Capital Structure and Regulation: Does Ownership Matter?

Bernardo Bortolotti, Carlo Cambini,
Laura Rondi and Yossi Spiegel

NOTA DI LAVORO 94.2007

OCTOBER 2007

PRCG – Privatisation, Regulation, Corporate Governance

Bernardo Bortolotti, *Università di Torino and Fondazione Eni Enrico Mattei*
Carlo Cambini, *Politecnico di Torino*
Laura Rondi, *Politecnico di Torino and CERIS-CNR*
Yossi Spiegel, *Tel Aviv University and CEPR*

Capital Structure and Regulation: Does Ownership Matter?

Summary

We construct a comprehensive panel data of 96 publicly traded European utilities over the period 1994-2005 in order to study the relationship between the capital structure of regulated firms, regulated prices, and investments, and examine if and how this interaction is affected by ownership structure. We show that firms in our sample increase their leverage after becoming regulated by an independent regulatory agency, but only if they are privately controlled. Moreover, we find that the leverage of these firms has a positive and significant effect on regulated prices, but not vice versa, and it also has a positive and significant effect on their investment levels. Our results are consistent with the theory that privately-controlled firms use leverage strategically to shield themselves against regulatory opportunism.

Keywords: Regulated Utilities, Regulatory Agencies, Capital Structure, Leverage, Investment, Private and State Ownership

JEL Classification: L51, G31, G32, L33

We thank Yaakov Amihud, Farid Gasmi, Yannis Katsoulacos, Martin Hellwig, Jon Stern, Tommaso Valletti, and seminar participants at Fondazione Eni Enrico Mattei, Politecnico di Milano, the 2007 International Industrial Organization Conference in Savannah (GA), and the 2007 CRESSE Conference in Corfu, for helpful comments. We also thank Mara Faccio and Fabrizio Gilardi for data and Valentina Milella and Silvana Zelli for excellent research assistance. Bernardo Bortolotti gratefully acknowledges financial support from the European Commission (Contract N. CIT5-CT-2005-028647). Carlo Cambini and Laura Rondi gratefully acknowledge financial support from the Italian Ministry of Education (n. 2006130472_002).

Address for correspondence:

Carlo Cambini
Politecnico di Torino, DISPEA
Corso Duca degli Abruzzi 24
10129 Torino
Italy
Phone: +390115647292
Email: carlo.cambini@polito.it

1. Introduction

Ten years after the beginning of privatization and institutional reforms in network industries in Europe, regulated utilities have substantially increased their financial leverage. Casual observation suggests that this trend is widespread across European countries and across sectors. For example, Telefonica de Espana, the Spanish incumbent telecom operator, increased its leverage after its privatization in 1997 from 36% to 68% in 2005; Autostrade per l'Italia, the largest freight road operator in Italy, increased its leverage from 32% in 1999, when it was completely privatised, to 88% in 2003; National Grid Group Plc, the U.K. energy transport operator, increased its leverage from 30% in 1997 to 72% in 2005; and Anglian Water Plc, the largest water company in England and Wales, raised its leverage from 7% in 1997 to 49% in 2005. A joint study of the U.K. Department of Trade and Industry (DTI) and the HM Treasury (DTI-HM, 2004) has expressed a concern about the "dash for debt" or "flight of equity" within the U.K. utilities sector from the mid-late 1990's and argued that such high leverage "could imply greater risks of financial distress, transferring risk to consumers and taxpayers and threatening the future financeability of investment requirements" (DTI-HM, 2004, p. 6).[1]

The high leverage of privately-owned regulated utilities is a well-known and well-documented phenomenon in the U.S., where large utilities were always privately owned and subject to rate regulation by state and by federal regulatory commissions since the 1910's.[2] It is therefore interesting to observe a similar trend in network industries in Europe. The European context though differs from that in the U.S. in at least three important respects. First, private ownership and control of utilities is still the exception rather than the rule; indeed, despite the privatization wave, many European utilities are still controlled by central or local governments (see Bortolotti and Faccio, 2004). Second, the degree of liberalization varies considerably across countries, and in most sectors is still incomplete. Third, not all European utilities are regulated by independent regulatory agencies: in some sectors regulation is performed directly by ministries, governmental committees, or local governments. Hence, the typical institutional framework in Europe is different from that in the U.S. and this difference may have important implications for regulated firms' financial decisions, possibly depending on their ownership structure.

From a theoretical perspective, when regulators cannot commit to long-term regulated price, they may have an incentive, once the firm's investments are sunk, to cut prices in order to

[1] For a related report, see Ofwat and Ofgem (2006).
[2] See for example, Bowen, Daly and Huber (1982), Bradley, Jarrell, and Kim (1984), Smith (1986), and Barclay, Marx, and Smith (2003).

benefit consumers at the expense of the firm's owners. High leverage can shield regulated firms against this type of regulatory opportunism because regulators are typically concerned about the stability of the industry they regulate and will therefore be reluctant to cut prices because this will expose the firm to the risk of financial distress (see e.g., Spiegel and Spulber, 1994 and 1997, and Spiegel, 1994 and 1996).[3] Hence, debt financing can alleviate regulatory opportunism and may therefore encourage regulated firms to increase their investment levels. This implies in turn that the capital structure of regulated firms, regulated prices, and investments are interrelated.

In this paper, we first document the capital structure of publicly traded regulated utilities in the EU, and then explore its determinants. Given the large variation in the ownership structure of EU regulated firms, we are particularly interested in finding out if and how the interaction between capital structure, regulated prices, and investments, varies across different ownership structures. To study this interaction, we have constructed a comprehensive panel data on 96 publicly traded EU utilities over the period 1994-2005. Our data covers practically all publicly traded regulated utilities in the EU 15 countries and it includes financial and accounting data as well as data on the firms' ownership structure, and the regulatory framework under which they operate.

There are some earlier empirical studies on the capital structure of regulated firms, but these studies have focused mainly on the U.S. Taggart (1985) finds that electric utilities have increased their debt to equity ratios after the introduction of rate regulation in various states in the U.S. in the 1910's. Dasgupta and Nanda (1993) study a cross-section of U.S. electric utilities, and find that firms operating in less pro-firm regulatory environments tend to have higher debt-equity ratios. Klein, Phillips and Shiu (2002) study a cross-section of U.S. property-liability insurers subject to varying degree of price regulation depending on the state/lines in which they operate and find strong and robust evidence that the degree of price regulation and its stringency have positive effects on the insurers' leverage. Bulan and Sanyal (2005) study a panel of U.S. investor-owned electric utilities for the period 1990-2000 and find that they reduced their debt to total assets ratios in response to the heightened regulatory and competitive uncertainty created by the deregulation process. Bulan and Sanyal (2006), use a similar panel to show that after deregulation, U.S. investor-owned electric utilities respond to growth opportunities in a two-step process: first, they accumulate financial slack in anticipation of new growth opportunities, but then, when the growth opportunities become more viable, they use debt finance to finance them.

[3] The effect of leverage on regulated prices was first identified by Taggart (1981), although his model does not consider the strategic interaction between the regulated firm and the regulator and does not examine the implications of the price-influence effect of leverage for the equilibrium choice of leverage.

Finally, Correia da Silva, Estache and Jarvela (2006), examine the leverage of 121 regulated utilities in 16 less developed countries over the period 1991-2002 and find that leverage varies significantly across sectors, with the highest leverage being observed in transportation and the lowest in water supply. Moreover, they find that leverage steadily increases over time while investment levels fall.

To the best of our knowledge, our paper is the first systematic study of the capital structure of European utilities and the first to examine empirically the relationship between capital structure, ownership structure, price regulation, and investments. The analysis of our panel data reveals the following:

(i) Utilities tend to increase their leverage following the introduction of price regulation, provided that they are privately controlled.

(ii) The leverage and prices of regulated utilities are positively related, provided that they are privately controlled. Granger causality tests reveal that leverage affects price but not vice versa.

(iii) An increase in the leverage of regulated utilities has a significant positive effect on their market value, provided that they are privately controlled.

(iv) Privately controlled regulated utilities tend to invest less than state-controlled utilities, after rate regulation is introduced. However, investment levels of privately controlled utilities are significantly positively affected by leverage, while the investment levels of publicly controlled utilities are not.

These results hold even after controlling for several firm-specific characteristics and for key features of the institutional context, such as the intensity of market liberalization, investor protection and macroeconomic conditions.

The rest of the paper is organized as follows. Section 2 presents the theoretical background and the empirical implications that we test. Section 3 provides a brief institutional framework of the regulatory environment in the EU. We describe our panel data in Section 4 and presents our empirical results in Section 5. Concluding remarks are in Section 6.

2. Theoretical predictions

Regulators set the prices of regulated rates by explicitly taking into account, among other things, the firm's capital structure. In the U.S., this practice stems from the need to ensure regulated

firms a "fair rate of return" on their investments. This fair rate of return depends on the firm's cost of capital, which in turn depends on the firm's capital structure.[4] Under the *RPI-X* regulation, which is widely used in the EU, regulators set price caps that ensure that the regulated firm's revenue will cover its operating costs, depreciation, and infrastructure renewals charges, and will provide the firm a return on its capital which will induce it to enhance and maintain its network. As in the U.S., the return on capital depends on the firm's capital structure.[5]

The fact that regulated prices are set on the basis of the firm's capital structure suggests that regulated firms can affect their prices by appropriately choosing their capital structure. To the extent that regulators can commit to use the firm's weighted cost of capital as a basis for computing the rate of return that the firm should earn on its capital, one would expect regulated firms to prefer equity over debt because the cost of equity is generally higher than the cost of debt.

However, in a series of papers, Spiegel and Spulber (1994 and 1997) and Spiegel (1994 and 1996) show that if regulators cannot commit to a particular regulatory scheme, then regulated firms will have an incentive to finance their investments with debt. The idea is as follows: when regulators cannot commit to long-term regulated prices, they have an incentive to cut prices once the firm's investments are sunk in order to benefit consumers at the expense of the firm's owners. This opportunistic behavior in turn may induce regulated firms to underinvest. However, if the firm finances its investments with debt, then regulators, who are typically concerned about the financial stability of the industry they regulate, will have an incentive to set higher regulated prices than they would otherwise set in order to minimize the risk that the firms will become financially distressed. Hence, debt financing will mitigate regulatory opportunism and will therefore boost the firm's value and encourage it to invest. Regulators on their part, may allow firms to become highly leveraged because this allows them to implicitly commit not to behave opportunistically. Since this commitment in turn provides regulated firms with a stronger incentive to invest, debt financing may end up being socially desirable.

This theory yields the following testable hypotheses:

---

[4] In an early decision from 1898, *Smyth v. Ames* (1898) 169 U.S. 466, the Supreme court of the U.S. decided that "what the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience." In its landmark decision *Federal Power Comm. v. Hope Natural Gas Co.*,(1944) 320 U.S. 591, the Supreme court of the U.S., elaborated on the concept of fair rate of return and stated that "the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks."

[5] See for example DTI-HM, (2004, p. 16).

Hypothesis 1: *Regulated firms will increase their leverage once they become regulated by an independent regulatory authority.*

Hypothesis 2: *Leverage leads to higher regulated prices.*

Hypothesis 3: *Leverage boosts the firm's market value.*

Hypothesis 4: *Leverage strengthens the firm's incentive to invest.*

Hypotheses 1-4 however are based on the implicit assumption that the regulated firm is privately owned. But as we mentioned in the Introduction, many European regulated utilities are still state-controlled. Clearly, if the government controls the regulated firm, then it can benefit consumers directly through the firm's actions and does not need to rely on regulatory intervention through opportunistic behavior to achieve this objective. Hence, Hypotheses 1-4 do not necessarily hold in the case of state-controlled firms.[6] We believe that the fact our panel data covers both privately-controlled and state-controlled-firms allows us to better test the theory since we can examine whether there is a significant difference between privately-controlled and state-controlled firms.

3. Regulatory environment

The evolution of network industries in the EU has been remarkable. Following a big wave of nationalization after WWII, network industries in Europe were largely characterized by vertical integration, state monopoly, and public ownership and control. Under this regime, public utilities in electricity, gas, water, telecommunications, and transportation markets, were viewed as an operational branch of the government and were instructed to provide universal services at low prices, to absorb unemployment, and to spur investment in infrastructure. The government in turn played the dual role of owner and "regulator," and fixed tariffs, quality standards, and investment levels. The result of this arrangement was ill-performing public monopolies and a high degree of inefficiency (Meggison and Netter, 2001).

Starting from the mid 1980's, however, the European Commission has promoted a gradual process of liberalization of the public utilities sector. The main goal of this process is to

[6] In a Technical Appendix, available at http://www.tau.ac.il/~spiegel, we present a model that explicitly accounts for partial ownership of the regulated firm by the state and show that debt plays a smaller strategic role when the state has a larger stake in the firm.

improve the efficiency and service quality of EU utilities and boost their investments. In particular, the European Commission has enacted a number of Directives aimed at setting up a common regulatory framework for EU countries, which in turn were required to transpose these directives into national legislation. However, the Commission did not provide any recommendation about the ownership structure of utilities in liberalized markets, leaving the privatization decision completely in the hands of national governments.[7] As a result, central and local governments still remain major shareholders in many utilities in the EU.

