The Political Economy of Mobile Telecommunications Liberalization: Evidence from the OECD Countries*

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Abstract

The change from analogue to digital technologies in the mobile telecom industries at the beginning of the 1990s increased the economic rationale for rendering these markets more competitive. Yet, the speed of reforms have been remarkably different across countries. We empirically investigate this cross-sectional and temporal variation in entry liberalization of OECD countries during the 1990s. A unique data set obtained by merging different sources on political, government and regulatory institutions -as well as private interests and ideologies- allows us to explore in detail several dimensions of the political economy of liberalization. Our findings indicate majoritarian electoral systems as important drivers for change, while independent industry regulators slow down such reforms. Furthermore, powerful industry incumbents hold up the liberalization process and governing bodies that favor a small welfare state accelerate it. The focus on separate elements of countries' institutions aims to shed light on the underlying structure of decision-making processes, providing a base for more structural political economy studies on regulatory change.

Keywords: Political Economy, Entry Liberalization, Mobile Telecom, Institutions, Ideology, Private Interests, OECD

JEL classification: C23, D72, D78, L51, L96

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1 Introduction

Since the 1980s, the majority of industrialized countries experienced an era of entry liberalization and deregulation. Many industries, which for decades were guided by the state's hand, have been opened up to competition. Especially in the so-called network industries - such as telecom, post, and electricity - governments have implemented more competitive market structures with the idea to stimulate economic growth.[1]

The speed and extent of these reforms, however, have been remarkably heterogenous. We explore these differences by investigating the liberalization patterns in mobile telecom industries of the OECD countries during the 1990s. Our study is based upon the underlying notion that, while political ideology (Olson, 1965; Romer and Rosenthal, 1987) and the relative power of interest groups (Stigler, 1971; Peltzman, 1976) shape the direction of economic policy, a country's institutional environment determines the ease of implementing the desired outcome (Lijphart, 1999; Henisz and Zelner, 2006). Hence, we argue that policies arise as a result of pressure by interest groups and politicians pursuing their private interests and ideologies, subject to institutional constraints that provide checks and balances to the introduction of new initiatives.

Accordingly, we construct a novel database by merging data on mobile telecom industries in OECD countries during the 1990s with several sources on political dimensions. We uncover a number of stylized facts. First, in accordance with private interest and partisan politics theories, while strong incumbents and pro-regulation governments slow down liberalization, governing bodies that favor a small welfare state speed up entry. Second, majoritarian systems are the most robust drivers for change, in line with these systems being more effective in altering the status quo, due to their higher concentration of power. Third, more independent industry regulators slow

[1] Alesina et al. (2005) find support for deregulation and privatization in OECD countries during the 1990s to increase firms' investments and therefore growth. Nicoletti and Scarpetta (2003) confirm that promotion of competition in OECD countries boosts productivity growth. Li and Xu (2004) evidence that privatization and competition in the fixed-line telecom sectors around the world contribute to growth by raising both factor inputs and total factor productivity.

down liberalization, confirming agency theories of regulation. Our results broadly correspond with the idea that a higher division of power leads more often to policy gridlock in democratic countries (Becker, 1983; Cox and McCubbins, 1986).[2] Thus, although political stability and an avoidance of power abuse is in general desirable (Persson et al., 1997; Powell, 2000), more checks and balances slow down reforms.

The choice to focus on entry liberalization in the mobile telecom industries during the 1990s, is threefold. First, due to drastic technological change during that time period, mobile telecom experienced a fast and radical liberalization process.[3] Second, the policy outcome, i.e. the number of mobile services providers allowed to operate in a market, is a direct consequence of the decisions taken by political actors. This directly links the political process with the observed policy. And third, the telecom industries are an essential part of the infrastructure, since they offer substantial positive externalities to other industries by reducing transaction costs (Röller and Waverman, 2001). In sum, our approach offers a focused study on the political process of economic policy-making in an important and unusually dynamic industry.

Our paper follows the renewed interest on the economic effects of institutions (e.g. Besley and Case, 2003; Acemoglu and Robinson, 2008). More specifically on entry regulation, Djankov et al. (2002) explore the variation in 75 countries of the bureaucratic requirements to set up a new business. Their results show that regulation is pursued for the benefit of politicians and bureaucrats, in line with De Soto's (1990) and Shleifer and Vishny's (1998) 'grabbing hand' theories. Most similar to ours is the study by Li and Xu (2002), who investigate the political economy of privatization and competition in the fixed-line telecom sectors in 45 countries. They find that, while democratic countries with a strong presence of pro-reform interest groups are more prone to reform, less democratic countries are more likely to retain a higher level of state ownership.

[2] A division of political power may also have positive effects on reforms, since this increases the credibility of the reform program for private investors (Levy and Spiller, 1996). But this effect is more important in developing and undemocratic countries (Henisz et al., 2005; Li and Xu, 2002).

[3] The early 1990s showed a trend towards more competitive markets with the switch from analogue to digital technology, because the induced large increase in spectrum capacity undermined the traditional arguments for government intervention and natural monopolies (Gruber and Verboven, 2001a).

We add to previous studies on entry regulation by including detailed indicators of regulatory institutions, which we find matter for liberalization. Further, while other works use institutional indices, our paper uncovers single institutional elements that influence the policy outcome. This focus on separate drivers is more befitting for shedding light on the underlying structure of the political decision-making process. Additionally, ours is the first study to focus on the liberalization of the mobile telecom industry, a particularly interesting sector, given that the increased competition there has had a major immediate impact on consumers (Gruber and Verboven, 2001b).

The paper proceeds as follows. Section 2 provides the building blocks of our analysis, based on a review of the literature. Section 3 deals with the description of our data. Section 4 presents our main model and discusses methodological issues. We provide the results and robustness checks in Sections 5 and 6 respectively. Section 7 concludes.

2 The various dimensions of policy reform

The traditional private interest view of regulation stresses the role of interest groups, which demand governmental intervention to redistribute in their favor the rents that are generated by market failures (Stigler, 1971; Peltzman, 1976).[4] Yet this theory is only partial in the sense that it does not model the supply side of policy. The policy-making bodies -politicians, governments and regulatory agencies- must be considered in a fully micro-founded theory of economic policy, since these actors create and shape the regulatory process. This extends the private interest view in three dimensions. First, politicians and legislators care about the policy outcome as well, as partisan politics theories say (Alesina and Rosenthal, 1995). Second, policy makers are agents of their constituents. When information is imperfect, their private interests may matter. For example, regulators may collude with industry incumbents to capture part of the rents (Faure-Grimaud and Martimort, 2003). And third, the comparative politics ap-

[4]Stigler's (1971) and Peltzman's (1976) idea of regulation is broad, including all dimensions of government intervention. While keeping this terminology when referring to their theories, the rest of the paper refers to industry-level regulatory agencies when using the terms 'regulators' and 'regulation'.

proach highlights the role of institutions, where more institutional players induce less flexibility in formulating policy (Henisz, 2000).

This study brings together different data sets which enables us to take into account all of the above dimensions. In order to present the different approaches to policy-making in an orderly way, we make the distinction between interest groups and political ideologies on the one hand, which determine what economic policy is desired, and the role of institutions on the other hand, which drive the change away from the status quo. In the context of mobile telecom industries, the power of telecom incumbents, potential entrants and consumers, combined with the ideological stance of governing bodies determine the degree of market liberalization. Once a preference is established, the design of institutions determines the ease of its implementation. For example, it may be more difficult to reach the desired level of liberalization under a coalition government than under a single-party majority. Similarly, an independent industry regulator adds one player to the political process. If this regulator colludes with industry incumbents, then he would block liberalization when possible.

We present each building block separately -first preference determination through private interests and governments' ideology and then ease of decision-making through institutions- as the main motivation of the paper is to identify detailed drivers of liberalization. However, given that in particular institutional drivers are likely to be interrelated, as an intermediate step, we introduce summary indicators and verify how our institutional variables load into these indicators. As a final step, we join all variables to offer a broad view of all political dimensions influencing reform.

2.1 Private interests and government ideology

The private interest theories predict that different interest groups try to capture the policy-makers, which is confirmed in empirical studies such as Kroszner and Strahan (1999) and Duso (2005). If all parties are equally represented, competition is tougher and the policy outcome should be more efficient (Becker, 1983). Generally though, the industry incumbents have higher stakes and are better organized in protecting their

market from new entry. This is especially true for the mobile telecom industries in the 1990s. Before the introduction of digital technology, incumbents in the fixed-line telecom industries had been routinely granted a mobile phone license, often a single monopoly license. Indeed, most countries viewed mobile telecom as just an additional business line of the (state-owned) telecom monopoly (Gruber and Verboven, 2001a). Furthermore, given the novelty of the technology, uncertainty over cost structure and future demand gave incumbents an informational advantage over other interest groups.[5] Lobbying intensity is a function of stakes, information and (spending) power (Bernheim and Whinston, 1986). Therefore, our expectation is that the higher the incumbent's market share, the more it is able to slow down liberalization.[6]

However, potential entrants lobby for entry liberalization. Although these firms do not have the same degree of local knowledge and political contacts as home incumbents, potential entrants in one market are typically incumbents in another market, as subsequent sales of licenses have shown (Gruber and Verboven, 2001a). Therefore, potential entrants should have some knowledge of market parameters and the resources to push forward liberalization. We expect that when a market is more attractive, i.e. when industry profits are higher, the entrants' lobbying intensity -and its potential success- should be higher as well.[7]

Given that consumers face a typical free rider problem (Olson, 1965), they are often not a powerful interest group. Moreover, during the first half of the 1990s, the diffusion of mobile phones was still low and thus the benefits of more competition were not clear (Gruber and Verboven, 2001a). Reforms creating uncertain benefits makes actors less likely to operate for change (Alesina and Drazen, 1991). Therefore, consumers'

[5]This uncertainty holds also to some extent for incumbents, but less than for other interest groups or the government. Informational asymmetry is the base of agency models in regulation (Laffont, 1999).

