance measures, telecommunications sector

	Unit Labour Cost		Productivity	
	Coefficient	t-statistic	Coefficient	t-statistic
Public	-26.64	-1.82	21.10	0.63
Mostly Public	39.77	2.96	-66.80	-2.18
Mostly Private	-16.41	-2.67	53.45	3.81
Private	-31.87	-4.83	116.1	7.70
Constant	87.32	15.45	117.7	9.13

* Country fixed-effects were also included in the estimations but were omitted for brevity. All results are available upon request.

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