The extent of effective liberalization varies considerably across member states and across industries. In telecommunications, liberalization kicked off in 1987 with the publication of the Green Paper for the Development of the Common Market for telecommunication services and equipment. The Green Paper was followed by a sequence of directives, starting from Directive 90/388 on "Competition in the markets for telecommunications services," which established the institution of national independent regulatory authorities (IRA) in each member state,[8] followed by a series of directives which defined the main principles for opening up the market for competition, including the "Licensing" Directive 97/13, the "Interconnection" Directive 97/33, and the "New voice telephony" Directive 98/10. However, the fundamental piece of EC legislation regarding telecommunication markets is the "Full Competition" Directive 96/19, aiming at opening up the market for voice telephony from January 1, 1998. This directive provided the basic principles for market access, interconnections rules, price controls, and universal service obligations.[9]

In the energy sector, the European Commission has been undertaking legislative actions since 1988 to establish an internal energy market for both electricity and natural gas within the EU. The milestone legislation is Directive 96/92 for the electricity, followed by Directive 98/30 for the gas market; these directives aimed at gradually introducing competition in generation/production and distribution, and at unbundling the different segments in the energy value chain. Importantly, these directives established independent national regulatory agencies.[10] Initially, these agencies were granted powers to settle disputes among operators and were only required to be independent from the regulated firms. Over time however, EC legislation has

[7] For a more comprehensive analysis of the privatization process in Europe, see Bortolotti and Siniscalco (2004).
[8] Art. 7 Directive 90/388/EC and also preamble 11 to Directive 96/19/CE.
[9] These Directives have subsequently undergone a substantial review in 2000-2002. After a first integration with the "Communications Review" document (issued in 1999), a new regulatory framework was established with the four Directives 2002/19-22/EC (the Framework, the Authorization, the Access and the Universal Service Obligation Directive) aiming at introducing a more "ex post oriented" than "ex ante oriented" approach to market policy. For more details, see Buigues and Rey (2004).
[10] Art. 20 Directive 96/92/EC and Art. 21 of Directive 98/30/EC.

broadened the powers of regulatory agencies to encompass the responsibility of ensuring non-discrimination, effective competition, and the efficient functioning of the market, along with the implementation of unbundling rules.[11]

Unlike in the telecommunications and energy sectors, the liberalization efforts in the water and transportation sectors are still in early stages. At present, privatization activity is still limited, and, with the exception of the U.K., price regulation is still carried out by ministries or governmental committees, rather than by an IRA. In the water supply industry, the "Water framework" Directive 200/60 has made some steps towards market opening by setting broad principles for water management and water pricing policies. The directive has been transposed in most European countries, although up to now, privatization in the water sector is still very limited, with only 6 member states being involved in privatization efforts.

To the best of our knowledge, the only relevant directive in the transportation sector is Directive 96/67 on air transportation infrastructures, introducing freedom to airports in the provision of ground handling services. The European Union however is considering some proposals to deal with other aspects of the transportation sector such as the national systems of tolls and user charges for infrastructure,[12] and the liberalization of market access to port services.[13] The lack of a suitable regulatory framework is undoubtedly responsible for the limited scale of freight roads privatization, which is confined to a handful of transactions in Italy, France, and Portugal.

Table A1 in the Appendix reports the timing of transposition of sectoral Directives in each member state, the year in which an IRA was established, and the allocation of proceeds from privatization over time.[14] In most member states, privatizations followed the implementation of EC directives regarding the adoption of regulatory framework and establishing IRAs.

4. The data

We constructed our data as follows. Using *Worldscope*, we identify publicly traded firms operating in regulated sectors during the period 1994-2005 in the EU 15 countries. We define regulated sectors to be those in which entry conditions and prices are subject to regulatory oversight either by the state or by an IRA. These sectors include electric and natural gas utilities,

[11] Art. 23 Directive 2003/54 and Art. 25 Directive 2003/55.
[12] COM (2003) 448.
[13] COM (2004) 654.
[14] The data refer only to the energy and telecoms sectors because in water supply and transports a common regulatory framework is still under construction, no independent regulatory agency was established and privatization process are extremly limited.

water supply companies, telecoms, freight roads concessionaires, and transport infrastructure operators such as ports, airports authorities, and rail infrastructure. Excluded from the sample are airlines, oil and refinery companies, and companies operating solely in wireless telecommunications or in the generation of electricity because typically the prices of these services are not regulated.

By applying these selection criteria, we end up with an unbalanced panel of 96 publicly traded utilities and transportation infrastructure operators (927 firm-year observations) in 14 EU member states.[15] Table A2 in the Appendix lists the firms in our sample. All in all, we have 44 firms that engage in electricity and gas distribution, 13 water supply companies, 18 telecoms (mainly vertically integrated operators), 9 freight roads concessionaires, and 12 transportation infrastructure operators.

We are particularly interested in disentangling the effects of state versus private ownership in the capital structure of regulated firms. Hence, we collected data on the government's ultimate control rights (UCR) in firms in our sample using the sources listed in Table A3 in the Appendix.[16] Since our sample often exhibits a complex web of cross-ownership patterns among firms (one firm holds the shares of another firm, which in turn holds the shares of a third firm and so on - see Figure 1 for an example), the government may have both direct as well as indirect control rights in firms. In order to measure the government's UCR, we therefore use the weakest link concept (see La Porta, Lopez-de-Silanes, and Shlifer (1999), Claessens, Djankov, and Lang (2000), Faccio and Lang (2002), and Bortolotti and Faccio (2004)). According to this concept, the UCR of a given investor (the government in our case) is simply equal to the minimum ownership stake along a chain (i.e., the weakest link). In the case of multiple chains, the UCR's are summed up across all chains.[17]

Among the firms in our sample, 60% have been privatized over the 1994-2005 period. Overall, these firms were involved in 125 privatization transactions worth on aggregate €239 billion, which is almost a half of the EU15 total privatization revenues (those include proceeds

[15] We did not find any listed regulated utility in Luxembourg. The number of observations will vary according to data availability. For example, when we use market leverage as a variable, the number of observations drops to 795 due to missing data in Worldscope. In the regression analysis, sample size is further reduced due to additional missing data in some control variables.

[16] In some cases, firms in our data have shares with multiple voting rights, although as of May 1998, such shares were outlawed in Italy, Spain, the U.K., and Germany. Prior to this, German firms could be authorized to issue shares with multiple voting rights by state authorities (Faccio and Lang, 2002). Unfortunately, our data sources do not report the identity of the owners of these shares and hence we must treat them as ordinary shares. As a result, our data on governmemt's UCR may be biased downward.

[17] To illustrate, suppose that an investor has an ownership stake of 50% in firm A and 30% in firm B. Firm A in turn has a 30% ownership stake in firm C, while firm B has a 10% ownership stake in firm C. Then, the investor's UCR in firm C is equal to min (50,30) + min (30,10) = 40.

from privatizations in other sectors, like banking and oil companies). Yet, the privatization process is still incomplete: as of 2005, the UCR of the state (including both central and local governments, ministries, and various branches of public administration) in the firms in our sample are 27% on average, with 28% of the firms being still under state control. Overall, the average UCR of the government in the firms in our sample over the period 1994-2005 were 34.3%. In Table 1 we report the relevant ownership and financial information for the largest 30 firms in our sample as of 2004-2005.

Table 2 provides data at the country and sector levels, averaged over time. The table reveals some cross-country differences. For instance, privatization appears to be particularly advanced in Spain and in U.K., where the state's average UCR are quite low, and companies are under private control during most (or even all) of our sample period. Likewise, privatization seems to be advanced in the telecommunications sectors in Denmark, Ireland, Italy, and the Netherlands. On the other hand, in Finland, France, Germany, Greece, and Sweden, governments seem to be reluctant to relinquish their control over regulated firms.

4.1. Dependent variables

Leverage, regulated prices, and investment are the main dependent variables in our study. For the theoretical predictions in Section 2, it is important for us to use a measure of leverage that captures the risk of default. Therefore, we use the book value of debt (both long- and short-term) divided by the sum of the book value of debt and the market value of equity as our measure of leverage (that is, we use "market leverage").[18] Accounting and financial market data have been collected from *Worldscope*. As Table 2 shows, telecoms and electric, gas, and water utilities appear to be more heavily leveraged on average than companies in the transportation sector. Interestingly, French and Portuguese regulated firms are the most highly leveraged across all sectors, while Italian and Portuguese telecoms appear to be highly leveraged compared to telecoms in other countries.

Unfortunately, we were unable to find reliable data on regulated retail prices at the individual firm level. Drawing from Eurostat and OECD sources (see Table A3 in the Appendix), we therefore collected retail price indices for all sectors in our data set except for infrastructures such as ports and docks and airports (the services provided by these sectors are considered to be intermediate rather than final services and we could not find price indexes either in the OECD or

[18] See Rajan and Zingales (1995) for a discussion of alternative leverage measures. Notice that a more precise definition of market leverage would also include the market value of debt. However, given that debt is not always publicly traded, we were unable to find reliable data for that item.

Eurostat data or in national statistics). Given that there is still limited competition in the utilities sectors and given that there is little price dispersion, we believe that these price indexes appropriately reflect the prices of the regulated firms in our sample. The average annual growth rates of these indices, reported in Table 2, reveal that retail prices in telecommunications have declined by an average of 3% annually over our sample period. A quite different picture emerges in electric, gas, and water utilities, where retail prices have increased by an average of 1% annually, and to an even a larger extent in transportation, where retail prices have increased by an average of 3% annually.

Investment rate represents the change in the fixed capital stock and includes new plants, property and equipment, as well as new capital goods acquired through mergers, acquisitions or divestitures. In the econometric analysis we use the investment rate calculated as the ratio of gross fixed investment to capital stock at the replacement value.[19] At the sector level, investment rates are higher in telecommunications (16% on average over the sample period), than in the energy and water sectors (13% on average) and transportation infrastructures (14% on average).

4.2. Privatization, Regulatory and Institutional variables

We use the data on government's UCR described in Section 3.1 to define a *Private Control* dummy which takes the value 1 in every year in which the government's UCR is below 50% and takes the value 0 in all other years. This variable therefore reflects whether the firm is "privately-controlled" or "state-controlled." In some of our analysis, we will use a more restrictive definition of private control, *Private Control_30*, according to which a firm is privately controlled only if the government's UCR are less than 30% (instead of 50%).

By construction, all firms in our sample are subject to some form of regulation. However, we are interested in studying the effect of regulation by an IRA on the firm's leverage and investment, as opposed to public oversight by ministries or some other branch of the public

[19] The accounting data from *Worldscope* only include historic cost valuations of fixed assets, which usually bear little relation to current replacement cost of long-lived fixed capital assets. Hence, we calculate the replacement cost of the capital stock using the perpetual inventory formula: $p_{t+1}K_{t+1} = p_tK_t(1-\delta)(p_{t+1}/p_t) + p_{t+1}I_{t+1}$, where p_t is the country-specific implicit price deflator for gross capital formation in period t sourced by the OECD, K_t is the fixed capital stock in period t, I_t is the investment flow in period t, and δ is the depreciation rate (see for example, Blundell, Bond and Meghir, 1992). To compute the depreciation rates, we use the Bureau of Economic Analysis estimates as reported in "Rates of Depreciation, Service Lives, Declining Balance Rates, and Hulten-Wykoff Categories" and obtain the following depreciation rates: 4.4% for energy, gas and water supply, 3% for freight roads concessionaires, 8% for telecommunications, and 4.5% for ports and airports. To obtain the starting values for the perpetual inventory formula, we assume that replacement cost valuations were equal to historic cost valuations for the first year of data available (usually 1994). In order to avoid loss of observations, we chose not to eliminate firms undergoing major acquisitions and divestitures, and hence split the firm's time-series into "before" and "after" the event, and then keep both sub units provided each sub unit has at least three consecutive observations.

administration. We therefore use the information collected by Gilardi (2002) to construct an *IRA* dummy variable which takes the value 1 in every year in which the firm was formally subject to regulation by an IRA, and takes the value 0 in all other years.

In order to capture the intensity of market liberalization in specific states and sectors, we use a *Liberalization Index* constructed from the OECD International Regulation database collected by Nicoletti *et al.* (2001) and updated by Conway and Nicoletti (2006). The index is an average of several indicators which vary from 0 to 6 (lower numbers indicate a greater degree of openness) and reflects entry barriers,[20] the state's stake in firms that operate in the relevant sector, the market share of the dominant player(s), and the presence of price controls on retail prices and specific guidelines for its implementation. We eliminate the state ownership dimension from the Liberalization Index, because we use explicit ownership variable in our analysis, and recompute the average over the remaining OECD indicators. As in the original OECD index, high values of the index are associated with low degrees of liberalization.

Another cross-country institutional difference that we control for is the legal protection of investors. To this end we use the "antidirector rights" index developed initially by La Porta *et al.* (1998) and updated by Pagano and Volpin (2005). This index is equal to the sum of six dummy variables, indicating if proxy by mail is allowed, shares are not blocked before a shareholder meeting, cumulative voting for directors is allowed, oppressed minorities are protected, the percentage of share capital required to call an extraordinary shareholder meeting is less than 10%, and existing shareholders have preemptive rights at new equity offerings.

Firm level controls will be described below in the relevant regressions in which they are used.

5. Empirical results

Our main goal is to test Hypotheses 1-4 stated in Section 2. In Section 5.1 we study the leverage of firms in our sample and examine Hypothesis 1 that states that regulated firms will increase their leverage once they become regulated. In Section 5.2 we study the relationship between leverage and regulated prices and test Hypothesis 2 that states that leverage leads to higher regulated prices. In Section 5.3, we turn to Hypothesis 3 and examine whether leverage boosts the firm's market value. Finally, in Section 5.4 we study the effect of leverage on investment and

[20] Low values of the entry barriers indicators are associated with competition in all segments of the relevant sector and with vertical separation between downstream and upstream firms, while high values are associated with the existence of a vertically integrated legal monopoly.

examine whether it strengthens the firm's incentive to invest. In all cases, the hypotheses are expected to hold in the case of privately-controlled firms but not necessarily in the case of state-controlled-firms.

In most of our analysis we will present random-effects estimates. Under fixed effects estimation, time invariant variables such as country and sector dummies cannot be estimated because they are perfectly collinear with the firm dummies. Although the random effects estimates are more efficient than fixed effects estimates, one must ensure that the individual invariant component in the error term under the random effects model is not correlated with regressors. To this end we use the Hausman (1978) specification test to test for the consistency of the random effects coefficients. Whenever the Hausman test suggests that the random effect model is inappropriate, we turn to fixed effects estimation (see e.g., Baltagi, 2001, or Arellano, 2003).

5.1. Leverage

We begin in Table 3 by dividing the 795 firm-year observations we have for market leverage into four groups, depending on whether firms are regulated by an IRA or not and whether they are privately- or state-controlled. A simple comparison of the mean leverage of firms (see Panel A) reveals that firms in our sample are significantly more leveraged when regulated by an IRA, and this is true irrespective of whether firms are privately- or state-controlled. Moreover, controlling for the type of regulation which is place, privately-controlled firms appear to be more leveraged than state-controlled firms, although the difference is insignificant. Panel B of Table 3 examines the robustness of this comparison to the definition of control by expanding the definition of state-control to include all firms in which the government's UCR are 30% or more (instead of 50%). Although the mean leverage values remain similar, we notice that under this more restrictive definition of private control, the difference between privately- and state-controlled firms is now statistically significant in the presence of an IRA (with a p-value of 7%).

These preliminary results suggest that ownership structure may matter for the financial decisions of regulated firms. To explore this issue further, we perform a thorough empirical analysis of leverage. In particular, we are interested in finding out whether European utilities increase their leverage when they become regulated by an IRA, and what effect, if any, their ownership structure has on the interaction between capital structure and rate regulation.