[6]It is worth noting at this point that proxying an incumbent's private interests with its market share can be problematic, given that market shares and the number of firms present in a market, which is our measure for entry liberalization as we detail further, are related. We therefore propose an 'instrument' for an incumbents market share in the mobile phone market, as explained in the data section.

[7]This is not a perfect measure for entrants' interests, since high profits are also good for an incumbent. However, when controlling incumbents' interests through another measure such as their market share, an industry's profitability should partly capture a potential entrant interest in a market.

lobbying activities might have been less intense than firms' activities. Nevertheless, we include a proxy for consumer interests. We use the relative share of the active population, since this group includes the main potential users of mobile phones.

The private interest theory, however, by implicitly assuming that the legislator is neutral in deciding upon reforms, denies the preferences of political parties. Yet, politicians make their choices not only to be reelected, but also because they genuinely care. This implies that decisions of politicians may not meet the preferred policy of the interest groups (Kalt and Zupan, 1984; Poole and Rosenthal, 1997). We include specific measures of parties' programmatic positions. In particular, we use proxies related to how favorable governments are towards regulation and a small welfare state. Pro-regulation governments should be less prone to liberalize and governments that prefer to limit the welfare state should, instead, be more in favor (Bagley and Revesz, 2006).

2.2 Institutions

Scholars in institutional economics have long argued that the institutional structure affects issues such as government spending and taxes (Persson and Tabellini, 1999; Milesi-Ferretti et al., 2002). But, as Persson and Tabellini (2003, p29) state: 'It is plausible to conjecture that structural policies [such as regulation of entry] also systematically differ across political systems, though demonstrating this is still an open research agenda.' Political scientists, on the other hand, have developed frameworks on how a country's institutions should be a primary determinant of specific regulatory reforms. Countries marked by greater political fragmentation, the argument goes, adjust existing policies less often because the blocking of such change is more likely, as the number of independent institutional actors with potential veto power increases (Henisz 2000; Tsebelis, 1995, 2002). Therefore, although more checks and balances add to political stability and avoid an abuse of power (Persson et al., 1997; Powell, 2000), they may also slow down reforms, especially in democratic countries.[8] This logic is confirmed

[8]For less developed and less democratic countries, the presence of checks and balances may actually help to push through reforms (Henisz and Zelner, 2006). By subjecting a reform to the scrutiny of several

in a number of empirical studies in political science.[9]

The liberalization outcome must be agreed upon by every actor with veto power. Therefore, instead of using a single index of checks and balances, as for example Henisz (2000) and Li and Xu (2002) do, we include separate measures of political, government and regulatory institutions to identify exactly those variables that matter most. With this approach, we offer a detailed analysis of the decision-making process of liberalization. However, after having identified which particular variables matter for policy change, we check how these load into two summary indices of political decision making proposed by Lijphart (1999). These indicators should give us insights into which of our institutional variables group together in determining the political process.

2.2.1 Political and government institutions

The most fundamental kind of institutions are related to electoral systems. We use the two dimensions as identified by Persson and Tabellini (1999). The first deals with an electoral system being majoritarian or representative. As Powell (2000) explains, majoritarian systems tend to score higher on concentration of political power, since one of their goals is to allow elected officials to make decisions more effectively.[10] Majoritarian systems, thus, being more prone to break the status quo, should liberalize more.

The other electoral dimension identifies countries that have a presidential regime, as opposed to a parliamentary regime. Presidential regimes are usually associated with a strong division of power between the parliament and the government (Persson et al., 1997). As Persson and Tabellini (2003, p23) admit: 'This statement is a stark simplification, as the separation of legislative powers also differs a great deal within each of these forms of government.' Yet, it is still a useful starting point. Due to its

political actors, it increases the credibility of the reform, which attracts foreign investors (Levy and Spiller, 1996), thus increasing the likelihood of success. The division of power may also help to diminish ruling politicians' discretion to pursue self-interests, often a problem in less democratic countries.

[9]For example, Henisz et al. (2005) show that states marked by greater political fragmentation less often change existing policies. Hallerberg and Basinger (1998) find that OECD states with fewer de facto veto points lowered their tax rates in the 1980s by a greater amount.

[10]A majoritarian system, however, is also less democratic than a representative system, since it does not take into account the preferences of all citizens, but only the majority (Powell, 2000).

checks and balances, we expect presidential regimes to liberalize at a slower pace.

A second set of institutional variables relates to the government's type. These institutions are, of course, linked to the electoral system of which they are a by-product (Persson and Tabellini, 2003). However, given that the above two electoral indicators are a simplification, we also include measures on government institutions. As a start, we consider one-party versus coalition governments, which parallels the idea of unified versus divided government in democracies (Alesina and Rosenthal, 1995). Coalition governments, therefore, should liberalize less. Further, we want to observe whether the government's support in parliament and the opposition's fractionalization play a role. Both minority governments -not supported by the majority in parliament- and oversized governments -including more parties than necessary to form a majority- potentially influence how easy it is to change the status quo (Tsebelis, 2002). We include in our regressions the percentage of seats held by the government in parliament and the number of parties in opposition. We expect that the more seats the government controls and the more fractionalized the opposition, the easier it is to reform.

2.2.2 Regulatory institutions

Although the decision to liberalize markets is usually taken by governments, the exact number of mobile licenses are normally decided by the regulators, which gives them considerable power in the process.[11] Lawmakers intentionally delegate authority to regulators, enabling them to develop technical expertise and to allow them sufficient flexibility. Regulators are thus better informed than governments about industry conditions. This informational asymmetry, however, may give rise to agency problems (Weingast and Moran, 1983; McCubbins et al., 1987). Indeed, regulators are not elected by the general public -and thus face no electoral pressure- and, given their frequent contact with industry incumbents, may be more prone to collude with these firms (Laffont and Tirole, 1991). Given the introduction of digital technology in the 1990s,

[11] See http://europa.eu.int/information_society/topics/telecoms/radiospec/doc/pdf/mobiles/mckinsey_study/annex_final_report.pdf for a report on how radio spectrum is allocated in member states of the EU, and http://www.fcc.gov/connectglobe/sec7.html, for details on the US.

uncertainty at the time was high, making the informational asymmetries higher and thus rendering this potential agency problem more severe.

Thus, while delegation to regulators is necessary, its associated cost may be that they do not implement policies in accordance with governments' preferences. There are two characteristics of regulators which have been pointed out as particularly important: regulators' independence and their accountability (Smart, 1994). Therefore, first, in line with Smart (1994), we include an indicator of whether regulators are directly appointed by the executive body, with the expectation that this induces less independence and, as a result, less agency problems and thus a faster liberalization.[12] We also check if fixed-term (versus unlimited-term) regulators' actions are more in line with their government's preferences, since choosing the 'right' actions may enhance regulators' chances to be re-appointed. Second, when regulators are more accountable, this should counterbalance the ability of industry incumbents to influence regulatory practice (Neven et al., 1993). We include two measures of accountability. In particular, we check whether in countries where regulators' decisions cannot be overturned by other institutions, this lack of accountability slows down the liberalization process. We further include an indicator of regulators who are financed by the industry -as a measure of regulatory capture- which increases the potential for collusion with incumbents and thus slows down reforms.

2.2.3 Two main dimensions of institutional design

It is likely that several of the mentioned institutional variables can be grouped, since they may influence decision-making in a similar way. For example, majoritarian systems often go hand in hand with one-party governments. Although the grouping of variables implies an important loss of information, this exercise is still insightful. More importantly, if our variables can be grouped, then these summary indicators

[12] Levy and Spiller (1996) note that regulation can be more credible in countries with political systems that constrain executive discretion, but that this credibility is often achieved at the expense of flexibility. The same mechanisms that make it difficult to impose arbitrary changes in the rules also make it more difficult to efficiently adapt in the face of changing circumstances.

can be used in a parsimonious full model of how interest groups, government ideologies and institutions impact the liberalization process. This avoids inescapable multicollinearity problems among the various institutional dimensions.

We, therefore, introduce the two summary indicators developed by Lijphart (1999) and verify how our individual elements load into these. Lijphart (1999) argues that democracies' typologies can be reduced to a two-dimensional pattern: the 'executives-parties' dimension and the 'federal-unitary' dimension. While the former measures how easy it is to concentrate power in the government,[13] the latter captures how simple it is to change policy, once in control of the government.[14] Both dimensions, thus, should give an indication of how the status quo can be moved, and can be seen as an alternative to the single veto-power index of Henisz (2000).

2.3 Demographic and economic controls

We further control for specific demographic and economic characteristics which constitute a source of observable heterogeneity of liberalization among countries, such as the income per capita and the population level. A correlation between higher income per capita and good government -leading to a lower need for regulation- is likely to exist.[15] Furthermore, larger countries have a higher potential demand for mobile services and a more competitive market structure is thus sustainable, given that most of the costs of setting up a mobile network are fixed. Finally, we include a time trend, which should capture, for example, the positive effect of the technological change from analogue to digital, thereby increasing the available spectrum capacity and thus making a more competitive market structure sustainable (Gruber and Verboven, 2001b).

[13] Lijphart (1999) used factor analysis to identify which factors contribute to this dimension. He found five elements: (i) concentration of executive power in a single-party majority, (ii) the executive is dominant over the legislature, (iii) a two-party system (as opposed to a multiparty system), (iv) majoritarion electoral rules and (v) few large interest groups (as opposed to many atomistic interest groups).

[14] Lijphart (1999) again identified five elements: (i) unitary structure, (ii) unicameral legislature, (iii) flexible and easily amended constitutions, (iv) legislatures determine constitutionality of own legislation and (v), executive control of the central bank.

[15] A reason for this could be that richer countries may deal better with market failures. This argument is proposed, for instance, in Acemoglu and Verdier (2000).

3 The data

Our data set, merged from different databases, constitutes a unique source of information for analyzing the politics of regulation. It contains facts about the liberalization process, the market structure, and the regulatory environment in OECD countries and, additionally, it includes information on these countries' institutional and political environment.

The regulatory variables are taken from a database on international regulation published by the OECD. Table 1 briefly defines the main variables and their sources (presented at the end of this document), while Table 2 presents the summary statistics for these variables. The database consists of primary data provided mainly by means of ad hoc questionnaires (providing detailed information about regulatory provisions), as well as quantitative information (such as market shares and industry performance).

Our data on legislative and political institutions is based on three sources. On the one hand, we use two dummy variables developed by Persson and Tabellini (1999), which take the value of one for countries with majoritarian elections (**MAJOR**) and for countries with presidential regimes (**PRES**). The second database we use is the major source for the political side of our data and has been developed by the *Manifesto Research Group* of the *European Consortium for Political Research* (ECPR). In this data set, various aspects of the party and governmental systems are examined on the basis of quantitative content analyses of party manifestos and government declarations (Budge et al., 2001). This original data set has been extended to cover information about the elected governments during the sample period (Woldendorp et al., 1998). Third, as summary indicators for institutional design of a country, we use the two indices (**EXEC_PAR** and **FED_UNIT**) developed by Lijphart (1999). These indices are a metric measure of the institutional details and are expressive of how each country scores along these two institutional dimensions. Finally, from the OECD statistical compendium we collected information about the countries' demographic and economic conditions. Our final data set covers 24 OECD countries in the time period 1991-1997.

[Insert Table 2 here]

Some first patterns arise. Our dependent variable is the number of firms that are licensed to compete in the mobile telecom industry in a given country/year (**DIGITLIB**), and takes on the values of one (monopoly), two (duopoly) or three (three or more firms). It is thus a very precise measure of the degree of liberalization of the digital mobile telecom industries. Figure 1 shows the number of firms in the mobile telecom industry in each country, averaged over our sample period 1991-1997.

[Insert Figure 1 here]

What emerges from Figure 1 is the high level of heterogeneity in the liberalization processes among OECD countries; while there is a group of countries that have a highly competitive industry from the start of our sample (Australia, New Zealand, Sweden, UK, and US), other countries still face a monopoly in the last period (Iceland, Luxemburg, Turkey, Switzerland). Moreover, looking at Figure 2, which plots the time evolution of the cross-sectional average of the degree of liberalization, we observe variability in the time dimension, which suggests that the liberalization of the telecom industry was an on-going process during the sample period. The aim is to explain both sources of variability in the observed policy.

[Insert Figure 2 here]

With respect to our private interest variables, as a measure of power of industry incumbents we propose to use their market share. However, this might induce a problem of endogeneity due to a potential two-way causality. That being so, we choose a different variable to proxy for the private interests of the incumbent firms, namely the state's share of the incumbent in the long-distance telecom industry (**SH_INCMO_L**), which is on average 91.8%.[16] For our measure of potential entrants' interest, the average mobile industry revenues per-year (**REV_MOB**) are equivalent to 10 billion US

[16]The logic of our choice is the following: the market share of the incumbent strongly correlates with the state's share of the incumbent in mobile telecommunications. However, this variable can also suffer from endogeneity problems, since the privatization of mobile operators happened during the same time

dollars. Our consumer interest variable is the share of active population (**ACT_POP**) and is 66% on average.

The two variables related to the parties' programmatic position concerning specific policy questions – pro-regulation (**PRO_REG**) and favorable to welfare state limitation (**WELF_LIM**) – represent, in percent value, how often a sentence related to a particular policy area is mentioned in the party's program. Pro-regulation statements constitute 1.77% of a government's program, whereas welfare state limitation statements represent 0.44% of a government's program.

For our measures of political and governmental institutions, in our sample 25% of the countries have a majoritarian election system (**MAJ**), while 9% have a presidential regime (**PRES**). The governments represented in our data set were mostly (57.1%) coalition governments (**GOVCOAL**). The average government has 55% of the seats in the legislature (**PSEAT_G**), and is opposed by 4 parties (**OPP_PAR**).

Our measures for regulatory institutions show that in 66% of the cases the head of the regulatory authority has a definite term of office (**TERM_DEF**) and was in 75% of the cases appointed by the executive, i..e by the prime minister or government (**APP_EXEC**). The regulatory authority is in 58% of the cases financed, at least partially, through industry fees (**FIN_IND**) and in 77% their decisions cannot not be overturned by any other political institution (**OVER_NO**).

Finally, our two summary indicators of a country's institutional design can take values between -2 and 2, where a lower value means more concentration of power and easier decision-making. The average value across the countries is 0.20 in the executive-party (**EXEC_PAR**) and 0.11 in the federal-unitary (**FED_UNIT**) dimension. The distribution of countries along these two dimensions is graphically represented in Figure 3. For instance, the UK scores *low* both on executives-parties and federal-unitary dimensions, which means that it has both a *high concentration of power* and a system that

period as the liberalization of the industry. We therefore proxy this latter variable by the share of the incumbent detained by the state in long-distance telecommunications. Notice, however, that we would obtain practically identical results in terms of sign and significance by using either the market share of the incumbent in mobile telecom or the share of the incumbent in mobile telecom owned by the government.

makes *policy change easy*. In the other extreme, Switzerland scores *high* on both dimensions, which means a *low concentration of power* and a system with many *checks and balances*.

[Insert Figure 3 here]

4 The empirical methodology

The general form of the equation that we estimate is the following:

$$DIGITLIB_{it} = \alpha + \beta_t + \gamma_1 \mathbf{C}_{it} + \gamma_2 \mathbf{X}_{it} + \epsilon_{it}, \tag{1}$$

where α is a constant term, β_t is a time trend, $\mathbf{C}_{it}$ is a vector of demographic controls, and $\mathbf{X}_{it}$ is a vector of exogenous political variables. Our database allows us to use panel methods to account for country specific heterogeneity. This approach should lead to unbiased and efficient estimates of the effects of political variables on our policy outcome. The dependent variable (**DIGITLIB**) is the degree of liberalization in the digital mobile telecom industry.[17] This ordered variable can be seen as the observable counterpart of a continuous latent variable, which can be thought of as the intensity of entry liberalization, or as the utility derived by the policy-maker by implementing one of the mentioned market structures.

The appropriate method to estimate a model with an ordinal dependent variable is the ordered probit model. Furthermore, because of the panel nature of our sample, we estimate the ordered probit model with country random-effects.[18] Hence, we as-

[17]Remember that our dependent variable takes value one if the market is a monopoly, two if it is a duopoly, and three if the market is more competitive (3 or more firms). The information about the exact number of firms, when larger than three, is not available in the database. A right censoring problem, therefore, cannot be overcome.

[18]Given that most of our regressors are constant over time, the fixed-effects methodology cannot be used. Moreover, while the ordered probit model with fixed-effects can be in principle estimated with an unconditional maximum likelihood estimator, it is well known that this estimator is inconsistent when the length of the panel is fixed and it is substantially biased when the number of periods is small (as in our case), the bias increasing with decreasing number of periods (Greene, 2004). We therefore did not try to estimate this model. We do present in Section 6, however, several robustness checks.

sume that the error term is constituted by two components, a country specific normally distributed term u_i, and a white noise error term ϵ_{it}:

$$\begin{aligned} DIGITLIB^*_{it} &= \alpha + \beta_t + \gamma_1 \mathbf{C}_{it} + \gamma_2 \mathbf{X}_{it} + u_i + \epsilon_{it}, \\ DIGITLIB_{it} &= \begin{cases} 1 & \tau_0 \leq digitlib^*_{it} < \tau_1 \\ 2 \text{ if } & \tau_1 \leq digitlib^*_{it} < \tau_2 \\ 3 & \tau_2 \leq digitlib^*_{it} < \tau_3 \end{cases} . \end{aligned} \tag{2}$$

Where $DIGITLIB^*_{it}$ is the latent variable, $DIGITLIB_{it}$ is the observed categorical variable, and the $\tau's$ are the thresholds, which determine the length of each category and which will also be estimated.[19]

We adopt as a measure of fit the McFadden's pseudo R-squared, which is defined as follows:

$$R^2_{MF} = 1 - \frac{\ln \widehat{L}\left(M_\beta\right)}{\ln \widehat{L}\left(M_\alpha\right)},$$

where $\ln \widehat{L}\left(M_\beta\right)$ is the log-likelihood function for the model with regressors, while $\ln \widehat{L}\left(M_\alpha\right)$ is the log-likelihood function for the model with only the intercept.

5 Results

Following our presentation in the previous section, we regress different sets of dependent variables separately, in order to understand how much each of those sets contributes to an explanation of the cross-sectional and time variations in the liberalization policy. Since some institutional characteristics are surely interrelated, we choose to adopt parsimonious specifications to avoid multi-collinearity problems in the identification of the specific drivers of liberalization.[20]

[19] We use LIMDEP to estimate the ordered probit model with random-effects. The identification assumption in this case is that $\tau_1 = 0$ and the model is estimated with a constant. This method allows us to obtain unbiased and efficient parameter estimates.