The results of our leverage regressions are shown in Table 4. Our key explanatory variables here are the *IRA* dummy which is equal to 1 if an IRA is in place and is equal to 0

otherwise, and the *Private Control* dummy which is equal to 1 if the government's UCR are less than 50%, and equal to 0 otherwise. Following the empirical literature on the determinants of capital structure we include firm-specific controls.[21] We therefore include in the regressions the log of real total assets to control for firm size, the fixed assets to total assets ratio to control for asset tangibility, and the EBIT (earning before interests and taxes) to total assets ratio to control for profitability and "efficiency" (more efficient firms are likely to make higher earnings with the same assets).[22] To control for the fact that debt may be preferred if shareholders' interests are weakly protected, we use the *Investor Protection* index defined in Section 4.2. Given that our sample firms are incorporated in 14 European countries and operate in 7 regulated sectors, we also control for country and sector-specific effects by including the country-specific *growth rate of GDP* to account for differences in macroeconomic conditions over time, the *Liberalization* index to account for competitive conditions, and market openness. Finally, to control for unaccounted factors related to the regulatory environment we also include country, sector, and year dummies.

In Table 4 we present random-effects estimates. The table shows that firm size has a positive effect on leverage, while tangibility and profitability-efficiency both have a negative effect. These results are common in the empirical literature on capital structure.[23] The negative and significant coefficient on GDP growth suggests that firms tend to rely more heavily on equity and internal funds when the macroeconomic conditions improve.

More importantly for us, Column 1 of Table 4 shows that the *IRA* dummy is insignificant, while the *Private Control*IRA* dummy is positive and significant across all specifications. This suggests that, consistent with Hypothesis 1, the introduction of an IRA has a significant positive

[21] Conditional on data availability, we define our explanatory variables following Titman and Wessels (1988), Rajan and Zingales (1995), and Fama and French (2002).

[22] Ideally, we would have also liked to control for ownership concentration since it is plausible that firms with concentrated ownership will prefer to use more debt than firms with dispersed ownership because their controlling shareholders will be reluctant to dilute their ownership stakes by issuing equity. Moreover, managers of firms with more dispersed ownership have a larger effect on their firms' decisions and may be reluctant to issue debt which raises the risk of financial distress (in which case they may bear a personal disutility). However, due to the prevalence of cross-ownership, computing ownership concentration for the firms in our data is a formidable task since in general, individual shareholders hold both direct as well as indirect ownership stakes. Computing the latter is very hard (see e.g., Dorofeenko *et al*, 2005). In our case, this task is particularly hard since we have 11 years of data (ownership structure has to be constructed year by year).

[23] The positive effect of the log of total assets is consistent with the idea that size is an inverse proxy for the probability of bankruptcy (see example, Rajan and Zingales, 1995). The negative and significant coefficient on the ratio between fixed and total assets, our proxy for tangibility, is less common because tangible assets can be used as collateral and hence reduce the cost of debt. However, we also find that profitability, measured by EBIT to total assets ratio, is significantly negative. Taken together these results are viewed as consistent with the pecking order theory of capital structure in which a preferential order of financial sources – internal funds first, debt, and then equity as a last resource - is postulated (see, for example, Booth *et al.*, 2001).

effect on the firm's leverage, but only if the firm is privately-controlled. Column 2 of Table 4 shows that the results remain virtually unchanged when we replace the *Private Control* dummy with the more restrictive *Private Control_30*, according to which a firm is considered to be privately controlled only if the government's UCR are less than 30% (instead of 50%). In Column (3), we replace the *Private Control* dummy with *Government UCR*, which is a continuous variable that measures the government's UCR in the firm. Once again, we find support for Hypothesis 1 since the *Government UCR* variable is insignificant, while the *Government UCR*IRA* variable is negative and highly significant (a higher government UCR means that the firm is "less private").

In Column 4 we check the robustness of our results by including the *Investor protection* and the *Liberalization* indexes as additional sector- and country-specific controls.[24] As before, the *Private Control*IRA* dummy is positive and significant. The negative sign on *Investor protection* is consistent with the idea that debt is preferred to equity financing when shareholder interests are weakly protected, while the negative sign on the *Liberalization* index suggests that regulated firms increase their leverage when there is a higher degrees of market openness.

Finally, one could claim that firms that were privatized early were for some reason more highly leveraged than other firms in our sample and hence, the positive relation of leverage and ownership that we discovered earlier is spurious. To check whether this is the case, we excluded from the data firms that were "privatised" during our sample period. That is, we reran the regressions on a sample that included only firms that were either state-controlled or privately-controlled throughout the 1994-2005 period. The results are reported in Column 5. We find that the *Private Control* dummy becomes significantly negative while the *Private Control*IRA* becomes larger and more significant than before. These results confirm our previous results and supports the idea that privately-controlled regulated firms increase their leverage significantly after an IRA is established.

5.2. Leverage and regulated prices

Next, we consider Hypothesis 2 that states that higher leverage induces regulators to raise regulated prices and hence boosts the firm's value. To test whether regulated firms choose their leverage strategically in order to boost their rates, we apply the Granger (1969) and Sims (1972)

[24] Note that since the OECD index from which we derive our *Liberalization index* is not available for transport infrastructure and water utilities, we have fewer observation for this regression.

causality tests.[25] These tests are used to examine whether leverage Granger-causes regulated prices as the theory predicts. One alternative possibility is that regulated price Granger-causes leverage; this situation could arise if regulators can make a long-term commitment to regulated prices which in turn determines the firm's revenue (up to exogenous demand shocks). The firm then adjusts its capital structure accordingly to fit its expected revenue stream. A third possibility is that leverage does not cause prices nor vice versa; rather the two variables may be correlated with a third variable that causes both of them.

We perform the Granger causality tests by estimating the following bivariate autoregressive processes for sector- and country- specific retail price indices and leverage:

$$P_{i,t} = \alpha_{t-1}P_{i,t-1} + \alpha_{t-2}P_{i,t-2} + \beta_{t-1}Lev_{i,t-1} + \beta_{t-2}Lev_{i,t-2} + \sum_i \mu_i Firm_i + \sum_t \lambda_t Year_t + \sum_j \omega_j Sector_j + \sum_j \sum_t \rho_t Year_t \times Sector_j + \varepsilon_{i,t}, \quad (1)$$

$$Lev_{i,t} = \delta_{t-1}Lev_{i,t-1} + \delta_{t-2}Lev_{i,t-2} + \gamma_{t-1}P_{i,t-1} + \gamma_{t-2}P_{i,t-2} + \sum_i \mu_i Firm_i + \sum_t \lambda_t Year_t + \sum_j \omega_j Sector_j + \sum_j \sum_t \rho_t Year_t \times Sector_j + \nu_{i,t}, \quad (2)$$

where $P_{i,t}$ is the regulated price of firm i in period t, $Lev_{i,t}$ is the leverage of firm i in period t, $Year_t$ is a year dummy, $Sector_j$ is an sector dummy equal to 1 if the firm is in sector j = telecommunications, energy, or water (as mentioned earlier, we do not have price indices for infrastructures such as ports and docks and airports), μ_i is a firm dummy, and ε is white noise. We present fixed effects estimates.[26] If, as the theory predicts, leverage Granger-causes prices but not vice versa, then β_{t-1} and β_{t-2} are significant while γ_{t-1} and γ_{t-2} are not, and moreover, an F-test will indicate that $Lev_{i,t-1}$ and $Lev_{i,t-2}$ contribute significantly to the explanatory power of regression (1), while $P_{i,t-1}$ and $P_{i,t-2}$ do not contribute significantly to the explanatory power of equation (2). Again, we expect these results to hold in the case of private firms, but not necessarily in the case of state-controlled firms.

[25] Edwards and Waverman (2006) and Gasmi, Noumba and Recuero Virto (2006) also use Granger causality tests to investigate simultaneity between interconnected rates and regulatory independence and between the quality of political institutions and regulatory performance, respectively.

[26] The Hausman test suggested that the fixed effect model was more appropriate than the random effects model.

The results are reported in Table 5. Table 5.1 shows that the lagged leverage terms are individually and jointly significant, and overall have a positive effect on the regulated price. As a result, we can reject the null hypothesis that leverage does not Granger-cause regulated prices. This conclusion holds both for the full sample of EU utilities (Column 1), a sub-sample of privately-controlled firms (Column 2), and a sub-sample of firms that are regulated by an IRA (Column 4). On the other hand, the null hypothesis cannot be rejected for the sub-sample of state-controlled firms (Column 3). Table 5.2 shows that we cannot reject the null hypothesis that regulated prices do not Granger-cause leverage.

Taken together, the results in Table 5 are consistent with the hypothesis that regulated firms choose their leverage strategically in order to boost their rates, and inconsistent with the idea that long-term commitments to regulated prices by regulators induce firms to adjust their capital structure to match their resulting expected revenue stream.

5.3. Market value equations

In this section we examine the effect of leverage on the market values of firms. The underlying idea here is that leverage shields regulated firms against regulatory opportunism and hence boosts their market value.[27] To test this hypothesis, we estimate a regression in which the dependent variable is the market-to-book value of the firm's equity and the main explanatory variable is the firm's leverage. As with Hypothesis 1, the positive relationship between the market-to-book value of the firm's equity and its leverage is expected to hold if the regulated firm is private, but not necessarily if it is state-controlled and hence not subject to regulatory opportunism.

Apart from leverage we also include in the regression, the log of real total assets, the EBIT to total assets ratio, the Investor Protection index, and sector and country dummies. As before, we account for ownership effects by using the *Private Control* dummy, which we include separately as well as interacted with *Leverage*.

Table 6 shows that the coefficient on *Leverage* is negative and significant,[28] the *Private Control* dummy is insignificant, and the coefficient on *Leverage*Private Control* is positive and significant (at the 9% level). These results hold even after including various controls. These

[27] This idea is based on the realistic assumption that regulated firms in the EU, which have been only recently privatized, do not necessarily have an optimal capital structure throughout our sample period. Otherwise, an increase in leverage will reflect the need to readjust the capital structure of the firm in response to some exogenous shock. This shock in turn may either have a positive effect on the firm (e.g., a reduction in the cost of financial distress) or a negative effect (e.g., the regulator become less pro-firm). Hence, if we start with an optimal capital structure, an increased leverage will be associated with either a higher or a lower market value.

[28] The negative and significant correlation between market to book and leverage is quite common (see e.g., Rajan and Zingales, 1995, and Booth *et al.*, 2001).

results are consistent with Hypothesis 3 that leverage boosts the market values of firms that are regulated by an IRA provided that these firms are privately-controlled.

5.4. Leverage and Investment

We begin by presenting simple comparisons of the average investment rates of our sample firms in Table 7. Specifically, we divided the 674 firm-year observations available on the investment rate (i.e., the ratio between gross fixed investment flow and the capital stock at replacement value) into 4 groups, depending on whether they are regulated by an IRA or not and whether they are privately- or state-controlled. We find that privately-controlled firms have lower investment rates when regulated by an IRA, and especially when we use the more restrictive definition of private control (see Panel B in Table 7). This finding is consistent with the presence of regulatory opportunism which discourages investments by privately-controlled regulated firms. Interestingly, state-controlled firms appear to be investing more than privately-controlled firms. We return to this point later.

Following these preliminary observations, we turn to econometric test, and estimate investment equations in which the dependent variable is the investment rate and the main explanatory variables are the lagged *Leverage* in level and its change, the *Private Control* dummy (or the continuous *Government UCR* variable), and the *IRA* dummy.

Our empirical model is similar to that used by Lyon and Mayo (2005) to study the behavior of U.S. electric utilities.[29] We regress the *Investment to Capital Stock* ratio on its lagged value to account for adjustment effects, on two lags of (real) *Sales Growth*, which serves as a proxy for an accelerator mechanism, on *Interest Rate*, which is a proxy for the cost of outside funds, and on the *EBIT to Total Asset* ratio to account for the return on assets and the utilization of assets (a higher EBIT/Asset implies that the firm utilizes its assets to a larger extent). Since the value of EBIT/Asset at which assets are fully utilized is likely to vary across sectors, we interact the EBIT to Asset ratio with the sector dummies. To control for institutional characteristics and regulatory environment, we add the *Investor Protection* and the *Liberalization* indexes.

A main concern when regressing investment on leverage is that both variables are endogenous. To address this endogeneity problem, at least to some extent, we lag all explanatory

[29] More precisely, in Lyon and Mayo (2005) the dependent variable is the level of gross investment flow in year *t* and the *Lagged Capital Stock* is one of the explanatory variables. For other references, see also Fazzari and Petersen (1993) and Hubbard (1998) for a survey on the empirical literature on investment decisions of individual firms.

variables one year.[30] Fortunately, we can exploit our panel data to discriminate between the decisions of privately- and state-controlled utilities since Hypothesis 4 applies in the case of privately-controlled firms, but not necessarily in the case of state-controlled firms. Hence, our main test here amounts to investigate the difference in the relationship between investment and leverage across ownership structures.[31]

The regression results are presented in Table 8.[32] Column 1 indicates that both the *Lagged* and *Differenced Leverage* terms are positive and significant, confirming the tight relationship between investment and leverage. Consistent with Table 7, the *IRA* variable is negative and significant. Moreover, the coefficient on the *Private Control* dummy is negative and significant (at the 10% level) indicating that other things being equal, privately-controlled utilities invest less than state-controlled utilities. Taken together, these findings are in line with the idea that regulated firms underinvest because they fear regulatory opportunism, especially if they are privately-controlled. Column 2 estimates the same model, with the exception that the *Private Control* dummy is replaced with the continuous *Government UCR* (higher values of this variable indicate that the firm is "less private"). The results on leverage are very similar, while the *Government UCR* coefficient is positive, but only significant at the 15% level. In Column 3 we include sector and country-specific controls for market structure and financial institutions. Our results show that the *Liberalization* index has a negative, but insignificant, coefficient.[33] Unlike Column 4 in Table 4, the *Investor Protection* variable is insignificant. This suggests that investor protection affects the way firms finance their investments, but not the size of these investments.

Columns 4 and 5 investigate cross-ownership differences by separating our sample into a sub-sample of privately-controlled firms (Column 4) and a sub-sample of state-controlled firms (Column 5). The results show that *Leverage* has a positive significant effect on privately-controlled firm, but not on state-controlled firms, thus supporting the prediction of different investment financing behavior across ownership structures. In both columns, the change in

---

[30] It should be noted however that if a firm plans to invest in *t*, then it may issue debt already in *t*-1, or even in *t*-2 or *t*-3, so lagged values of leverage may also be, at least in part, endogenous and hence invalid instruments. Unfortunately, finding alternative truly exogenous instruments is a major challenge.