[20] The parsimonious specification was also dictated by the fact that the correlation among some of the regressors caused convergence problems in the iteration procedure used by our maximum likelihood estimator, which makes estimates unreliable.

Table 3, which shows the impact of interest groups and the ideological position of governments, is our starting point. We first discuss the coefficients estimates for our control variables. The time trend (**TIME_IND**) has a significant and positive effect, which confirms that there was a general tendency towards liberalization during the 1990s. The population (**POP**) has only a positive and significant impact on mobile markets' liberalization in one of three specifications, while the income per capita (**YPC**) has no significant impact. Note further that in all three specifications, the standard deviation of the random-effects (**SIGMA**) is highly significant, which indicates that the panel data approach is appropriate, since unobserved heterogeneity among countries matters. [21]

[Insert Table 3 here]

We first regress our dependent variable on a set of variables which should capture the private interests theory's arguments. To mitigate the potential endogeneity problems we lag all explanatory variables one year, which we do throughout our regressions for all time-varying variables. Only the proxy for the incumbent's interests (**SH_INC_L**) appear to be significant at the 1% level: a strong incumbent achieved to hold up the liberalization process. The variables that proxy for consumers' and potential entrants interests - i.e., the percentage of active population (**ACT_POP**) and profitability of the market **(REV_MOB)**- are not significant. This is not unexpected: consumers, and to a lesser extent potential entrants, have more difficulties with organizing and successfully lobbying than incumbent firms.[22] We then test the role of the government's ideological position, using two different measures on programmatic position. The government's attitude towards regulation (**PRO_REG**) and favoring the

[21] This tendency is present in all specifications of our study; sigma is always significant, the time trend is always positive and significant, the population size is positive and sometimes significant and the income per capita is never significant. For expositional convenience, in what follows we do not discuss our control variables again.

[22] Still, it cannot be excluded that, since high revenues are also in the interest of incumbent firms, the coefficient's estimate is not significant because the opposite actions of incumbents and entrants counterbalance. Also our measure for consumers may not be precise enough to capture the power of particular consumer groups, such as urban or industrial consumers (see Li and Xu, 2002).

welfare state's limitation (**WELF_LIM**) both have the expected sign and are significant, at the 1% and 5% level respectively: governments which are pro-regulation liberalized less, and those in favor of smaller welfare states more.[23]

In the third specification, we group all measures on programmatic position and power of interest groups; bundling these together should tell us which factors dominate in forming preferences on liberalization. The explained variance is also highest in this third specification (the pseudo R-squared is 55%), giving validity to our decision to group variables that explain policy preferences. While coefficients estimates keep the same sign, they lose some significance. The government's stance towards the welfare state's limitation, and especially our proxy for the incumbents' power, stay significant; thus, both preferences of politicians and strong interest groups matter for policy change.

In Table 4, we show how political and governmental institutions influence liberalization. Again, in order to be as parsimonious as possible, we use three specifications; The first two specifications regress political and governmental variables separately, the third includes both groups. In the case of institutions, this especially makes sense, since political institutions likely influence governmental design. In the first specification, we use the two political variables taken from Persson and Tabellini (1999). The two institutional dummies have the expected sign: countries with majoritarian elections (**MAJ**) liberalized more, whereas countries with a presidential regime (**PRES**) liberalized less. Indeed, majoritarian regimes are normally associated with a concentration of decision-making power, while presidential regimes go hand in hand with an extensive system of checks and balances. However, while the effect of a majoritarian system is highly significant (at the 1% level), the presidential dummy is not significant, which may be due to the limited cross-sectional variation in this variable.

[Insert Table 4 here]

[23] A previous version of the paper also included a variable that indicated the ideology of a country's government in the right-left dimension. However, this variable did not capture any effect on reforms, once controlling for more precise programmatic variables.

The second set of institutional variables we use are related to the government type. We contrast coalition governments to one-party governments (**GOVCOAL**) and further include a measure for the government's support in the legislature (**PSEAT_GOV**) and fractionalization of the opposition (**OPP_PART**). Note first that the explained variance is lower for governmental than for political institutions (the pseudo R-squared are 37% and 42%, respectively), which hints at legislative institutions being more fundamental for the decision-making processes. Only the dummy for coalitional governments is significant (at the 1% level) and has the expected negative sign; coalitional governments should find it more difficult to change the status quo. The fact that both a government's number of seats in the legislation and number of opposition parties have no influence is in line with Tsebelis (2002), who argues that minority governments, or oversized governments, should make the same decisions as minimal winning coalitions, but with higher levels of error.

The third specification groups all political and government variables. First off, notice that the explained variance (42%) is essentially the same as in the first specification, indicating that government institutions do not explain more of the decision-making processes once we control for political institutions. This is further confirmed by the significance of the variables: while the indicator for majoritarian regimes stays strongly significant, the dummy for coalitional governments loses its importance. Indeed, the existence of coalitional governments is largely explained by the country not having a majoritarian regime [24]

In Table 5, we assess the importance of regulatory institutions on countries' liberalization pattern. First, regulators who are appointed by the executive bodies (**APP_EXEC**) have a positive and significant impact on the liberalization process. This points to the fact that, in line with our expectations, government appointed regulators are less independent, which makes agency problems less severe, and thus liberalization easier to accomplish. As a mirror to this result, industry-financed regulators (**FIN_IND**) in-

[24]Indeed, when we run a probit regression of the majoritarian dummy on the **GOVCOAL** dummy we estimate a negative and significant relationship.

duce less liberalization. Both results together indicate that agency problems exist in the mobile telecom industries, also when it concerns regulatory changes. Our measure for accountability, i.e. whether a decision by the regulator can be overturned (**OVER_NO**), is not significant however. Further, and perhaps surprisingly, regulators that are appointed for a fixed term (**TERM_DEF**) have a significantly negative impact on the liberalization process. While we a priori associated fixed-term appointments as a restriction on regulators' power, this dimension actually seems to add to the checks and balances that exist in a political system, which is also confirmed below when looking at how our separate variables load on the summary indicators.

Given that all our institutional variables, be it political, governmental or regulatory, facilitate or hinder decision-making, it seems natural that these can be grouped together. We chose Lijphart's (1999) two institutional dimensions, as they are well-suited to our purposes of explaining how institutions impact decision-making. When looking at how our institutional variables correlate with these two summary indicators, we do indeed find a clear pattern. First, as can be seen from Figure 4, the executive-parties dimension -remember that a lower value means a higher concentration of political power- is negatively correlated with countries that have a majoritarian system; and positively correlated with coalitional governments, the number of parties in the opposition, and the percentage of seats the government has in the legislation, although the latter not significantly. These political and government institutions are thus related and can be grouped into a measure of concentration of political power.

Second, the federal-unitary dimension -remember that a higher value means that one can less easily change policy, once controlling the government- is positively correlated with presidential regimes, fixed terms for regulators, and their decisions not being challengeable by other instances, and negatively with regulators being appointed by the executive. It further correlates positively with the regulators being financed by the industry, although not significantly. Therefore, these variables can be grouped together into a measure of how many checks and balances exist. Note that, related to our results in the specification on regulatory institutions, we find that fixed-terms for reg-

ulators load positively on this indicator, thus confirming that regulators' fixed terms make it more difficult to push decisions through.

[Insert Figure 4 here]

We are now ready to bring together our various variables to make inferences on which dimensions matter most for liberalization. As a first step, we group all institutional variables that are significant in the previous regressions. We only include these to be as parsimonious as possible and hence minimize the identified problems of multi-collinearity and convergence of our maximum likelihood estimation procedure. As can be seen from the first specification in Table 6, countries with majoritarian systems and where regulators are appointed by the executive are still found to have a strongly positive and significant impact on the liberalization process. The negative impact of fixed-term regulators on liberalization stays, but loses significance, while the financing through industry-effect vanishes.

As a second step, in light of our findings that most of our institutional variables significantly load into Lijphart's (1999) two summary indicators, we regress only these two indicators -with our control variables- to check whether these can be used as the most parsimonious representation of institutions. This is not the main goal of the paper. But in order to present a complete specification with institutions, private interests groups and ideology, we need to restrict the number of variables, due to the correlation among several of our variables.[25] Specification two in Table 6 shows that, indeed, a higher concentration of political power leads to more liberalization. i.e. a lower value for **EXEC_PAR** leads to more liberalization. This effect is highly significant at the 1% level. Further, more checks and balance (a higher **FED_UNIT)**, lead to significantly less liberalization. The explained variance of this specification is only slightly lower than the previous one (46% versus 47%, respectively). Therefore, we use these summary indicators for the 'mixed' specification (specification three in Table 6).

[25]We also tried specifications with all variables; unfortunately, due to the above specified problems, these specifications experienced convergence problems and hence did not provide reliable estimates.

[Insert Table 6 here]

The most significant variable is the summary indicator for the concentration of political power (**EXEC_PAR)**, while the variables for industry incumbents' interests (**SH_INC_L**) and governments' preference for welfare-state limitations (**WELF_LIM**) lose significance, although they stay below the 5% level. Our other institutional summary indicator, **FED_UNIT,** however, becomes insignificant. The overall explained variance is just above 60%, which is the highest of all our specifications, thus indicating that all dimensions -interest groups, ideologies and institutions- matter.

6 Robustness checks

We performed two different types of robustness checks. First, although an ordered probit approach is the preferred estimation method, given the discrete ordered nature of our dependent variable, we re-estimated our specifications using linear panel regression techniques. We used the two estimators that we thought to be most appropriate in our setting: generalized least squared (GLS), accounting for heteroscedasticity in the residuals, and GLS, accounting for panel specific AR(1) error terms. Our main results remain robust, as can be seen from the Tables 1-4 in Appendix 1. First, strong incumbents slow down the liberalization process, whereas governments against the welfare state accelerate it. Second, majoritarian systems remain the most robust driver for liberalization. Third, independence and accountability of regulatory institutions still have the expected effect on the liberalization process. However, while in some specifications the significance of the proxy for the independence of the regulators loses significance, the proxy for their accountability becomes more significant than in our reported regressions. Finally, the mixed-specifications provide the same results as the regressions estimated by the ordered probit model, and are often even more significant.

For a second set of robustness checks we used the OECD regulation index for the telecom industry as an alternative dependent variable.[26] Although positively and sig-

[26]The OECD indicators of product market regulation can be downloaded from:

nificantly correlated to our measure of liberalization (66%), this index differs from our dependent variable along two dimensions. First, it looks at the broader telecom industries, rather than at the mobile telecom industry, which experienced a particularly important change due to a switch to digital technology at the beginning of the 1990s. Second, the index summarizes dimensions of liberalization, privatization and regulation, which makes the formulation of expectations more difficult, given that, for example, more liberalization may at first be accompanied by a higher regulation (Bergman et al., 1998). Nevertheless, we estimated the previously mentioned linear models (GLS correcting for heteroscedasticity and GLS correcting for panel specific AR(1) error terms) for the same specifications. Results are again close to our main specifications and in the first set of robustness checks, as can be seen from Tables 1-4 in Appendix 2. In particular, the power of industry incumbents and governments' preference for a welfare state have the same effects on liberalization, although the latter is not significant in all specifications. The effect of majoritarian systems is still a robust predictor for deregulation, while the appointment of regulators by the executive has a positive and significant impact in most specifications, but not in all.

7 Concluding remarks

The switch from analogue to digital technology in mobile telecom at the beginning of the 1990s increased spectrum capacity by so much that it undermined the traditional economic arguments for government intervention and natural monopolies. However, despite an economic rationale in favor of liberalization, regulatory policy -and the case of mobile telecom industries has been no exception- can exhibit a great degree of inertia. Indeed, political decision structures and private interests often impede swift policy changes. The forces that preserve the policy status quo, however, are quite different across countries: some experienced a rapid liberalization after the technological changes, while in others, it took several years.

http://www.oecd.org/document/36/0,3343,en_2649_34323_35790244_1_1_1_1,00.html.

In this paper we empirically analyze the political economy of entry deregulation in the mobile telecom industries of 24 OECD countries during the 1990s, with the aim of shedding light on the decision-making processes of market-oriented reform. The use of a unique data set obtained by merging different data sources on political, government and regulatory institutions -as well as private interests and government ideologies- allows us to explore time-series and cross-sectional variation in the political process of liberalization. Our findings are consistent with the rationale that the structure of institutions has a strong effect on policy outcomes, and that the relative strength of economic and political actors matters for this policy-making process.

In particular, because of their higher concentration of political power and hence their potential for faster decision-making, majoritarian political systems induce a faster liberalization. Further, while single-party governments (as opposed to multi-party coalitions) also seemingly speed up reforms, it appears that majoritarian systems are inductive to single parties being in power and, hence, a better predictor for change. Furthermore, more independent industry regulators slow down liberalization, consistent with agency theories and additional layers of power slowing down the decision-making process. Indeed, although some delegation is necessary, given regulators' superior knowledge about an industry's characteristics, the cost of this delegation is the chance that regulators may not implement policies precisely in accordance with the government's preferences. For example, regulators may abuse their informational advantages to collude with industry incumbents. This agency problem is to some extent confirmed by the observation that regulators who are financed by industry incumbents have a (weak) tendency to slow down liberalization. Finally, our study confirms previous works on entry liberalization in showing that the relative power of interest groups and the ideology of governments have a significant influence; we find powerful industry incumbents to slow down market reforms for competition, and governments that prefer limited welfare states to speed up this process.

Methodologically, we explicitly choose an explorative approach, with the aim to disentangle different aspects of the policy-making process in the cleanest way. We

therefore build several blocks of different variables. On the one hand, we relate the choice of a particular policy agenda -liberalization- to the strength of interest groups and the governments' ideological position. On the other hand, we connect the ability to change this policy -to push through the liberalization process- to a country's institutional framework. Our study should be seen as a first step in a micro-founded analysis of liberalization and regulatory reform. Our main contribution is to point out that one needs to look at fine-gridded dimensions of policy-making to understand this process. In particular, we stress that institutions are various in nature and that one needs to look at disaggregate institutional measures for a clear understanding of how each of these dimensions affects policy.

There are some steps to further pursue. First, the interaction between the institutional design and preferences of actors might be explored to better understand how institutions affect the ability of actors to direct policy outcomes according to their interests. Second, and related to the previous point, more micro-founded models of regulatory policy seem needed, where the different layers of institutions and their interactions are explicitly modeled. During the past decade, this avenue of research has been prominently followed in some fields of economics, such as public finance and trade, but has been less developed in others, like regulatory reform and competition enhancing policies. From a normative point of view, this understanding might help to design more efficient institutions. From an empirical point of view, cleaner theoretical models of regulation and institutions would be needed to abandon our descriptive approach. Clear causal relationships could then be derived and structural parameters identified.

References

Acemoglu, Daron and James A. Robinson, "Persistence of Power, Elites and Institutions," *American Economic Review*, 2008, *98*, 267–293.

— **and Thierry Verdier**, "The Choice Between Market Failures and Corruption," *American Economic Review*, 2000, *90*, 194–211.

Alesina, Alberto and Allan Drazen, "Why Are Stabilizations Delayed?," *American Economic Review*, 1991, *81*, 1170–88.

_ **and Howard Rosenthal**, *Partisan Politics, Divided Government and the Economy*, Cambridge: Cambridge University Press, 1995.

_ **, Silvia Ardagna, Giuseppe Nicoletti, and Fabio Schiantarelli**, "Regulation and Investment," *Journal of the European Economic Association*, 2005, *3*, 791–825.

Bagley, Nicholas and Richard L. Revesz, "Centralized Oversight of the Regulatory State," *Columbia Law Review*, 2006, *106*, 1260–1329.

Becker, Gary S., "A Theory of Competition Among Pressure Groups," *The Quarterly Journal of Economics*, 1983, *98*, 371–400.

Bergman, Lars, Chris Doyle, Jordi Gual, Lars Hultkrantz, Damien Neven, Lars-Hendrik Roeller, and Leonard Waverman, *Europe's Network Industries: Conflicting Priorities. Monitoring European Deregulation. 1-Telecommunications*, London: CEPR, 1998.

Bernheim, Douglas B. and Michael D. Whinston, "Menu Auctions, Resource Allocation, and Economic Influence," *The Quarterly Journal of Economics*, 1986, *101*, 1–31.

Besley, Timothy and Anne Case, "Political Institutions and Policy Choices: Evidence from the United States," *Journal of Economic Literature*, 2003, *41*, 7–23.

Budge, Ian, Hans-Dieter Klingelman, Andrea Volkens, Judith Bara, and Eric Tanderbaum, *Mapping Policy Preferences. Estimates for Parties, Electors and Governments 1945-1998*, Oxford: Oxford University Press, 2001.

Cox, Gary W. and Mathew D. McCubbins, "Electoral Politics as a Redistributive Game," *Journal of Politics*, 1986, *48*, 370–389.

De-Soto, Hernando, *The Other Path*, New York: Harper and Row, 1990.

Duso, Tomaso, "Lobbying and Regulation in a Political Economy: Evidence from the U.S. Cellular Industry," *Public Choice*, 2005, *122*, 251–276.

Faure-Grimaud, Antonie and David Martimort, "Regulatory Inertia," *Rand Journal of Economics*, 2003, *34*, 414–442.

Greene, William, "The Behaviour of the Maximum Likelihood Estimator of Limited Dependent Variable Models in the Presence of Fixed Effects," *Econometrics Journal*, 2004, *7*, 98–119.

Gruber, Harald and Frank Verboven, "The Diffusion of Mobile Telecommunications Services in the European Union," *European Economic Review*, 2001a, *45*, 577–588.

_ **and** _ , "The Evolution of Markets under Entry and Standards Regulation - The Case of Mobile Telecommunications," *International Journal of Industrial Organization*, 2001b, *19*, 1189–1212.

Hallerber, Mark and Scott Basinger, "Internationalization and Changes in Tax Policy in OECD Countries: The Importance of Domestic Veto Players," *Comparative Political Studies*, 1998, *31*, 321–353.

Henisz, Witold J., "The Institutional Environment for Economic Growth," *Economics and Politics*, 2000, *12*, 1–31.

_ **and Bennet A. Zelner**, "Interest Groups, Veto Points and Electricity Infrastructure Deployment," *International Organization*, 2006, *60*, 263–286.

_ **,** _ **, and Mauro F. Guilln**, "The Worldwide Diffusion of Market-Oriented Infrastructure Reform, 1977-1999," *American Sociological Review*, 2005, *70*, 871–897.

Kalt, Joseph P. and Mark A. Zupan, "Capture and Ideology in the Economic Theory of Politics," *American Economic Review*, 1984, *74*, 302–22.

Kroszner, Randal S. and Phil Strahan, "What Drives Deregulation? Economics and Politics of the Relaxation of Bank Branching Restrictions," *Quarterly Journal of Economics*, 1999, *114*, 1437–1467.