[31] This approach has been widely used to test the effects of capital market imperfections, in particular the impact of asymmetric information, on investment decisions of individual firms classified into separate groups (Hubbard, 1998).

[32] We present fixed effects estimates because the Hausman (1978) test indicate that a fixed-effects model is more appropriate than a random effects model. By including the EBIT/Asset ratio interacted with industry dummies we attempt to control, at least in part, for unobservable industry effects. We also accounted for the possibility that shocks to investments will be serially correlated and estimated a variant of the investment equations using the Cochrane-Orcutt transformation. We do not report the results from this alternative estimation procedure because they are very similar to the results reported in Table 8 and because they led to a decreases in the number of available observations.

[33] This finding is in line with Alesina *et al.* (2005) who show that entry liberalization and privatization (which are associated with small values of the index) have boosted the investment activity in OECD countries in the last decade.

leverage, which captures the expected relationship between investment and debt financing is positive and significant (p-value = 0.000 for private firms, and 0.08 for state-controlled firms). Finally, the coefficient on *IRA* is negative and significant for privately-controlled firms, but not for state-controlled firms. This result is consistent with the idea that private firms that are regulated by an IRA underinvest.

In Column 6 we restrict our analysis to the period when an IRA is in place (electricity, natural gas, telecommunications, and, in the case of the UK only, water utilities).[34] In Columns 7 and 8 we separate the observations in Column 6 into a sub-sample of privately-controlled firms (Column 7) and a sub-sample of state-controlled firms (Column 8). The comparison between Columns 7 and 8 confirms the evidence found in Columns 4 and 5: lagged leverage and its change have a positive and significant effect on investment when firms are privately-controlled, but not when they are state-controlled firms.

Finally, we note that the interest rate, which is included as a proxy for the cost of capital, has a negative and significant effect on the investment of privately-controlled firms, but has a weak impact on the investment of state-controlled firms. This suggests that state-controlled firm may not invest efficiently or are driven by external (possibly political) motives, so their investment is independent of their cost of capital. Apart from the interest rate, we find that the EBIT to Total Asset ratio interacted with sector dummies, our proxy for utilization of assets, is positive as expected and, for electric and gas utilities, also highly significant,[35] while the growth of sales, is insignificant in most specifications.

In sum, our results show that private regulated firms tend to invest "less" than state-controlled utilities, but their investment is found to be more sensitive to the level and change of leverage. Combined with our evidence on leverage, the results from investment equations suggest that privately-controlled firms offset the negative effect of regulatory opportunism on investment by using debt financing. As far as state controlled firms are concerned, our results indicate clearly that in regulated sectors they are more effective than private firms in boosting investment, even if they do not resort to leverage. A possible explanation for this result is that state controlled firms do not need leverage as a commitment device because they are less exposed to regulatory opportunism to begin with. Indeed, the large stake owned by the government provides an alternative instrument: politically appointed regulators will be wary to expropriate sunk investments and to curb tariffs if dividends accrue to the State's budget. This view is consistent

[34] We do not have a sufficient number of observations on the period before an IRA was established.
[35] Note that the default is represented by freight road utilities. The interaction with transport infrastructures was not estimated due to perfect collinearity with either IRA or control.

with the previous empirical results which have shown that partly privatized firms are less risky and more valuable than fully privatized firms (Bortolotti and Faccio, 2004). In this paper, we observe the implications of this conjecture on the capital structure of regulated firms given that state controlled firms will attract more easily capital to finance investment rather than debt.

6. Conclusion

Theoretical models suggest that if regulators cannot commit ex ante to a particular regulatory scheme, then the firms they regulate will have an incentive to finance their investments with debt. Indeed, following the large scale privatization and structural reforms in network industries in Europe, it appears that European regulated firms have accumulated large amounts of debt. This phenomenon, which has been described by the U.K. Department of Trade and Industry (DTI) and the HM Treasury (DTI-HM, 2004) as the "dash for debt," has raised concerns among policymakers about the financial stability of regulated utilities and their ability to finance future investments. The theory however suggests that debt financing allows regulated firms and regulators to overcome, at least partly, the regulators' inability to make long-term commitments to prices, and hence shields firms against the risk of future price reductions once their investments become sunk. The implication then is that debt financing boosts the market values of regulated firms and strengthens their incentives to invest.

In this paper we construct a comprehensive panel of virtually all publicly traded regulated utilities in the EU15 states and use it in order to examine the interaction between the capital structure of regulated firms, regulated prices, market values, and investments. Our analysis shows that this interaction depends critically on two factors: (i) the regulatory framework, i.e., whether the firms are subject to regulation by an IRA or not, and (ii) the ownership structure, i.e., whether firms are privately- or state-controlled.

Specifically, we find that EU utilities tend to increase their leverage following the introduction of an IRA but only if they are privately-controlled. Moreover, the leverage of privately-controlled regulated firms has a positive effect on regulated prices, on the firms' market values, and on their investments. By contrast, we do not find similar positive effects of leverage in the case of state-controlled firms. These results provide strong support for the hypothesis that privately-controlled regulated firms rely on debt financing as a way to shield themselves against opportunistic behavior on the part of independent regulatory authorities. Moreover, these results suggest that debt financing may have some desirable consequence since it benefits shareholders

and boosts investments. Of course, given that debt financing also leads to higher regulated prices and may also increase the likelihood of financial distress, it is clear that more research, both theoretically and empirically, is needed in order to determine if the “dash for debt” is a desirable phenomenon and (at least in part) a solution to a regulatory opportunism problem, or whether it is an unintended consequence of the privatization of firms in network industries and should be discouraged. Yet, we believe that our paper makes an important contribution to this debate by providing a systematic study of the capital structure of EU regulated utilities and its effects.

References

Alesina A., S. Ardagna, G. Nicoletti and F. Schiantarelli (2005), "Regulation and Investment," *Journal of European Economic Association*, **3(4)**, 791- 825.

Arellano M. (2003), *Panel Data Econometrics*, Oxford University Press.

Baltagi B.H. (2001), *Econometric Analysis of Panel Data*, John Wiley & Sons.

Barclay M.J., L. Marx, and C. Smith (2003), "The Joint Determination of Leverage and Maturity," *Journal of Corporate Finance*, **9**, 149-167.

Blundell R., S. Bond and C. Meghir (1992), "Econometric Models of Company Investment," in L. Matyas and P. Sevestre, *The Econometrics of Panel Data*, Dordrecht: Kluwer Academic Publishers, 685-710.

Booth L., V. Aivazian, A. Demirguc-Kunt, and V. Maksimovic (2001), "Capital Structures in Developing Countries," *Journal of Finance*, **56(1)**, 87-130.

Bortolotti B. and M. Faccio (2004), "Reluctant Privatization," *ECGI Working Paper* n. 4, Milan.

Bortolotti B. and D. Siniscalco, (2004), *The Challenges of Privatization: an International Analysis*, Oxford University Press.

Bowen, R.M., L.A. Daley, and C. Huber (1982), "Evidence on the Existence and Determinants of Inter-Industry Differences in Leverage," *Financial Management*, 10-20.

Bradley M., G. Jarrell and H. Kim (1984), "On the Existence of an Optimal Capital Structure: Theory and Evidence," *Journal of Finance*, **39(3)**, 857-878.

Buigues P.A. and P. Rey (2004), *The Economics of Antitrust and Regulation in Telecommunications*, (eds.) Edward Elgar, UK.

Bulan, L. and P. Sanyal (2005), "Regulatory Risk, Market Risk and Capital Structure: Evidence from U.S. Electric Utilities," *mimeo*, Brandeis University, Waltham, MA.

Bulan, L. and P. Sanyal (2006), "Is There Room For Growth? Capital Structure and the Deregulation of U.S. Electric Utilities," *mimeo*, Brandeis University, Waltham, MA.

Claessens, S., S. Djankov, and L. Lang, (2000), "The Separation of Ownership and Control in East Asian Corporations," *Journal of Financial Economics*, **58**, 81-112.

Conway P. and G. Nicoletti (2006), *Product Market Regulation in the Non Manufacturing Sectors of OECD Countries: Measurement and Highlights*, OECD Economics Department Working Paper n. 530, OECD, Paris.

Correia da Silva L., A. Estache and S. Jarvela (2006), "Is Debt Replacing Equity in Regulated Privatized Infrastructure in LDCs?," *Utilities Policy*, **14**, 90-102.

Dasgupta S. and V. Nanda (1993), "Bargaining and Brinkmanship – Capital Structure Choice by Regulated Firms," *International Journal of Industrial Organization*, **11(4)**, 475-497.

Department of Trade and Industry and HM Treasury (2004), *The Drivers and Public Policy Consequences of Increased Gearing*, October, London.

Dorofeenko V., L. H. P. Lang, K. Ritzberger, and J. Shorish (2007), "Who Controls Allianz? Measuring the Separation of Dividend and Control Rights Under Cross-Ownership Among Firms," *Annals of Finance*.

Edwards, G. and L. Waverman (2006), "The Effects of Public Ownership and Regulatory Independence on Regulatory Outcomes," *Journal of Regulatory Economics*, **29(1)**, 23-67.

Faccio, M., and L. H. P. Lang (2002), "The Ultimate Ownership of Western European Corporations," *Journal of Financial Economics*, **65**, 365-395

Fama E. and K.R. French (2002), "Testing Trade-Off and Pecking Order Predictions about Dividends and Debt," *Review of Financial Studies*, **15**, 1-33.

Fazzari S.M. and Petersen B.C. (1993), "Working Capital and Fixed Investment: New Evidence on Financial Constraints," *RAND Journal of Economics*, **24**, 328-342.

Gasmi F., P. Noumba and L. Recuero Virto (2006), "Political Accountability and Regulatory Performance in Infrastructured Industries: an Empirical Analysis," *World Bank Policy Research Working Paper* n. 4101, December, Washington D.C

Granger C. W. (1969), "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods," *Econometrica*, **37**, 24-36.

Gilardi F. (2002), "Policy Credibility and Delegation to Independent Regulatory Agencies: A Comparative Empirical Analysis," *Journal of European Public Policy*, **9(6)**, 873-893.

Hausman J.A. (1978), "Specification Tests in Econometrics," *Econometrica*, **46**, 1251-1272.

Hubbard G. R. (1998), "Capital Market Imperfections and Investment," *Journal of Economic Literature*, **36**, 193-225.

Klein R., Phillips R. and Shiu W. (2002), "The capital structure of firms subject to price regulation: evidence from the insurance industry," *Journal of Financial Services Research*, **22(1-2)**, 79-100.

La Porta R., F. Lopez-de-Silanes, A. Shleifer, and R. Vishny (1997), "Legal Determinants of External Finance," *Journal of Finance*, **52(3)**, p. 1131-1150.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. Vishny (1998), "Law and Finance," *Journal of Political Economy*, **106**, 1113-1155.

La Porta, R., F. Lopez-de-Silanes, and A. Shleifer (1999), "Corporate Ownership around the World," *Journal of Finance*, **54**, 471-518.

Lyon T. and J. Mayo (2005), "Regulatory Opportunism and Investment Behavior: Evidence from the U.S. Electric Utility Industry," *Rand Journal of Economics*, **36(3)**, 628-644.

Megginson, W.L., and J.M. Netter (2001) "From State to Market: A Survey of Empirical Studies on Privatization," *Journal of Economic Literature*, **39(2),** 321–89.

Myers S. (1984), "The Capital Structure Puzzle," *Journal of Finance*, **39**, 575-592.

Nicoletti G., A. Bassanini, E. Ernst, S. Jean, P. Santiago and P. Swaim (2001), *Product and Labor Markets Interaction in OECD Countries*, OECD Economics Department Working Paper n. 321, OECD, Paris.

Ofwat and Ofgem, (2006), *Financing Networks: A discussion paper*, February, London.

Pagano M. and P. Volpin (2005), "The Political Economy of Corporate Governance," *American Economic Review*, **95(4)**, 1005-1030.

Rajan R. and L. Zingales (1995), "What Do We Know about Capital Structure? Some Evidence from International Data," *The Journal of Finance*, **50(5)**, 1421-1460.

Sims, C. A. (1972), "Money, Income, and Causality," *American Economic Review*, **62**, 540-552.

Smith, C.W. (1986), "Investment Banking and the Capital Acquisition Process," *Journal of Financial Economics*, **15**, 3-29.

Spiegel Y. (1994), "The Capital Structure and Investment of Regulated Firms," *Journal of Regulatory Economics*, **6**, 297-320.

Spiegel Y. (1996), "The Choice of Technology and Capital Structure under Rate Regulation," *International Journal of Industrial Organization*, **15**, 191-216.

Spiegel Y. and D. Spulber (1994), "The Capital Structure of a Regulated Firm," *RAND Journal of Economics*, **25(3)**, 424-440.

Spiegel Y. and D. Spulber (1997), "Capital Structure With Countervailing Incentives," *RAND Journal of Economics*, **28(1)**, 1-24.

Spulber D. (1989), *Regulation and Markets*, The MIT Press, Cambridge (MA).

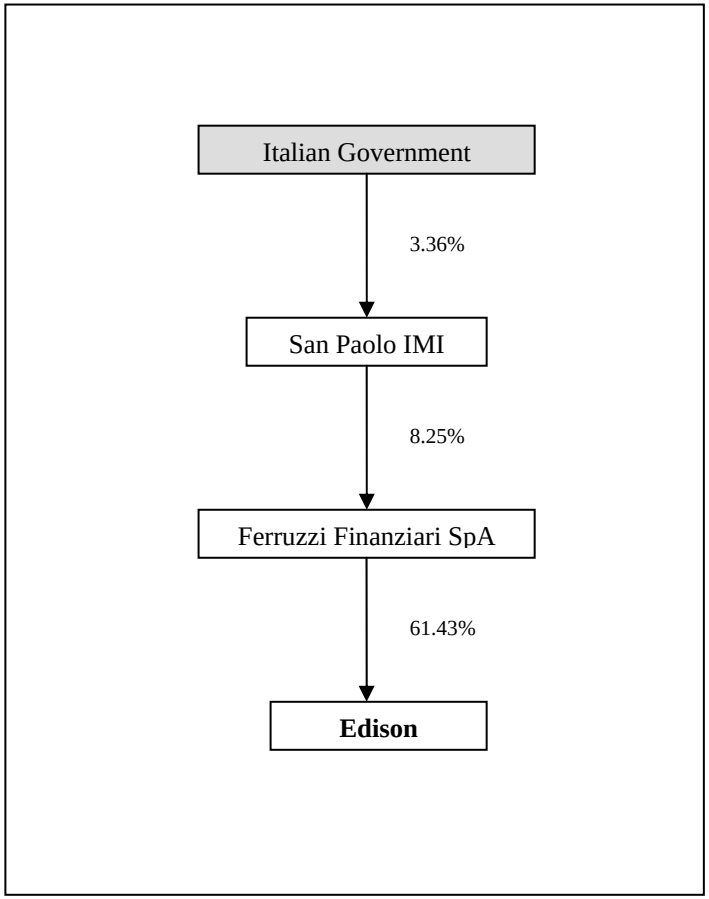
Taggart R. (1981), "Rate-of-Return Regulation and Utility Capital Structure Decision," *The Journal of Finance*, **36(2)**, pp. 383-393.