Laffont, Jean-Jacques, *Incentives and Political Economy: 1997 Clarendon Lectures*, Oxford: Oxford University Press, 1999.

_ **and Jean Tirole**, "The Politics of Government Decision-Making: a Theory of Regulatory Capture," *Quarterly Journal of Economics*, 1991, *106*, 1089–1127.

Levy, Brian and Pablo Spiller, *Regulations, Institutions and Commitment*, Cambridge: Cambridge University Press, 1996.

Li, Wei and Lixin Colin Xu, "The Political Economy of Privatisation and Competition: Cross-Country Evidence from the Telecommunications Sector," *Journal of Comparative Economics*, 2002, *30*, 439–462.

_ **and** _ , "The impact of Privatization and Competition in the Telecommunications Sector Around the World," *Journal of Law and Economics*, 2004, *47*, 395–428.

Lijphart, Arend, *Patterns of Democracy*, New Haven and London: Yale University Press, 1999.

McCubbins, Mathew D., Roger G. Noll, and Barry R. Weingast, "Administrative Procedures as Instruments of Political Control," *Journal of Law, Economics, and Organization*, 1987, *3*, 243–277.

Milesi-Ferretti, Gian-Maria, Roberto Perotti, and Massimo Rostagno, "Electoral Systems and Public Spending," *Quarterly Journal of Economics*, 2002, *67*, 609–658.

Neven, Damien, Robin Nuttal, and Paul Seabright, *Mergers in Daylight. The Economics and Politics of Merger control in the EC*, London: CEPR, 1993.

Nicoletti, Giuseppe and Stefano Scarpetta, "Regulation, Productivity, and Growth: OECD Evidence," *Economic Policy*, 2003, *18*, 11–72.

Olson, Mancur, *The Logic of Collective Action*, Cambridge, MA: Harvard University Press, 1965.

Peltzman, Sam, "Toward a More General Theory of Regulation," *Journal of Law and Economics*, 1976, *19*, 211–240.

Persson, Torsten and Guido Tabellini, "The Size and Scope of Government: Comparative Politics with Rational Politicians. 1998 Marshall Lecture," *European Economic Review*, 1999, *43*, 699–735.

_ **and** _ , *The Economic Effects of Constitutions*, Cambridge MA: MIT Press, 2003.

_ **, Gerard Roland, and Guido Tabellini**, "Separation of Powers and Political Accountability," *Quarterly Journal of Economics*, 1997, *112*, 1163–1202.

Poole, Keith T. and Howard Rosenthal, *Congress: A Political-Economic History of Roll Call Voting*, Oxford: Oxford University Press, 1997.

Powell, G. Bingham, *Elections as Instruments of Democracy: Majoritarian and Proportional Visions*, Yale: Yale University Press, 2000.

Röller, Lars-Hendrik and Leonard Waverman, "Telecommunications Infrastructure and Economic Development: A Simultaneous Approach," *American Economic Review*, 2001, *91*, 909–923.

Romer, Thomas and Howard Rosenthal, "Modern Political Economy and the Study of Regulation," in Elisabeth Bailey, ed., *Public Regulation*, Cambridge, MA: MIT Press, 1987, pp. 73–116.

Shleifer, Andrei and Robert W. Vishny, *The Grabbing Hand*, Cambridge, Massachusetts: Harvard University Press, 1998.

Smart, Susan R., "The Consequences of Appointment Methods and Party Control for Telecommunications Pricing," *Journal of Economics and Management Strategy*, 1994, *3*, 301–323.

Stigler, George, "The Theory of Economic Regulation," *The Bell Journal of Economics*, 1971, pp. 3–21.

Tsebelis, George, "Decision Making in Political Systems: Veto Players in Presidentialism, Parliamentarism, Muliticameralism and Multipartyism," *British Journal of Political Science*, 1995, *25*, 289–325.

_ , *Veto Players: How Political Institutions Work*, New York Princeton, N.J.: Russell Sage Foundation and Princeton University Press, 2002.

Weingast, B.R. and M.J. Moran, "Bureaucratic Discretion or Congressional Control? Regulatory Policymaking by the Federal Trade Commission," *The Journal of Political Economy*, 1983, *91*, 765–800.

Woldendorp, Jaap, Hans Keman, and Ian Budge, "Party government in 20 democracies: an update (1990-1995)," *European Journal of Political Research*, 1998, *33*, 125–164.

8 Tables and Figures

Table 1. Description of Variables

Variable	Description	Source
Countries	Aus, Aut, Bel, Can, Den, Fin, Fra, Ger, Gre, Ice, Ire, Ita, Jap, Lux, Net, NZ, Nor, Por, Spa, Swe, Swi, Tur, UK, USA	
DIGITLIB	Degree of liberalization in the digital mobile industry (1=monopoly, 2=duopoly, 3=Three or more firms)	OECD Regulation Database
SH_INC_L	Share of incumbent operator in long-distance telecom detained by the state (1997)	
REV_MOB	Annual revenues in the mobile telecommunications industry (1995 constant US$)	
TERM_DEF	Dummy = 1 if regulator's term of office is definite	
APP_EXEC	Dummy = 1 if regulator is appointed by the executive (prime minister/government)	
FIN_IND	Dummy = 1 if the regulation authority is financed (at least partially) by industry fees	
OVER_NO	Dummy = 1 if the regulatory authority's decisions cannot be overturned by other institutions	
MAJOR	Dummy =1 if the country has a majoritarian election system	Persson and Tabellini (1999)
PRES	Dummy =1 if the country has a presidential regime	
GOVCOAL	Dummy =1 if coalition government	Woldendorp et al. (1998)
OPP_PAR	Number of parties in the opposition	
PSEAT_GOV	Percentage seats in the legislature held by government parties	
PRO_REG	Government's programmatic position: Pro market regulations (weighted average of government's parties position)	Budge et al. (2001)
WELF_LIM	Government's programmatic position: Pro welfare state limitation (weighted average of government's parties position)	
EXEC_PAR	Index: consensus in the executive-party dimension	Lijphart (1999)
FED_UNIT	Index: consensus in the federal-unitary dimension	
POP	Total Population in 100.000	OECD statistical compendium
ACT_POP	Share of active Population aged between 15 and 64 years in 100.000	
YPC	Annual Income Per Capita in 1995 constant thousand US$	

Table 2. Preliminary Statistics

Variable	Mean	Std.Dev.	Min.	Max.	Cases
DIGITLIBER	2.0476	0.8175	1.0000	3.0000	168
YPC	19591.35	10805.07	133.7719	43804.46	168
POP	483.7358	712.0181	3.8980	2667.9200	168
ACT_POP	66.4806	1.9223	61.0016	69.7819	168
SH_INC_L	91.7960	24.0100	0.0000	100.0000	168
LREV_M	22.5574	2.7100	16.1226	32.0873	168
PRO_REG	1.7701	1.5668	0.0000	6.2500	168
WELF_LIM	0.4470	0.8881	0.0000	4.2000	168
MAJOR	0.2500	0.4343	0.0000	1.0000	168
PRES	0.0833	0.2772	0.0000	1.0000	168
GOVCOAL	0.5714	0.4964	0.0000	1.0000	168
PSEAT_GOV	56.0849	10.8338	19.1919	81.8024	168
OPP_PAR	4.1607	2.0248	1.0000	10.0000	168
APP_EXEC	0.7500	0.4346	0.0000	1.0000	140
OVER_NO	0.7727	0.4204	0.0000	1.0000	140
TERM_DEF	0.8000	0.4014	0.0000	1.0000	140
FIN_IND	05833	0.4501	0.0000	1.0000	140
EXEC_PAR	0.2062	1.0123	-1.4700	1.8700	168
FED_UNIT	0.1075	1.1564	-1.7700	2.5300	168

Table 3. Private Interest and Ideological Position

	Specification 1			Specification 2			Specification 3		
	Coeff.	St.Err.		Coeff.	St.Err.		Coeff.	St.Err.	
CONSTANT	22.6723	5.6853	***	-1.7350	1.0485	*	30.4833	16.5164	*
YPC	0.0042	0.0414		0.0014	0.0131		0.0003	0.0853	
100*(POP)	-0.2990	0.1149	***	0.2340	0.8410		0.0000	0.6947	
TIME_IND	1.0182	0.2929	***	1.1229	0.3704	***	1.6125	0.7106	***
SH_INC_L	-0.2538	0.0561	***				-0.3650	0.1655	***
LREV_M	-0.0008	0.0715					0.0010	0.5835	
ACT_POP	-0.0005	0.0046					0.0005	0.0165	
PRO_REG				-0.5237	0.1658	***	-0.5128	0.4394	
WELF_LIM				1.2390	0.5131	**	1.5930	0.8350	**
Mu(01)	4.7187	1.1260	***	5.3282	1.4410	***	7.5096	3.7495	**
Sigma	4.1860	0.8802	***	6.7647	1.7510	***	5.0293	2.4693	**
N. obs.	168			168			168		
Log likelihood	-65.2567			-66.68076			-53.8112		
Pseudo R^2	0.4478			0.4596			0.5544		
Chi-squared	176.9574			94.12408			101.6231		

The dependent variable is DIGITLIB. ***, **,* represents 1%, 5%, and 10% significance level.

Table 4. Political and Government Institutions

	Specification 1			Specification 2			Specification 3		
	Coeff.	St.Err.		Coeff.	St.Err.		Coeff.	St.Err.	
CONSTANT	-3.2341	0.9394	***	0.1210	2.3122		-3.0266	1.7735	*
YPC	-0.0006	0.0341		-0.0038	0.0272		-0.0023	0.03112	
POP	0.0008	0.0007		0.0038	0.0020	*	0.0022	0.0010	**
TIME_IND	1.0339	0.2237	***	1.0187	0.2353	***	1.0175	0.2262	***
MAJOR	8.5218	1.8994	***				8.3614	1.9912	***
PRES	-3.6621	4.7755					-5.3447	3.7533	
GOVCOAL				-2.1034	0.7581	***	-0.0488	1.1310	
PSEAT_GOV				-0.0172	0.0323		-0.0024	0.0353	
OPP_PAR				-0.1158	0.1489		-0.0597	0.1219	
Mu(01)	4.9791	0.9188	***	4.7149	0.9689	***	4.9104	0.8983	***
Sigma	4.2509	0.8551	***	4.2530	0.8340	***	4.3872	0.9244	***
N. obs.	168			168			168		
Log likelihood	-69.8868			-76.0363			-68.8377		
Pseudo R^2	0.4213			0.3703			0.4200		
Chi-squared	146.6302			151.4520			132.2089		

The dependent variable is DIGITLIB. ***, **,* represents 1%, 5%, and 10% significance level.

Table 5. Regulatory Institutions

	Coeff	St.Err.	
CONSTANT	-0.2467	2.4632	
YPC	-0.0028	0.0746	
POP	0.0027	0.0016	*
TIME_IND	1.0589	0.2573	***
APP_EXEC	5.0545	1.5650	***
OVER_NO	0.7127	1.0293	
TERM_DEF	-2.9878	1.2536	**
FIN_IND	-2.5661	1.3958	*
Mu(01)	4.9870	0.9608	***
Sigma	4.8225	1.2155	***
Obs.	140		
Log likelihood	-61.0219		
Pseudo R^2	0.4947		
Chi-squared	106.2181		

The dependent variable is DIGITLIB. ***, **,* represents 1%, 5%, and 10% significance level.

Table 6. Mixed Specifications

	Specification 1			Specification 2			Specification 3		
	Coeff.	St.Err.		Coeff.	St.Err.		Coeff.	St.Err.	
CONSTANT	-5.6996	4.1900		0.6323	0.8325		28.4381	14.8917	*
YPC	-0.0023	0.1184		-0.0030	0.0387		-0.0008	0.0329	
POP	0.0024	0.0022		0.0030	0.0014	**	0.0010	0.0063	
TIME_IND	1.0612	0.2282	***	1.0028	0.2486	***	1.2607	0.4886	***
MAJOR	5.7927	2.0853	***						
APP_EXEC	10.1805	3.4224	***						
TERM_DEF	-2.51928	1.4705	*						
FIN_IND	-2.3520	1.7755							
EXEC_PAR				-2.5651	0.7875	***	-2.1213	0.9746	***
FED_UNIT				-2.6063	0.6566	***	-0.5143	1.2657	
SH_INC_1							-0.3285	0.1533	**
WELF_LIM							1.3187	0.6360	**
Mu(01)	4.9857	0.9775	***	4.7280	1.0396	***	6.2691	2.3945	***
Sigma	4.4019	1.2694	***	3.5709	0.8197	***	2.7330	1.1519	**
N. obs.	140			140			140		
Log likelihood	-63.0345			-64.7928			-45.18663		
Pseudo R^2	0.4780			0.4635			0.6176		
Chi-squared	84.7302			101.5433			42.64707		

The dependent variable is DIGITLIB. ***, **,* represents 1%, 5%, and 10% significance level.

Figure 1. Digital Liberalization: Cross-country Differences

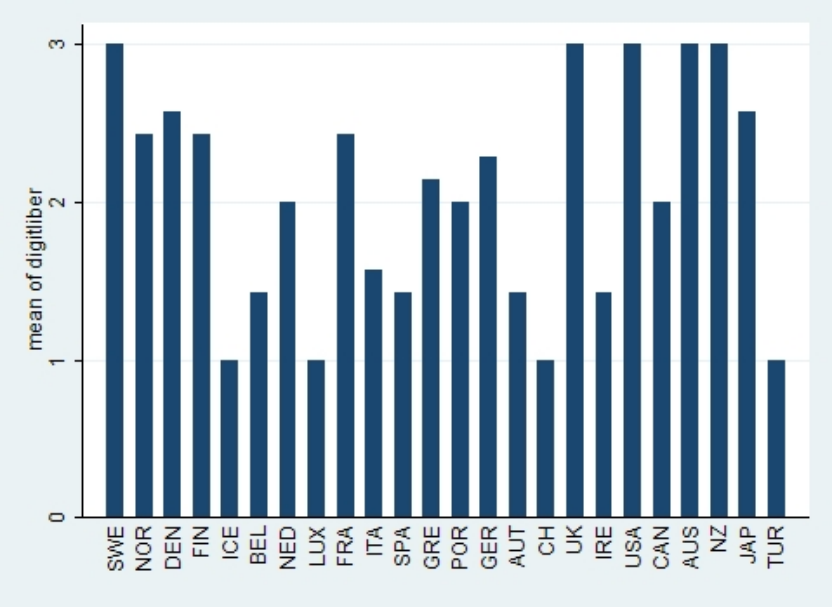


Figure 2. Digital Liberalization: Time-Series Variation

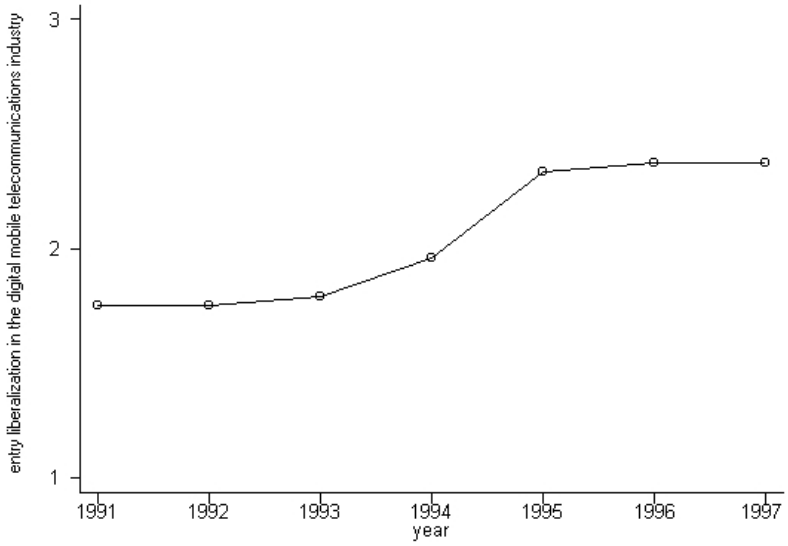
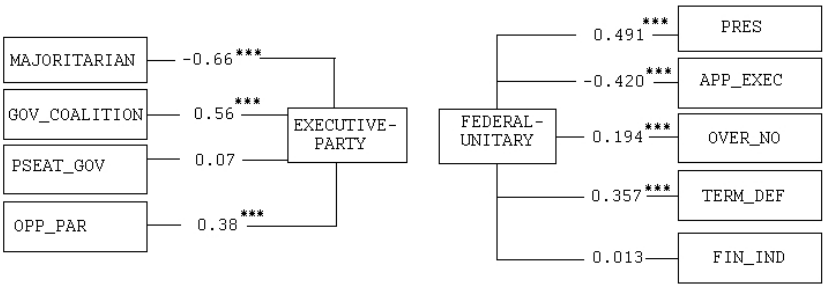


Figure 3. Lijphart's Two Dimensional Map of Institutions

Figure 4. The Institutional Indexes and their Components



Pairwise correlation coefficients are reported. *** represents 1% significance level.

A Appendix 1

In all regressions, the dependent variable is DIGITLIB. Columns labeled GLS_het report GLS estimates controlling for across-panel heteroschedasticity, while those labeled GLS_ar1 report GLS estimates controlling for panel-specific AR(1) error terms. Standard errors in parentheses. The symbols *, **, *** represent significance at the 1%, 5%, and 10% level respectively.

Table 1: Private Interest - Entry Liberalization

	GLS_het	GLS_ar1	GLS_het	GLS_ar1	GLS_het	GLS_ar1
CONSTANT	3.140***	2.290***	1.200***	1.085***	3.315***	2.082***
	(0.370)	(0.481)	(0.129)	(0.148)	(0.425)	(0.473)
YPC	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
POP	-0.001	0.006*	0.000***	0.000***	-0.001	0.007**
	(0.002)	(0.003)	(0.000)	(0.000)	(0.003)	(0.003)
TIME_IND	0.156***	0.132***	0.121***	0.115***	0.160***	0.114***
	(0.022)	(0.023)	(0.021)	(0.019)	(0.024)	(0.022)
SH_INC_L	-0.006***	-0.004*			-0.006***	-0.005**
	(0.002)	(0.003)			(0.002)	(0.002)
LREV_MOB	-0.074***	-0.047**			-0.086***	-0.037*
	(0.015)	(0.019)			(0.017)	(0.020)
ACTPOP	0.002	-0.008			0.002	-0.010**
	(0.004)	(0.005)			(0.004)	(0.005)
PRO_REG			-0.080***	-0.024	-0.056**	-0.033
			(0.030)	(0.023)	(0.028)	(0.023)
WELF_LIM			0.134***	0.118***	0.101**	0.125***
			(0.046)	(0.039)	(0.040)	(0.041)
N	168	168	168	168	168	168