Taggart R. (1985), "Effects of Regulation on Utility Financing: Theory and Evidence," *Journal of Industrial Economics*, **33(3)**, 257-276.

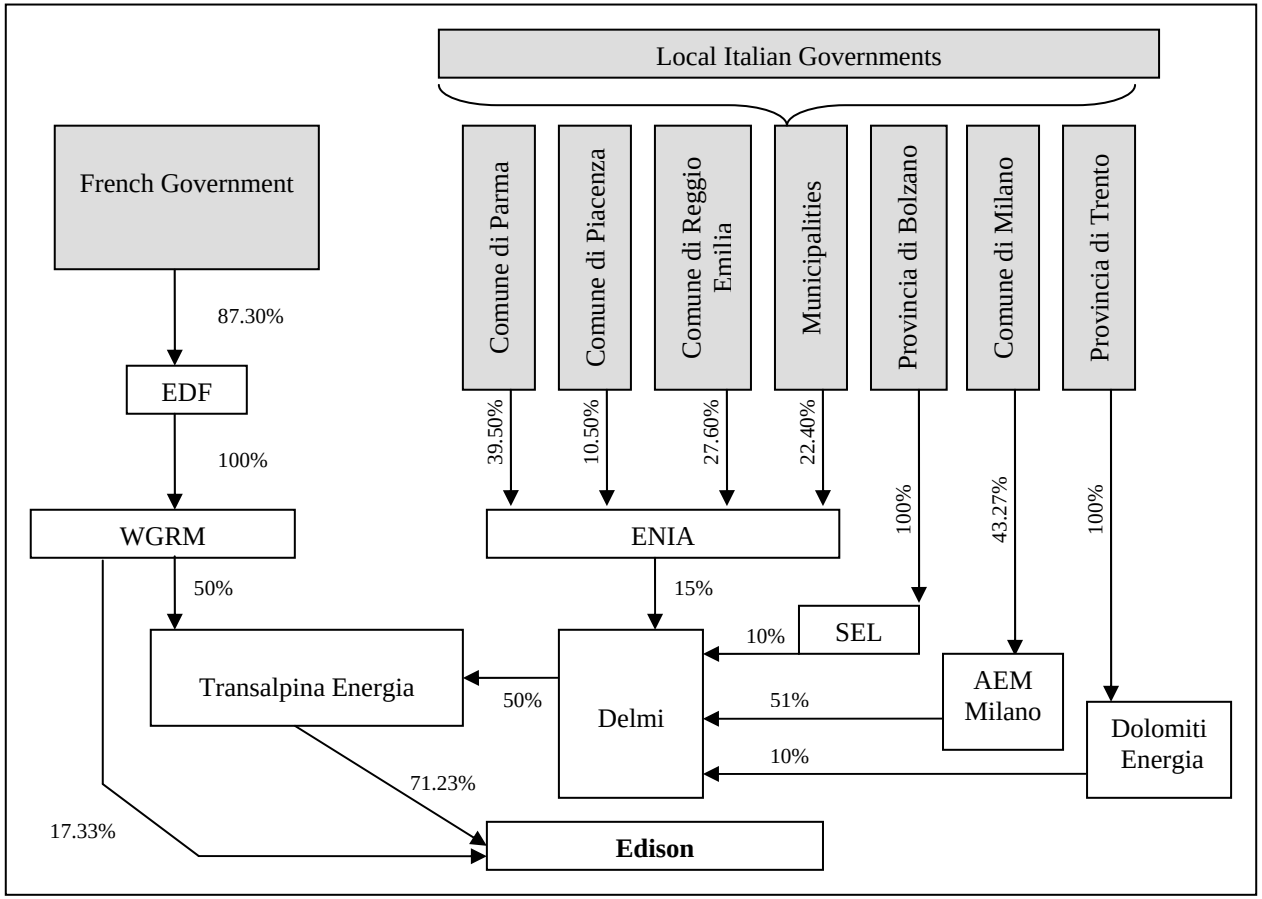
Titman S. And R. Wessel (1988), "The Determinants of Capital Structure Choice," *Journal of Finance*, **43**, 1-19.

Figure 1 -- The evolution of the Government Control Rights in Edison (Italy)

As of the end of 1994



As of the end of 2005



Total GCR = 3.36%
(Central, Domestic and Indirect)

Total GCR >= 100%
(Local, Central, Indirect and International)

Table 1 – The Top 30 European Regulated Companies by Market Capitalization

Company Name	Country	IPO Year	Market Cap. (US$bn)	Market Leverage 2004-05	Government Control Rights
Panel A: Telecommunications					
Telefonica de Espana SA	Spain	1987	71.88	0.30	0.0000
Deutsche Telekom AG	Germany	1996	69.74	0.18	0.5750
France Telecom	France	1997	64.58	0.20	0.3245
Telecom Italia SpA	Italy	1997	56.04	0.35	0.0000
British Telecommunications PLC	U.K.	1991	33.02	0.19	0.0000
Telia Sonera AB	Sweden	2000	24.10	0.09	0.5904
Koninklijke KPN NV	Netherlands	1994	21.32	0.16	0.0778
Koninklijke PTT NV	Netherlands	1998	13.94	0.02	0.0960
TeleDanmark AS	Denmark	1994	11.64	0.07	0.0000
Portugal Telecom SA	Portugal	1995	11.27	0.83	0.1268
Panel B: Energy and Water Supply					
Electricité de France	France	2005	68.88	0.20	0.8730
E.ON	Germany	1987	68.14	0.11	0.0486
Enel	Italy	1999	48.29	0.09	0.3219
RWE	Germany	1922	41.47	0.23	0.3100
Suez	France	1987	39.10	0.35	0.1977
Vivendi	France	2000	36.00	0.13	0.1238
British Gas PLC	U.K.	1986	35.03	0.02	0.0000
Gaz de France	France	2005	28.80	0.09	0.8010
National Grid Transo PLC	U.K.	1995	28.67	0.18	0.0000
Iberdola	Spain	1992	24.60	0.20	0.0200
Panel C: Airports, Ports and Docks, and Freight Roads					
Abertis	Spain	2003	14.36	0.13	0.0100
Autostrade SpA	Italy	1999	13.69	0.04	0.0000
Autoroutes du Sud de la France (ASF)	France	2002	13.65	0.09	0.0080
BAA PLC	U.K.	1987	11.90	0.10	0.0000
SAPRR (Autoroutes Paris-Rhin-Rhone)	France	2004	8.07	0.09	0.0000
SANEF (Autoroutes du Nord et de l'Est de la France)	France	2005	6.21	0.05	0.1500
Brisa Auto Estradas de Portugal	Portugal	1997	5.04	0.47	0.0500
Fraport AG	Germany	2001	4.83	0.05	0.5860
Associated British Ports Hldgs	U.K.	1983	3.04	0.05	0.0000
Kobenhavns Lufthavne A/S	Denmark	1994	2.33	0.04	0.3920

Table 2 – Country and Sector Distribution of Regulated Firms, EU 15, 1994-2005

This table reports the mean values for the sample firms by country and sector over the 1994-2005 period. *Market Leverage* is total debt divided by the sum of total debt and the market value of equity. *Annual Price Change* is the annual growth rate of the corresponding sector price index. *Investment Rate* is gross investment divided by the stock of capital at replacement value. *Government Control Rights* are the mean ultimate control rights held by the State in regulated firms. *Liberalization Index* is a revised version of the OECD Overall Index of Regulation of Nicoletti *et al.* (2001) that does not incorporate the Public Ownership Indicator. *Investor Protection* is the antidirectors rights index developed by Pagano and Volpin (2005).

Country	N. of Firms	Market Leverage	Annual Price Change	Investment Rate	Government Control Rights	Liberalization Index	Investor Protection
Panel A: Telecommunications							
Austria	1	0.20	-0.03	0.10	0.50	1.64	2.75
Belgium	1	0.34	-0.01	0.12	0.61	3.43	2.00
Denmark	1	0.12	-0.02	0.19	0.17	2.00	2.00
Finland	1	0.16	0.01	0.19	0.52	0.85	3.00
France	1	0.28	-0.02	0.13	0.68	2.81	3.33
Germany	1	0.17	-0.03	0.10	0.75	2.81	2.67
Greece	1	0.10	-0.03	0.18	0.64	3.68	2.92
Ireland	1	0.27	-0.01	0.20	0.00	2.36	4.00
Italy	1	0.38	-0.02	0.21	0.18	3.23	3.58
Netherlands	2	0.12	-0.01	0.15	0.35	2.32	2.00
Portugal	1	0.44	-0.01	0.14	0.30	3.57	3.50
Spain	1	0.19	-0.01	0.14	0.04	3.16	4.00
Sweden	1	0.08	-0.02	0.18	0.77	1.60	3.00
UK	3	0.12	-0.02	0.19	0.13	1.11	5.00
Total	**17**	**0.20**	**-0.02**	**0.16**	**0.35**	**2.40**	**3.29**
Panel B: Energy and Water Supply							
Austria	3	0.16	0.00	0.12	0.51	3.70	2.50
Belgium	2	0.10	-0.01	0.18	0.53	3.23	2.00
Denmark	….	….	….	….	….	….	….
Finland	1	0.23	0.01	0.19	0.81	1.39	3.00
France	5	0.32	0.01	0.12	0.60	4.65	3.36
Germany	4	0.22	0.01	0.17	0.35	2.94	2.67
Greece	3	0.14	0.03	0.21	0.75	3.45	3.00
Ireland	….	….	….	….	….	….	….
Italy	15	0.14	0.02	0.14	0.64	2.80	4.17
Netherlands	….	….	….	….	….	….	….
Portugal	1	0.39	0.03	0.06	0.64	3.14	3.50
Spain	6	0.25	0.00	0.11	0.12	2.32	4.00
Sweden	….	….	….	….	….	….	….
UK	17	0.17	0.02	0.12	0.00	0.65	5.00
Total	**57**	**0.19**	**0.01**	**0.13**	**0.34**	**2.44**	**3.87**
Panel C: Airports, Ports and Docks and Freight Roads							
Austria	1	0.02	….	0.11	0.49	….	2.50
Belgium	….	….	….	….	….	….	….
Denmark	1	0.12	….	0.14	0.47	….	2.00
Finland	….	….	….	….	….	….	….
France	4	0.10	0.02	0.13	0.69	1.75	3.70
Germany	1	0.09	….	0.10	0.87	….	2.67
Greece	1	0.02	….	0.33	0.85	….	3.00
Ireland	….	….	….	….	….	….	….
Italy	6	0.11	0.03	0.15	0.37	5.77	3.98
Netherlands	….	….	….	….	….	….	….
Portugal	1	0.28	0.03	0.09	0.31	1.02	3.55
Spain	1	0.08	0.03	0.09	0.10	3.26	4.00
Sweden	….	….	….	….	….	….	….
UK	5	0.08	….	0.15	0.02	....	5.00
Total	**21**	**0.10**	**0.03**	**0.14**	**0.34**	**3.53**	**3.88**

Table 3 – Mean Leverage by Ownership and Regulation types

Market Leverage is total debt divided by the sum of total debt and the market value of equity. Firms are defined "state-controlled" if the government's UCR exceed 50% (Panel A), or 30% (Panel B). (Standard errors are in parenthesis).

Panel A: Average leverage 1994-2005 (50% control threshold)

	IRA exists N = 490	**IRA does not exist** N = 305	**Regulation Difference** **p-value**
Privately-Controlled N = 564	0.202 (0.010) N = 359	0.163 (0.011) N = 205	0.039 p = 0.01
State-Controlled N = 231	0.179 (0.013) N = 131	0.127 (0.015) N = 100	0.052 p = 0.01
Ownership Difference **p-value** N=795	0.023 p = 0.173 N = 490	0.036 p = 0.05 N = 305	

Panel B: Average leverage 1994-2005 (30% control threshold)

	IRA exists N = 490	**IRA does not exist** N = 305	**Regulation Difference** **p-value**
Privately-Controlled N = 455	0.208 (0.011) N = 299	0.166 (0.017) N = 156	0.042 p = 0.018
State-Controlled (30%) N = 340	0.179 (0.011) N =191	0.137 (0.012) N = 149	0.042 p = 0.010
Ownership Difference **p-value** N= 795	0.029 p = 0.07 N = 490	0.029 p = 0.11 N = 305	

Table 4 – Leverage, Ownership and Regulation

The dependent variable is Leverage; it is defined as in Table 3. IRA is a dummy equal to 1 if an independent regulatory agency (IRA) is in place and is equal to 0 otherwise. Private Control is a dummy equal to 1 when the firm was privately-controlled (i.e., the government's UCR are below 50%) and is equal to 0 otherwise. In Column 2, Private control_30 is equal to 1 when the government's UCR are below 30%. In Column 3, Government UCR is equal to the government's UCR in the firm. Column 4 includes the Liberalization Index, a revised version of the OECD Index by Nicoletti *et al.* (2001) and the Investor Protection Index by Pagano and Volpin (2005). Column (5) reports the results for a subsample of firms that were not privatised over our sample period, i.e., were either state-controlled or privately-controlled throughout our sample period. All regressions include year, sector and country dummies. Random-effects estimates. Standard errors in parentheses are robust to heteroschedasticity and to within group serial correlation. ***, **, * denote significance at the 1%, 5% and 10%, respectively.

Market Leverage	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Log of real total assets	0.039***	0.038***	0.039***	0.037***	0.028**
	(0.009)	(0.010)	(0.009)	(0.011)	(0.013)
Fixed-to-Total Assets	-0.148***	-0.141***	-0.136**	-0.127**	-0.045
	(0.056)	(0.058)	(0.055)	(0.066)	(0.088)
GDP Growth	-0.033***	-0.032***	-0.034***	-0.041***	-0.042***
	(0.008)	(0.009)	(0.009)	(0.010)	(0.013)
EBIT-to-Total Assets	-0.293***	-0.299***	-0.295***	-0.252***	-0.321***
	(0.067)	(0.068)	(0.068)	(0.076)	(0.026)
IRA	-0.054	-0.034	0.044*	-0.099**	-0.250***
	(0.035)	(0.028)	(0.025)	(0.049)	(0.057)
Liberalization Index	-	-	-	-0.014*	-0.032***
	-	-	-	(0.009)	(0.010)
Investor Protection				- 0.048***	-0.019
				(0.016)	(0.026)
Private Control	-0.019	-	-	-0.013	-0.148**
	(0.027)	-	-	(0.042)	(0.065)
Private Control_30	-	-0.010	-	-	-
	-	(0.026)	-	-	-
Private Control*IRA	0.072**	-	-	0.085**	0.204***
	(0.034)	-	-	(0.043)	(0.054)
Private Control_30*IRA	-	0.058**	-	-	-
	-	(0.030)	-	-	-
Government UCR	-	-	0.044	-	-
	-	-	(0.055)	-	-
Government UCR*IRA	-	-	-0.160***	-	-
	-	-	(0.060)	-	-
R squared within	0.248	0.246	0.253	0.294	0.284
Wald-test $\chi 2$ (p-value)	1172 (0.0)	1152 (0.00)	1127 (0.0)	2737(0.0)	2320(0.0)
Hausman test $\chi 2$ (p-value)	3.07 (1.00)	13.7 (0.75)	10.3 (0.94)	5.17 (0.99)	7.23(0.99)
N. Firms [N. Obs.]	96 [785]	96 [785]	96 [785]	71 [570]	47[396]

Table 5.1 – Price Equations – Granger Tests

The dependent variable in Tables 5.1 is the country and sector-specific utility price index (see Section 3 and Appendix A.3). The dependent variable in Table 5.2 is Leverage. Column 4 focuses only on firms that are subject to regulation by an IRA (telecoms, energy, and water supply firms in the U.K.) (see Gilardi, 2002). Fixed effects estimates. All regressions include also interacted year and sector dummies. Standard errors in parentheses are robust to heteroschedasticity and to within group serial correlation. *** = significant at the 1% level; ** = significant at the 5% level; * = significant at the 10% level.

Utility Prices	**(1)**	**(2)**	**(3)**	**(4)**
	All	**Privately-controlled firms**	**State- controlled firms**	**Firms regulated by an IRA**
Utility Price$_{t-1}$	0.573***	0.539***	0.366**	0.565***
	(0.057)	(0.067)	(0.175)	(0.063)
Utility Price$_{t-2}$	-0.019	-0.047	0.080	-0.015
	(0.040)	(0.053)	(0.178)	(0.048)
Leverage$_{t-1}$	0.515	2.321	-5.389	-0.172
	(2.703)	(2.834)	(4.888)	(3.208)
Leverage$_{t-2}$	5.577***	6.293***	2.614	5.833***
	(1.923)	(2.212)	(3.585)	(2.315)
F-test of H_0	4.25	4.08	1.12	3.37
p-value	(0.018)	(0.022)	(0.338)	(0.041)
N. Firms [N. Obs.]	78 [501]	61 [380]	31 [121]	61 [398]

Table 5.2 – Leverage Equations – Granger Tests

Leverage	**(1)**	**(2)**	**(3)**	**(4)**
	All	**Privately-controlled firms**	**State- controlled firms**	**Firms in IRA regulated sectors**
Leverage$_{t-1}$	0.270***	0.243***	0.235	0.231***
	(0.090)	(0.097)	(0.171)	(0.095)
Leverage 1$_{t-2}$	-0.118	-0.131	-0.143	-0.157
	(0.119)	(0.141)	(0.182)	(0.138)
Utility Price$_{t-1}$	-0.001	-0.001	0.001	-0.002
	(0.001)	(0.002)	(0.005)	(0.001
Utility Price$_{t-2}$	0.001	0.000	0.001	0.001
	(0.001)	(0.002)	(0.006)	(0.002)
F-test of H_0	0.63	0.07	0.03	0.75
p-value	(0.533)	(0.928)	(0.971)	(0.476)
N. Firms [N. Obs.]	78 [497]	61 [377]	31 [120]	61 [395]

Table 6 – Leverage and Market-to-Book Values

The dependent variable is the Market-to-Book ratio (Market Capitalization/Book value of the Equity). Leverage is defined as in Table 3. Private Control is defined as in Table 4. Investor Protection is the time-varying "antidirector rights" index by Pagano and Volpin (2005). Random-effects estimates. All regressions include sector and country dummies. Robust standard errors are in parentheses.*** = significant at the 1% level; ** = significant at the 5%; * = significant at the 10%.

Market to Book	**(1)**	**(2)**	**(3)**	**(4)**
Leverage	-4.941***	-4.441***	-4.398***	-4.340***
	(1.325)	(1.273)	(1.271)	(1.245)
Private Control	0.017	0.014	-0.027	-0.005
	(0.289)	(0.296)	(0.293)	(0.288)
Leverage*Private Control	2.548*	2.324*	2.303*	2.315*
	(1.368)	(1.387)	(1.384)	(1.388)
EBIT-to-Total Assets ratio	-	2.719**	2.724**	2.723**
	-	(1.344)	(1.339)	(1.338)
Investor Protection	-	-	0.068	0.076
	-	-	(0.055)	(0.057)
Log of real total assets	-	-	-	-0.064
	-	-	-	(0.127)
R squared (within)	0.175	0.103	0.104	0.104
Wald-test χ^2 (p value)	197.5 (0.00)	80.7 (0.00)	83.4 (0.00)	83.6 (0.00)
Hausman test χ^2 (p-value)	0.28 (0.96)	0.29 (0.99)	2.16 (0.83)	1.80 (0.94)
N. Firms [N. Obs.]	96 [790]	96 [780]	96 [780]	96 [780]

Table 7 - Average Investment Rate by Ownership and Regulation types

The investment rate is the ratio between gross fixed investment and fixed capital stock at replacement value. Firms are defined "state-controlled" if the government's UCR exceed 50% (Panel A), or 30% (Panel B). (Standard errors are in parenthesis).

Panel A: Average investment rate 1994-2005 (50% control threshold)

	IRA exists N = 490	**IRA does not exist** N = 305	**Regulation Difference p-value**
Privately-Controlled	0.130	0.146	- 0.016
	(0.007)	(0.010)	p = 0.18
N = 430	N = 267	N = 163	
State-Controlled	0.149	0.132	0.018
	(0.011)	(0.012)	p = 0.28
N = 244	N = 139	N = 105	
Ownership Difference	- 0.023	0.036	
p-value	p = 0.12	p = 0.36	
N=674	N = 406	N = 268	

Panel B: Average investment rate 1994-2005 (30% control threshold)

	IRA exists N = 490	**IRA does not exist** N = 305	**Regulation Difference p-value**
Privately-Controlled	0.122	0.144	-0.022
	(0.007)	(0.012)	p = 0.096
N = 344	N = 220	N = 124	
State-Controlled	0.154	0.138	0.016
(30%)	(0.011)	(0.010)	p = 0.248
N = 330	N =186	N = 144	
Ownership Difference	-0.033	0.006	
p-value	p = 0.006	p = 0.721	
N= 674	N = 406	N = 268	

Table 8 – Fixed Capital Investment and Leverage- The impact of Ownership and Regulation

The dependent variable is the ratio between fixed investment and fixed capital at replacement value. Regressions in Columns 1-3 are on the entire sample; in Column 3 we add the Liberalization and the Investor protection Indexes. Columns 4 and 5 examines privately- and state-controlled utilities, separately. Column 6 examines the firms' investment behavior after an IRA is established. Columns 7 and 8 examines privately- and state-controlled separately, after the set up of an IRA. Leverage is defined as in Table 3. Private Control is defined as in Table 4. Fixed-effects estimates. All regressions include time dummies. Standard errors in parentheses are robust to cross sectional heteroschedasticity and within group serial correlation. ***, **, * denote significance at the 1%, 5% and 10% respectively.

Investment to Capital Stock	**(1) Full Sample**	**(2) Full Sample**	**(3) Full sample**	**(4) Privately-Controlled Utilities**	**(5) State-Controlled Utilities**	**(6) After an IRA is established**	**(7) "Private" after an IRA is established**	**(8) "State-ctrl." after an IRA is established**
Fixed Investment to Capital Stock $_{t-1}$	-0.046	-0.063	-0.065	0.052	-0.305***	-0.037	0.135*	-0.320***
	(0.072)	(0.077)	(0.073)	(0.081)	(0.098)	(0.074)	(0.073)	(0.108)
Sales Growth$_{t-1}$	-0.019	-0.020	-0.014	-0.031	-0.024	-0.030	0.014	-0.054
	(0.037)	(0.037)	(0.040)	(0.049)	(0.084)	(0.035)	(0.044)	(0.077)
Sales Growth$_{t-2}$	-0.032	-0.033	-0.041	-0.096*	0.076	-0.031	-0.136***	0.084**
	(0.042)	(0.041)	(0.044)	(0.050)	(0.050)	(0.040)	(0.046)	(0.041)
LT_Interest Rate $_{t-1}$	-0.058**	-0.049**	-0.066***	-0.073**	-0.028	-0.050**	-0.074*	-0.033*
	(0.025)	(0.024)	(0.024)	(0.037)	(0.018)	(0.024)	(0.039)	(0.018)
EBIT to Total Asset $_{t-1}$* Electricity	0.758**	0.778**	0.691*	0.965*	-0.189	0.748**	0.952**	0.336
	(0.361)	(0.366)	(0.388)	(0.504)	(0.478)	(0.350)	(0.491)	(0.283)
EBIT to Total Asset $_{t-1}$* TLC	0.177	0.160	0.156	0.137	0.131	0.125	0.021	0.193
	(0.118)	(0.123)	(0.126)	(0.200)	(0.201)	(0.125)	(0.186)	(0.239)
EBIT to Total Asset $_{t-1}$* Water	0.562	0.420	-	0.330	2.056	-0.280	-0.521	-
	(0.448)	(0.393)	-	(0.400)	(2.887)	(0.667)	(0.532)	-
EBIT to Total Asset $_{t-1}$* Natural Gas	2.937**	2.881**	3.007**	3.772***	2.191	2.314**	2.810***	1.680
	(1.204)	(1.207)	(1.199)	(1.250)	(1.680)	(1.042)	(0.924)	(1.586)
Private Control $_{t-1}$	-0.159*	-	-0.168*	-	-	-0.015	-	-
	(0.091)	-	(0.088)	-	-	(0.041)	-	-
Leverage $_{t-1}$	0.180**	0.182**	0.215***	0.230***	0.093	0.237***	0.164*	0.359
	(0.077)	(0.080)	(0.080)	(0.077)	(0.213)	(0.082)	(0.085)	(0.276)
Differenced Leverage $_{t-1}$	0.0239***	0.241***	0.279***	0.273***	0.232*	0.258***	0.235***	0.319*
	(0.049)	(0.050)	(0.055)	(0.048)	(0.127)	(0.058)	(0.063)	(0.163)
IRA	-0.086**	-0.083**	-0.094***	-0.095**	0.112	-	-	-
	(0.039)	(0.039)	(0.037)	(0.039)	(0.078)	-	-	-
Government UCR $_{t-1}$	-	0.216	-	-	-	-	-	-
	-	(0.147)	-	-	-	-	-	-
Liberalization Index $_{t-1}$	-	-	-0.010	-	-	-	-	-
	-	-	(0.010)	-	-	-	-	-
Investor Protection $_{t-1}$	-	-	0.019	-	-	-	-	-
	-	-	(0.019)	-	-	-	-	-
R squared within	0.350	0.349	0.386	0.332	0.734	0.409	0.452	0.756
F (p-value)	10.3 (0.00)	15.0 (0.00)	16.6 (0.00)	9.7 (0.00)	45.4 (0.00)	10.7 (0.00)	12.5 (0.00)	121.7 (0.00)
N. Firms [N. obs.]	75 [338]	75 [338]	63 [288]	57 [251]	24 [87]	59 [253]	46 [185]	19 [68]

Appendix A1 -- The timing of regulation and privatization in the energy and telecommunications sectors in European countries

	Energy (Electricity & Gas)					Telecommunications			
Country	**Date of transposition of Directive 96/92 (Electricity)**	**Date of transposition of Directive 98/30 (Gas)**	**Date of establishment of Energy IRA**	**Privatization revenues in energy raised before the transposition Directives**	**Privatization revenues in energy raised before the establishment of the IRA**	**Date of transposition Directive 96/19**	**Date of establishment of IRA**	**Privatization revenues in TLC raised before the transposition Directives**	**Privatization revenues in TLC raised before the establishment of IRA**
Italy	1999	2000	1995	30.52%	0	1997	1997	5.72%	5.72%
UK	2000	2000	1989	100%	18.60%	1997	1984	94.84%	3.07%
Spain	1997	1998	1998	23.91%	52.62%	1997	1996	22.17%	22.17%
France	2000	2003	2000	2.54%	2.54%	1996	1996	2.24%	2.24%
Portugal	1999	2006	1995	66.58%	12.94%	1997	2001	31.19%	100%
Germany	1998	2003	2006	63.15%	100%	1996	1996	0%	0%
Netherlands	1998	2001	1998	16.11%	0%	1998	1997	42.84%	41.86%
Austria	1998	2000	2000	55.40%	70.76%	1997	1997	0%	0%
Sweden	1997	2004	1998	0%	0%	1997	1992	0%	0%
Finland	1998		1995	4.47%	0.42%	1997	1987	0.10%	0%
Greece	1999	failure to transpose	2000	2.40%	0%	1999	1992	50.20%	0%
Belgium	2000	1999	1999	10.12%	10.12%	1997	1991	79.33%	0%
Ireland	1999	2000	1999	-	-	1996	1997	0%	0%
Denmark	1996	2001	1999	0%	0%	1996	2002	48.54%	100%