Table 2: Political and Government Institutions - entry liberalization

	GLS_het	GLS_ar1	GLS_het	GLS_ar1	GLS_het	GLS_ar1
CONSTANT	0.804***	0.858***	2.241***	1.458***	1.847***	1.321***
	(0.101)	(0.125)	(0.256)	(0.235)	(0.240)	(0.234)
YPC	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
POP	0.000***	0.000	0.000***	0.000***	0.000***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TIME_IND	0.089***	0.108***	0.120***	0.125***	0.092***	0.107***
	(0.018)	(0.019)	(0.019)	(0.019)	(0.018)	(0.019)
MAJOR	0.985***	0.909***			1.014***	0.888***
	(0.100)	(0.182)			(0.121)	(0.169)
PRES	-0.997***	-0.422			-0.769***	-0.538
	(0.139)	(0.377)			(0.127)	(0.387)
GOVCOAL			-0.366***	-0.360***	-0.123	-0.165*
			(0.080)	(0.090)	(0.090)	(0.094)
PSEAT_GOV			-0.014***	-0.003	-0.016***	-0.004
			(0.003)	(0.002)	(0.003)	(0.002)
OPP_PAR			-0.053***	-0.039**	-0.020	-0.024
			(0.020)	(0.020)	(0.020)	(0.020)
N	168	168	168	168	168	168

Table 3: Regulatory Institutions - Entry Liberalization

	(1) GLS_het	(2) GLS_ar1
CONSTANT	1.347***	1.281***
	(0.233)	(0.358)
YPC	0.000***	0.000***
	(0.000)	(0.000)
POP	0.000***	0.000***
	(0.000)	(0.000)
TIME_IND	0.103***	0.114***
	(0.019)	(0.021)
APP_EXEC	0.379**	0.334
	(0.153)	(0.257)
OVER_NO	0.314***	0.382**
	(0.103)	(0.181)
TERM_DEF	-0.074	0.177
	(0.091)	(0.160)
FIN_IND	-0.403***	-0.470**
	(0.142)	(0.222)
N	140	140

Table 4: Mixed Specification - Entry Liberalization

	GLS_het	GLS_ar1	GLS_het	GLS_ar1	GLS_het	GLS_ar1	GLS_het	GLS_ar1
CONSTANT	0.888***	0.778***	0.898***	0.927***	2.468***	1.672***	1.630***	1.795***
	(0.115)	(0.212)	(0.098)	(0.128)	(0.254)	(0.416)	(0.199)	(0.280)
YPC	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
POP	0.000***	0.000	0.000***	0.000***	0.000***	0.000**	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TIME_IND	0.079***	0.107***	0.083***	0.104***	0.084***	0.109***	0.108***	0.114***
	(0.017)	(0.019)	(0.017)	(0.019)	(0.017)	(0.019)	(0.017)	(0.018)
MAJOR	0.961***	1.011***			0.656***	0.877***		
	(0.098)	(0.173)			(0.124)	(0.210)		
APP_EXEC	0.409***	0.249			0.903***	0.457**		
	(0.098)	(0.185)			(0.132)	(0.232)		
TERM_DEF	-0.379***	-0.402***			-0.171**	-0.309**		
	(0.082)	(0.134)			(0.081)	(0.142)		
FIN_IND	0.096	0.178			-0.460***	-0.092		
	(0.106)	(0.173)			(0.139)	(0.235)		
EXEC_PAR			-0.270***	-0.291***			-0.279***	-0.234***
			(0.044)	(0.075)			(0.046)	(0.069)
FED_UNIT			-0.199***	-0.133**			-0.263***	-0.128*
			(0.033)	(0.061)			(0.039)	(0.065)
SH_INC_L					-0.019***	-0.010**	-0.010***	-0.010***
					(0.003)	(0.004)	(0.002)	(0.003)
WELF_LIM					0.049	0.065	0.122***	0.101**
					(0.049)	(0.039)	(0.035)	(0.041)
N	140	140	168	168	140	140	168	168

B Appendix 2

In all regressions, the dependent variable is the OECD index of telecom deregulation. Columns labeled GLS_het report GLS estimates controlling for across-panel heteroschedasticity, while those labeled GLS_ar1 report GLS estimates controlling for panel-specific AR(1) error terms. Standard errors in parentheses. The symbols *, **, *** represent significance at the 1%, 5%, and 10% level respectively.

Table 5: Private Interests - Deregulation Index

	GLS_het	GLS_ar1	GLS_het	GLS_ar1	GLS_het	GLS_ar1
CONSTANT	5.809***	3.466***	-0.050	-0.293	5.829***	2.381***
	(0.717)	(0.773)	(0.185)	(0.206)	(0.709)	(0.834)
YPC	-0.000***	0.000	0.000	0.000	-0.000***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
POP	-0.030***	-0.001	0.002***	0.002***	-0.027***	0.002
	(0.004)	(0.008)	(0.000)	(0.000)	(0.004)	(0.011)
TIME_IND	0.331***	0.311***	0.199***	0.196***	0.303***	0.265***
	(0.039)	(0.028)	(0.027)	(0.030)	(0.040)	(0.035)
SH_INC_L	-0.022***	-0.015***			-0.020***	-0.021***
	(0.004)	(0.004)			(0.004)	(0.003)
LREV_MOB	-0.169***	-0.099***			-0.171***	-0.019
	(0.024)	(0.030)			(0.025)	(0.038)
ACTPOP	0.048***	0.004			0.044***	-0.001
	(0.006)	(0.012)			(0.006)	(0.017)
PRO_REG			-0.251***	-0.043	-0.149**	-0.013
			(0.053)	(0.032)	(0.059)	(0.035)
WELF_LIM			0.276**	0.048	0.242*	0.051
			(0.138)	(0.056)	(0.129)	(0.062)
N	168	168	168	168	168	168

Table 6: Political and Government Institutions - Deregulation Index

	GLS_het	GLS_ar1	GLS_het	GLS_ar1	GLS_het	GLS_ar1
CONSTANT	-0.688***	0.858***	1.130***	0.045	1.220***	-0.412
	(0.112)	(0.125)	(0.377)	(0.297)	(0.349)	(0.283)
YPC	0.000***	0.000***	0.000***	0.000**	0.000***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
POP	0.001***	0.000	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TIME_IND	0.173***	0.108***	0.175***	0.219***	0.153***	0.192***
	(0.022)	(0.019)	(0.021)	(0.025)	(0.018)	(0.024)
MAJOR	1.913***	0.909***			1.790***	1.253***
	(0.272)	(0.182)			(0.310)	(0.407)
PRES	-0.490**	-0.422			-0.276	0.777
	(0.232)	(0.377)			(0.199)	(0.482)
GOVCOAL			-0.907***	-0.561***	-0.428***	-0.204
			(0.125)	(0.131)	(0.125)	(0.148)
PSEAT_GOV			-0.017***	-0.001	-0.027***	0.000
			(0.006)	(0.003)	(0.006)	(0.003)
OPP_PAR			-0.035*	-0.025	-0.005	0.030
			(0.019)	(0.025)	(0.018)	(0.022)
N	168	168	168	168	168	168

Table 7: Regulatory Institutions - Deregulation Index

	(1) GLS_het	(2) GLS_ar1
CONSTANT	-1.163***	-0.746
	(0.340)	(0.637)
YPC	0.000***	0.000*
	(0.000)	(0.000)
POP	0.002***	0.002***
	(0.000)	(0.000)
TIME_IND	0.172***	0.210***
	(0.028)	(0.026)
APP_EXEC	1.587***	1.439***
	(0.200)	(0.470)
OVER_NO	0.069	0.420
	(0.161)	(0.454)
TERM_DEF	-0.870***	-1.153***
	(0.174)	(0.383)
FIN_IND	-0.441***	-0.317
	(0.161)	(0.239)
N	140	140

Table 8: Mixed Specification - Deregulation Index

	GLS_het	GLS_ar1	GLS_het	GLS_ar1	GLS_het	GLS_ar1	GLS_het	GLS_ar1
CONSTANT	-1.043***	-0.195	-0.778***	-0.488*	2.221***	1.479**	1.882***	1.698***
	(0.214)	(0.361)	(0.145)	(0.271)	(0.561)	(0.603)	(0.507)	(0.501)
YPC	0.000***	0.000*	0.000***	0.000*	0.000***	0.000**	0.000***	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
POP	0.001***	0.002***	0.001***	0.002***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TIME_IND	0.177***	0.198***	0.165***	0.155***	0.181***	0.228***	0.156***	0.239***
	(0.025)	(0.028)	(0.024)	(0.027)	(0.023)	(0.026)	(0.027)	(0.029)
MAJOR	1.843***	1.450***			1.499***	1.130**		
	(0.234)	(0.389)			(0.269)	(0.448)		
APP_EXEC	0.903***	1.118***			1.151***	1.158***		
	(0.166)	(0.359)			(0.215)	(0.282)		
TERM_DEF	-0.656***	-1.546***			-0.342**	-1.611***		
	(0.175)	(0.377)			(0.163)	(0.428)		
FIN_IND	0.197	-0.045			-0.154	-0.196		
	(0.171)	(0.314)			(0.256)	(0.320)		
EXEC_PAR			-0.446***	-0.189			-0.522***	-0.188
			(0.089)	(0.161)			(0.095)	(0.176)
FED_UNIT			-0.124	-0.054			-0.253***	-0.019
			(0.077)	(0.134)			(0.090)	(0.165)
SH_INC_L					-0.034***	-0.015*	-0.027***	-0.023***
					(0.006)	(0.008)	(0.005)	(0.004)
WELF_LIM					0.240***	0.053	0.275***	0.146***
					(0.090)	(0.053)	(0.106)	(0.051)
N	140	140	168	168	140	140	168	168