Appendix A2 -- The Sample Firms

Company Name	Country	Sample Period	Privately Controlled Since
Airports			
Flughafen Wien AG	Austria	1994 – 2005	2000
Kobenhavns Lufthavne A/S	Denmark	1994 – 2005	2000
Aeroporti di Roma	Italy	1994 – 2000	2000
Aeroporto di Firenze SpA	Italy	1999 – 2005	2000
Aeroporto di Venezia	Italy	2002 – 2005	------
BAA PLC	United Kingdom	1994 – 2005	1994
Freight Roads			
Autoroutes du Sud de la France (ASF)	France	1999 – 2005	2005
SANEF (Autoroutes du Nord et de l'Est de la France)	France	2002 – 2005	2005
SAPRR (Autoroutes Paris-Rhin-Rhone)	France	2001 – 2005	2005
Autostrada Torino-Milano	Italy	1994 – 2005	1994
Autostrade SpA	Italy	1994 – 2005	1999
Sias - Società Autostrada Torino Milano	Italy	1998 – 2005	1998
Brisa Auto Estradas de Portugal	Portugal	1995 – 2005	1998
Abertis	Spain	1994 – 2005	1994
Ports and Docks			
Piraeus Port Authority	Greece	2001 – 2005	------
Associated British Ports Hldgs	United Kingdom	1994 – 2005	1994
Forth Ports PLC	United Kingdom	1994 – 2005	1994
Mersey Docks & Harbour Co	United Kingdom	1994 – 2004	1994
Railtrack Group PLC	United Kingdom	1996 – 2002	1996
Telecommunications			
Telekom Austria AG	Austria	1998 – 2005	2000
Belgacom SA	Belgium	1994 – 2005	------
TeleDanmark AS	Denmark	1994 – 2005	1998
Sonera	Finland	1997 – 2002	1997
France Telecom	France	1994 – 2005	2004
Deutsche Telekom AG	Germany	1994 – 2005	------
OTE (Hellenic Telecom Organization)	Greece	1994 – 2005	2002
EIRCOM	Ireland	1999 – 2005	1999
Telecom Italia SpA	Italy	1994 – 2005	1997
Koninklijke KPN NV	Netherlands	1994 – 2005	1994
Koninklijke PTT NV	Netherlands	1996 – 2005	1996
Portugal Telecom SA	Portugal	1994 – 2005	1997
Telefonica de Espana SA	Spain	1994 – 2005	1994
Telia AB	Sweden	1997 – 2005	------
British Telecommunications PLC	United Kingdom	1994 – 2005	1994
Cable & Wireless PLC	United Kingdom	1994 – 2005	1994
Kingston Communications	United Kingdom	1998 – 2005	2000
Water Supply			
Veolia	France	2000 – 2005	2001
Vivendi	France	1994 – 2005	1994
Thessaloniki Water	Greece	2001 – 2005	------
Water Supply & Sewerage Systems Co of Athens	Greece	2000 – 2005	------
Acquedotto Nicolay	Italy	1994 – 2005	------
Condotta Acque Potabili (dal 2005: Acque Potabili)	Italy	1994 – 2004	2001
AEA Technology PLC	United Kingdom	1997 – 2005	1997
Anglian Water PLC	United Kingdom	1994 – 2005	1994
Severn Trent PLC	United Kingdom	1994 – 2005	1994
South West Water PLC	United Kingdom	1994 – 2005	1994
Thames Water PLC	United Kingdom	1994 – 2000	1994
Wessex Water PLC	United Kingdom	1994 – 1998	1994
Yorkshire Water PLC	United Kingdom	1994 – 2005	1994

Appendix A2 -- The Sample Firms (continued)

Company Name	Country	Sample Period	Privately Controlled Since
Electricity			
EVN AG	Austria	1994 - 2005	------
Verbund	Austria	1994 - 2005	------
Fortum	Finland	1994 - 2005	------
Electricité de France	France	1994 - 2005	------
MVV Energie AG	Germany	1996 - 2005	------
VEBA AG	Germany	1994 - 2005	1994
VIAG AG	Germany	1994 - 1999	1994
Public Power Corporation SA	Greece	1998 - 2005	------
AEM Milano	Italy	1996 - 2005	2004
AEM Torino SpA	Italy	1999 - 2005	------
Edison	Italy	1994 - 2005	1994
Enel	Italy	1994 - 2005	2004
EnerTad	Italy	1996 - 2005	1996
Terna (Enel)	Italy	2000 - 2005	2004
EDP Electricidade de Portugal	Portugal	1994 - 2005	2004
ENDESA (Empresa Nacional de Electricidad SA)	Spain	1994 - 2005	1997
Iberdola	Spain	1994 - 2005	1994
Red Electrica de Espana SA	Spain	1995 - 2005	1999
Union electrica Fenosa	Spain	1994 - 2005	1994
British Energy PLC	United Kingdom	1996 - 2005	1996
National Grid Group PLC	United Kingdom	1995 - 2005	1995
National Power - PowerGen Ltd	United Kingdom	1994 - 2001	1994
Scottish and Southern Energy	United Kingdom	1994 - 2005	1994
ScottishPower/Hydro-Electric	United Kingdom	1994 - 2005	1994
United Utilities	United Kingdom	1994 - 2005	1994
Viridian	United Kingdom	1994 - 2005	1994
Yorkshire Electricity Group	United Kingdom	1994 - 1997	1994
Gas			
OMV AG	Austria	1994 - 2005	1994
Distrigaz SA	Belgium	2001 - 2005	2001
Fluxys	Belgium	2001 - 2005	2005
Gaz de France	France	1994 - 2005	------
Acsm SpA	Italy	1998 - 2005	------
Amga SpA	Italy	1996 - 2005	------
SNAM Rete Gas SpA	Italy	2000 - 2005	2000
Enagas	Spain	2000 - 2005	2000
Gas Natural SDG SA	Spain	1994 - 2005	1994
British Gas PLC	United Kingdom	1994 - 2005	1994
Centrica	United Kingdom	1996 - 2005	1996
Multiutility			
Suez	France	1994 - 2005	1994
Fraport AG	Germany	1994 - 2005	------
RWE	Germany	1994 - 2005	1994
ACEA SpA	Italy	1998 - 2005	------
Acegas	Italy	1997 - 2005	------
HERA	Italy	2001 - 2005	2001
Meta SpA	Italy	2002 - 2004	------

Appendix A3 -- Data Sources

Panel A. Ownership Data

Country	Individual Countries Sources 1994-2004	All Countries Sources 1994-2004
Austria	**1.** Austrian Holding and Privatisation Agency, www.oiag.at	**1.** Company Web Sites; **2.** Annual Reports; **3.** 20-F Reports; **4.** SEC, Filings & Forms (EDGAR), ww.sec.gov/edgar.shtml; **5.** Hoovers Company In-dept Records; **6.** SDC Thomson Financial; **7.** Amadeus, Bureau van Dijk; **8.** Lexis Nexis, Business News; **9.** Privatization Barometer, www.privatizationbarometer.net; **10.** Financial Times; **11.** For Banks and Financial Institutions: IMF Working Paper, 2005, "State-Owned Banks, Stability, Privatization, and Growth: Practical Policy Decisions in a World Without Empirical Proof," www.imf.org/external/pubs/ft/wp/2005/wp0510.pdf
Belgium	**1.** Bureau Fédéral du Plan (BFP), www.plan.be, "Participations Publiques dans le Secteur Marchand en Belgique, 1997-2003".	
Finland	**1.** Ministry of Trade & Industry, " State - Owned Companies" Publications, 1995, 2005.	
France	**1.** La Caisse des Dépôts, www.caissedesdepots.fr/FR/index.php **2.** L'Agence des participations de l'État (APE), www.ape.minefi.gouv.fr/ **3.** Euronext, www.euronext.com/home/0,3766,1732,00.html	
Germany	**1.** KfW, www.kfw.de/EN_Home/index.jsp	
Greece	**1.** Athens Stock Exchange, www.ase.gr/default_en.asp **2.** Hellenic Capital Market Commission, Annual Reports 1999-2005, www.hcmc.gr/english/index2.htm	
Italy	**1.** MEF, Dipartimento del Tesoro, "Libro bianco sulle privatizzazioni," April 2001, 2002 and 2003. **2.**MEF, Dipartimento del Tesoro, "La relazione sulle privatizzazioni," 1997-2000. **3.** MEF, Dipartimento del Tesoro, "Libro verde sulle partecipazioni dello Stato," November 1992. **4.** MEF, www.dt.tesoro.it/Aree-Docum/Partecipaz/Partecipaz/Partecipate.htm_cvt.htm. **5.** IRI (2001) "Le privatizzazioni in Italia, 1992-2000". Edited by Bemporad S. and E. Reviglio. **6.** Mediobanca (2000) "Le privatizzazioni in Italia dal 1992". **7.** Borsa Italiana, "Operazioni di Privatizzazione - Anni 1993-2006," www.borsaitaliana.it/documenti/ufficiostampa/datistorici/privatizzazioni_pdf.htm **8.** Consob, www.consob.it	
Netherlands	**1.** Ministry of Finance, www.minfin.nl/en/subjects.government-participation **2.** Morgan Stanley, Journal of Applied Corporate Finance, Vol. 9, Number 1, Spring 1996 **3.** OECD, 1998, Reforming Public Enterprises: The Netherlands.	
Portugal	**1.** Ministry of Finance and Public Administration, Economic Research and Forecasting Department (DGEP), www.dgep.pt/menprinci.html	
Spain	**1.** Sociedad Estatal de Participaciones Industriales, www.sepi.es **2.** Economic Monthly Report (1995 and 1999), La Caixa, www.lacaixa.comunicacions.com **3.** The Comisión Nacional del Mercado de Valores (CNMV), www.cnmv.es	
Sweden	**1.** Ministry of Industry, Employment and Communication, Annual Report for Government-Owned Companies, 2000 - 2005, www.sweden.gov.se/sb/d/2106/a/19792	
UK	**1.** "Who Owns Whom in the UK Electricity Industry," Electricity Association Policy Research, June 2003 **2.** www.ukprivatisation.com	

Appendix A3 -- Data Sources (continued)

Panel B. Additional Company Data

Data sources used to identify privatized companies through public offers of shares in EU markets, and track name changes and M&A activity

1. Thomson Financial Securities Data Corporation, SDC Platinum Global New Issues Database and Mergers & Acquisitions Database.

2. Dow Jones Newswires, Dow Jones.

3. The Privatization Barometer (www.privatizationbarometer.net)

Accounting and Financial Market Data

1. Worldscope.

Panel C. Institutional Data

Data sources used for the regulatory independence, legal protection of investors and intensity of regulation and market liberalization

1. Gilardi. F. (2002) "Policy Credibility and Delegation to Independent Regulatory Agencies: A Comparative Empirical Analysis," *Journal of European Public Policy*, **9(6)**, 873-893

2. Pagano, M. and Volpin, F. (2005) "The Political Economy of Corporate Governance," American Economic Review, .95 (4): 1005-1030.

3. OECD International Regulation database: Conway and Nicoletti (2006), "Product Market Regulation in Non-Manufacturing Sectors in OECD Countries: Measurement and Highlights," OECD Economics Department Working Paper, http://www.oecd.org/eco/pmr

Panel D. Price Data

Data sources used to identify series of price indexes of final consumer prices in regulated sectors

1. EUROSTAT – New Cronos: for electricity, gas, water, telecommunications
2. National statistics and ASECAP for freight roads

Data sources for country specific interest rates and investment prices

1. Long term interest rates. OECD Factbook 2006, Environmental and social statistics
2. OECD Gross fixed capital formation: implicit price deflator.

NOTE DI LAVORO DELLA FONDAZIONE ENI ENRICO MATTEI

Fondazione Eni Enrico Mattei Working Paper Series

Our Note di Lavoro are available on the Internet at the following addresses:

http://www.feem.it/Feem/Pub/Publications/WPapers/default.htm
http://www.ssrn.com/link/feem.html
http://www.repec.org
http://agecon.lib.umn.edu
http://www.bepress.com/feem/

NOTE DI LAVORO PUBLISHED IN 2007

NRM	1.2007	*Rinaldo Brau, Alessandro Lanza, and Francesco Pigliaru*: How Fast are Small Tourism Countries Growing? The 1980-2003 Evidence
PRCG	2.2007	*C.V. Fiorio, M. Florio, S. Salini and P. Ferrari:* Consumers' Attitudes on Services of General Interest in the EU: Accessibility, Price and Quality 2000-2004
PRCG	3.2007	*Cesare Dosi and Michele Moretto*: Concession Bidding Rules and Investment Time Flexibility
IEM	4.2007	*Chiara Longo, Matteo Manera, Anil Markandya and Elisa Scarpa*: Evaluating the Empirical Performance of Alternative Econometric Models for Oil Price Forecasting
PRCG	5.2007	*Bernardo Bortolotti, William Megginson and Scott B*. Smart: The Rise of Accelerated Seasoned Equity Underwritings
CCMP	6.2007	*Valentina Bosetti and Massimo Tavoni*: Uncertain R&D, Backstop Technology and GHGs Stabilization
CCMP	7.2007	*Robert Küster, Ingo Ellersdorfer, Ulrich Fahl* (lxxxi): A CGE-Analysis of Energy Policies Considering Labor Market Imperfections and Technology Specifications
CCMP	8.2007	*Mònica Serrano* (lxxxi): The Production and Consumption Accounting Principles as a Guideline for Designing Environmental Tax Policy
CCMP	9.2007	*Erwin L. Corong* (lxxxi): Economic and Poverty Impacts of a Voluntary Carbon Reduction for a Small Liberalized Developing Economy: The Case of the Philippines
CCMP	10.2007	*Valentina Bosetti, Emanuele Massetti, and Massimo Tavoni*: The WITCH Model. Structure, Baseline, Solutions
SIEV	11.2007	*Margherita Turvani, Aline Chiabai, Anna Alberini and Stefania Tonin*: Public Policies for Contaminated Site Cleanup: The Opinions of the Italian Public
CCMP	12.2007	*M. Berrittella, A. Certa, M. Enea and P. Zito*: An Analytic Hierarchy Process for The Evaluation of Transport Policies to Reduce Climate Change Impacts
NRM	13.2007	*Francesco Bosello, Barbara Buchner, Jacopo Crimi, Carlo Giupponi and Andrea Povellato*: The Kyoto Protocol and the Effect of Existing and Planned Measures in the Agricultural and Forestry Sector in the EU25
NRM	14.2007	*Francesco Bosello, Carlo Giupponi and Andrea Povellato*: A Review of Recent Studies on Cost Effectiveness of GHG Mitigation Measures in the European Agro-Forestry Sector
CCMP	15.2007	*Massimo Tavoni, Brent Sohngen, and Valentina Bosetti*: Forestry and the Carbon Market Response to Stabilize Climate
ETA	16.2007	*Erik Ansink and Arjan Ruijs*: Climate Change and the Stability of Water Allocation Agreements
ETA	17.2007	*François Gusdorf and Stéphane Hallegatte*: Compact or Spread-Out Cities: Urban Planning, Taxation, and the Vulnerability to Transportation Shocks
NRM	18.2007	*Giovanni Bella*: A Bug's Life: Competition Among Species Towards the Environment
IEM	19.2007	*Valeria Termini and Laura Cavallo*: "Spot, Bilateral and Futures Trading in Electricity Markets. Implications for Stability"
ETA	20.2007	*Stéphane Hallegatte and Michael Ghil*: Endogenous Business Cycles and the Economic Response to Exogenous Shocks
CTN	21.2007	*Thierry Bréchet, François Gerard and Henry Tulkens*: Climate Coalitions: A Theoretical and Computational Appraisal
CCMP	22.2007	*Claudia Kettner, Angela Köppl, Stefan P. Schleicher and Gregor Thenius*: Stringency and Distribution in the EU Emissions Trading Scheme –The 2005 Evidence
NRM	23.2007	*Hongyu Ding, Arjan Ruijs and Ekko C. van Ierland*: Designing a Decision Support System for Marine Reserves Management: An Economic Analysis for the Dutch North Sea
CCMP	24.2007	*Massimiliano Mazzanti, Anna Montini and Roberto Zoboli*: Economic Dynamics, Emission Trends and the EKC Hypothesis New Evidence Using NAMEA and Provincial Panel Data for Italy
ETA	25.2007	*Joan Canton*: Redealing the Cards: How the Presence of an Eco-Industry Modifies the Political Economy of Environmental Policies
ETA	26.2007	*Joan Canton*: Environmental Taxation and International Eco-Industries
CCMP	27.2007	*Oscar Cacho and Leslie Lipper* (lxxxii): Abatement and Transaction Costs of Carbon-Sink Projects Involving Smallholders
CCMP	28.2007	*A. Caparrós, E. Cerdá, P. Ovando and P. Campos* (lxxxii): Carbon Sequestration with Reforestations and Biodiversity-Scenic Values
CCMP	29.2007	*Georg E. Kindermann, Michael Obersteiner, Ewald Rametsteiner and Ian McCallcum* (lxxxii): Predicting the Deforestation–Trend Under Different Carbon–Prices

CCMP	30.2007	*Raul Ponce-Hernandez* (lxxxii): A Modelling Framework for Addressing the Synergies between Global Conventions through Land Use Changes: Carbon Sequestration, Biodiversity Conservation, Prevention of Land Degradation and Food Security in Agricultural and Forested Lands in Developing Countries
ETA	31.2007	*Michele Moretto and Gianpaolo Rossin*i: Are Workers' Enterprises Entry Policies Conventional
KTHC	32.2007	*Giacomo Degli Antoni*: Do Social Relations Affect Economic Welfare? A Microeconomic Empirical Analysis
CCMP	33.2007	*Reyer Gerlagh and Onno Kuik*: Carbon Leakage with International Technology Spillovers
CCMP	34.2007	*Richard S.J. Tol*: The Impact of a Carbon Tax on International Tourism
CCMP	35.2007	*Reyer Gerlagh, Snorre Kverndokk and Knut Einar Rosendahl*: Optimal Timing of Environmental Policy; Interaction Between Environmental Taxes and Innovation Externalitie
SIEV	36.2007	*Anna Alberini and Alberto Longo*: Valuing the Cultural Monuments of Armenia: Bayesian Updating of Prior Beliefs in Contingent Valuation
CCMP	37.2007	*Roeland Bracke, Tom Verbeke and Veerle Dejonckheere*: What Distinguishes EMAS Participants? An Exploration of Company Characteristics
CCMP	38.2007	*E. Tzouvelekas, D. Vouvaki and A. Xepapadeas*: Total Factor Productivity Growth and the Environment: A Case for Green Growth Accounting
CCMP	39.2007	*Klaus Keller, Louise I. Miltich, Alexander Robinson and Richard S.J. Tol*: How Overconfident are Current Projections of Anthropogenic Carbon Dioxide Emissions?
CCMP	40.2007	*Massimiliano Mazzanti and Roberto Zoboli*: Environmental Efficiency, Emission Trends and Labour Productivity: Trade-Off or Joint Dynamics? Empirical Evidence Using NAMEA Panel Data
PRCG	41.2007	*Veronica Ronchi*: Populism and Neopopulism in Latin America: Clientelism, Trade Union Organisation and Electoral Support in Mexico and Argentina in the '90s
PRCG	42.2007	*Veronica Ronchi*: The Neoliberal Myth in Latin America: The Cases of Mexico and Argentina in the '90s
CCMP	43.2007	*David Anthoff, Cameron Hepburn and Richard S.J. Tol*: Equity Weighting and the Marginal Damage Costs of Climate Change
ETA	44.2007	*Bouwe R. Dijkstra and Dirk T.G. Rübbelke*: Group Rewards and Individual Sanctions in Environmental Policy
KTHC	45.2007	*Benno Torgler*: Trust in International Organizations: An Empirical Investigation Focusing on the United Nations
CCMP	46.2007	*Enrica De Cian, Elisa Lanzi and Roberto Roson*: The Impact of Temperature Change on Energy Demand: A Dynamic Panel Analysis
CCMP	47.2007	*Edwin van der Werf*: Production Functions for Climate Policy Modeling: An Empirical Analysis
KTHC	48.2007	*Francesco Lancia and Giovanni Prarolo*: A Politico-Economic Model of Aging, Technology Adoption and Growth
NRM	49.2007	*Giulia Minoia*: Gender Issue and Water Management in the Mediterranean Basin, Middle East and North Africa
KTHC	50.2007	*Susanna Mancinelli and Massimiliano Mazzanti*: SME Performance, Innovation and Networking Evidence on Complementarities for a Local Economic System
CCMP	51.2007	*Kelly C. de Bruin, Rob B. Dellink and Richard S.J. Tol*: AD-DICE: An Implementation of Adaptation in the DICE Model
NRM	52.2007	*Frank van Kouwen, Carel Dieperink, Paul P. Schot and Martin J. Wassen*: Interactive Problem Structuring with ICZM Stakeholders
CCMP	53.2007	*Valeria Costantini and Francesco Crespi*: Environmental Regulation and the Export Dynamics of Energy Technologies
CCMP	54.2007	*Barbara Buchner, Michela Catenacci and Alessandra Sgobbi*: Governance and Environmental Policy Integration in Europe: What Can We learn from the EU Emission Trading Scheme?
CCMP	55.2007	*David Anthoff and Richard S.J. Tol*: On International Equity Weights and National Decision Making on Climate Change
CCMP	56.2007	*Edwin van der Werf and Sonja Peterson*: Modeling Linkages Between Climate Policy and Land Use: An Overview
CCMP	57.2007	*Fabien Prieur*: The Environmental Kuznets Curve in a World of Irreversibility
KTHC	58.2007	*Roberto Antonietti and Giulio Cainelli*: Production Outsourcing, Organizational Governance and Firm's Technological Performance: Evidence from Italy
SIEV	59.2007	*Marco Percolo*: Urban Transport Policies and the Environment: Evidence from Italy
ETA	60.2007	*Henk Folmer and Pierre von Mouche*: Linking of Repeated Games. When Does It Lead to More Cooperation and Pareto Improvements?
CCMP	61.2007	*Arthur Riedacker* (lxxxi): A Global Land Use and Biomass Approach to Reduce Greenhouse Gas Emissions, Fossil Fuel Use and to Preserve Biodiversity
CCMP	62.2007	*Jordi Roca and Mònica Serrano*: Atmospheric Pollution and Consumption Patterns in Spain: An Input-Output Approach
CCMP	63.2007	*Derek W. Bunn and Carlo Fezzi* (lxxxi): Interaction of European Carbon Trading and Energy Prices
CTN	64.2007	*Benjamin Golub and Matthew O. Jackson* (lxxxiii): Naïve Learning in Social Networks: Convergence, Influence and Wisdom of Crowds
CTN	65.2007	*Jacob K. Goeree, Arno Riedl and Aljaž Ule* (lxxxiii): In Search of Stars: Network Formation among Heterogeneous Agents
CTN	66.2007	*Gönül Doğan, M.A.L.M. van Assen, Arnout van de Rijt, and Vincent Buskens* (lxxxiii): The Stability of Exchange Networks
CTN	67.2007	*Ben Zissimos* (lxxxiii): Why are Trade Agreements Regional?
CTN	68.2007	*Jacques Drèze, Michel Le Breton, Alexei Savvateev and Shlomo Weber* (lxxxiii): «Almost» Subsidy-free Spatial Pricing in a Multi-dimensional Setting
CTN	69.2007	*Ana Babus* (lxxxiii): The Formation of Financial Networks

CTN	70.2007	*Andrea Galeotti and Sanjeev Goyal* (lxxxiii): A Theory of Strategic Diffusion
IEM	71.2007	*Francesco Bosello, Enrica De Cian and Roberto Roson*: Climate Change, Energy Demand and Market Power in a General Equilibrium Model of the World Economy
ETA	72.2007	*Gastón Giordana and Marc Willinger*: Fixed Instruments to Cope with Stock Externalities An Experimental Evaluation
KTHC	73.2007	*Oguzhan Dincer and Eric Uslaner*: Trust and Growth
CCMP	74.2007	*Fei Teng and Alun Gu*: Climate Change: National and Local Policy Opportunities in China
KTHC	75.2007	*Massimiano Bucchi and Valeria Papponetti*: Research Evaluation as a Policy Design Tool: Mapping Approaches across a Set of Case Studies
SIEV	76.2007	*Paolo Figini, Massimiliano Castellani and Laura Vici*: Estimating Tourist Externalities on Residents: A Choice Modeling Approach to the Case of Rimini
IEM	77.2007	*Irene Valsecchi*: Experts and Non-experts
CCMP	78.2007	*Giuseppe Di Vita*: Legal Families and Environmental Protection: is there a Causal Relationship?
KTHC	79.2007	*Roberto Antonietti and Giulio Cainelli*: Spatial Agglomeration, Technology and Outsourcing of Knowledge Intensive Business Services Empirical Insights from Italy
KTHC	80.2007	*Iacopo Grassi*: The Music Market in the Age of Download
ETA	81.2007	*Carlo Carraro and Alessandra Sgobbi*: Modelling Negotiated Decision Making: a Multilateral, Multiple Issues, Non-Cooperative Bargaining Model with Uncertainty
CCMP	82.2007	*Valentina Bosetti, Carlo Carraro, Emanuele Massetti and Massimo Tavoni*: International Energy R&D Spillovers and the Economics of Greenhouse Gas Atmospheric Stabilization
CCMP	83.2007	*Sjak Smulders and Edwin van der Werf*. Climate Policy and the Optimal Extraction of High- and Low-Carbon Fossil Fuels
SIEV	84.2007	*Benno Torgler, Bruno S. Frey and Clevo Wilson*: Environmental and Pro-Social Norms: Evidence from 30 Countries
KTHC	85.2007	*Elena Bellini, Ugo Gasparino, Barbara Del Corpo and William Malizia*: Impact of Cultural Tourism upon Urban Economies: An Econometric Exercise
NRM	86.2007	*David Tomberlin and Garth Holloway*: Trip-Level Analysis of Efficiency Changes in Oregon's Deepwater Trawl Fishery
CTN	87.2007	*Pablo Revilla*: Many-to-One Matching when Colleagues Matter
IEM	88.2007	*Hipòlit Torró*: Forecasting Weekly Electricity Prices at Nord Pool
ETA	89.2007	*Y. Hossein Farzin*: Sustainability and Optimality in Economic Development: Theoretical Insights and Policy Prospects
NRM	90.2007	*P. Sarfo-Mensah and W. Oduro*: Traditional Natural Resources Management Practices and Biodiversity Conservation in Ghana: A Review of Local Concepts and Issues on Change and Sustainability
NRM	91.2007	*Lorenzo Pellegrini*: The Rule of The Jungle in Pakistan: A Case Study on Corruption and Forest Management in Swat
NRM	92.2007	*Arjan Ruijs*: Welfare and Distribution Effects of Water Pricing Policies
ETA	93.2007	*Jean-Marie Grether, Nicole A. Mathys and Jaime de Melo*: Trade, Technique and Composition Effects: What is Behind the Fall in World-Wide SO2 Emissions 1990-2000?
PRCG	94.2007	*Bernardo Bortolotti, Carlo Cambini, Laura Rondi and Yossi Spiegel*: Capital Structure and Regulation: Does Ownership Matter?

(lxxxi) This paper was presented at the EAERE-FEEM-VIU Summer School on "Computable General Equilibrium Modeling in Environmental and Resource Economics", held in Venice from June 25th to July 1st, 2006 and supported by the Marie Curie Series of Conferences "European Summer School in Resource and Environmental Economics".
(lxxxii) This paper was presented at the Workshop on “Climate Mitigation Measures in the Agro-Forestry Sector and Biodiversity Futures”, Trieste, 16-17 October 2006 and jointly organised by The Ecological and Environmental Economics - EEE Programme, The Abdus Salam International Centre for Theoretical Physics - ICTP, UNESCO Man and the Biosphere Programme - MAB, and The International Institute for Applied Systems Analysis - IIASA.
(lxxxiii) This paper was presented at the 12th Coalition Theory Network Workshop organised by the Center for Operation Research and Econometrics (CORE) of the Université Catholique de Louvain, held in Louvain-la-Neuve, Belgium on 18-20 January 2007.

	2007 SERIES
CCMP	*Climate Change Modelling and Policy* (Editor: Marzio Galeotti)
SIEV	*Sustainability Indicators and Environmental Valuation* (Editor: Anil Markandya)
NRM	*Natural Resources Management* (Editor: Carlo Giupponi)
KTHC	*Knowledge, Technology, Human Capital* (Editor: Gianmarco Ottaviano)
IEM	*International Energy Markets* (Editor: Matteo Manera)
CSRM	*Corporate Social Responsibility and Sustainable Management* (Editor: Giulio Sapelli)
PRCG	*Privatisation Regulation Corporate Governance* (Editor: Bernardo Bortolotti)
ETA	*Economic Theory and Applications* (Editor: Carlo Carraro)
CTN	*Coalition Theory Network*