

# THE UNBUNDLING REGIME FOR ELECTRICITY UTILITIES IN THE EU: A CASE OF LEGISLATIVE AND REGULATORY CAPTURE?

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# The Unbundling Regime for Electricity Utilities in the EU: A Case of Legislative and Regulatory Capture?

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## Abstract

Theory and empirics suggest that by curbing competition, incumbent electricity companies which used to be and here are referred to as Vertically Integrated Utilities (VIUs), can increase their profitability through combined ownership of generation and transmission and/or distribution networks. Because curbing competition is generally believed to be welfare-reducing, EU law requires unbundling (separation) of the VIU networks. However, the EU allows its member states the choice between incomplete (legal) and complete (ownership) unbundling. There is tantalizing anecdotal evidence that VIUs have tried to influence this choice through questionable means of persuasion. Such means of persuasion should be more readily available in countries with a more corrupted political culture. This paper shows that among the old EU member states (EU-15), countries which are perceived as more corrupt are indeed more likely to apply weaker forms of unbundling. Somewhat surprisingly, we do not obtain a similar finding for the new EU member states that acceded in 2004 (NMS-10). We provide a conjecture for this observation.

## Abstrakt

Teorie i fakta naznačují, že kvůli omezené konkurenci mohou stávající elektrárenské společnosti – obecně označované jako vertikálně integrované firmy (VIF) – zvýšit svou ziskovost prostřednictvím kombinovaného vlastnictví produkce a transmise a/nebo distribučních sítí. Protože se všeobecně věří, že omezení konkurence redukuje blahobyt, právo EU vyžaduje neprovázanost (separaci) VIF sítí. Nicméně, EU umožňuje členským státům výběr mezi neúplnou (legální) a úplnou (vlastnickou) neprovázaností. Existují jednotlivé případy naznačující, že VIF se pokoušely ovlivnit toto rozhodnutí pomocí problematických přesvědčujících prostředků. Takovéto přesvědčující prostředky by mohly být více očekávané v zemích, v nichž je politická kultura zkorumpovanější. Tato práce ukazuje, že mezi starými členskými státy EU (EU-15) je v zemích, které jsou pokládány za více zkorumpované, skutečně větší pravděpodobnost slabší formy neprovázanosti. Překvapující je, že stejné zjištění nenacházíme pro nové členské země EU (NMS-10). V tomto článku vyslovíme domněnku pro vysvětlení tohoto postřehu.

*Keywords:* electricity markets; regulation; vertical integration; corruption

*JEL classification code:* K49, L43, L51, L94, L98.

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## 1. Introduction

The European electricity market is undergoing major changes. Prompted by EU legislation (most notably DIRECTIVE 2003/54/EC<sup>1</sup> and REGULATION 1228/2003<sup>2</sup>), the EU member states are restructuring their electricity industry to allow for more competition which is widely believed to be welfare-enhancing. A major complication is that, at the outset, the electricity markets were almost completely controlled by large, Vertically Integrated Utilities (VIUs) that used to be regulated state monopolies. These VIUs typically still own almost all generators, as well as transmission and/or the distribution networks.<sup>3</sup> Such an ownership pattern is believed to be an obstacle for free competition (e.g. European Commission Competition DG, 2006, p.149).

To prevent VIUs from using their influence to reduce competition, the EU has required its member states to unbundle (separate) their generation and network activities. Many members, however, have been slow in implementing these directives and many have chosen the weaker (but permitted) form of unbundling. These developments, and the fact that weaker forms of unbundling are allowed at all, are widely believed to be welfare-reducing (e.g. European Commission Competition DG, 2006, pp.144-148). These observations suggest that the pertinent political, legislative, and regulatory processes have unduly been influenced.

Motivated by tantalizing anecdotal evidence and a well-established literature on legislative and regulatory capture, we conjecture that a significant part of the timing of the implementation of unbundling regimes and the choice of weaker forms of unbundling regimes, as well as the fact that this choice is possible in the first place, can be explained by questionable (and possibly illegal) influence activities by VIUs. We conjecture specifically that such influence activities are more effective in countries where the policy and regulatory process is more susceptible to manipulations.

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<sup>1</sup> Directive 2003/54/EC of 26 June 2003 of the European Parliament and of the Council concerning common rules for the internal market in electricity and repealing Directive 96/92/EC (OJ 2003 L 176/37).

<sup>2</sup> Regulation (EEC) No 1228/2003 of the European Parliament and of the Council on Conditions for Access to the Network for Cross-Border Exchanges in Electricity (OJ 2003 L 176/1).

<sup>3</sup> Generators produce electricity. The transmission network is used for the transport of electricity over long distances, which is done by a Transmission System Operator (TSO). The distribution network is used for the transport of electricity over short distances, mostly to the final consumer, which is done by a Distribution System Operator (DSO).

Our data analysis supports our hypothesis for the old EU member states (EU-15<sup>4</sup>) but fails to support it for the new member states that acceded the EU in 2004 (NMS-10<sup>5</sup>). We conjecture that these newly acceded states have used legal and regulatory arrangements as relatively cheap signals of their compliance with anti-corruption strategies, as this has been an important criterion for accession into the EU.

The remainder of this paper is organized as follows. In the next section, we give examples of the welfare-reducing effects of having a fully integrated VIU and then discuss types of unbundling. We also formulate our claim and present a summary of the data that we use. In section 3, we explain the sources of our data, describe our strategy for analyzing the data, and specifically state our hypothesis. In section 4, we report our results. We conclude with a discussion in section 5.

## **2. Motivation**

Arguably, the major obstacle in both creating a single market in energy and allowing more competition is the dominance of large, once regulated VIUs that were typically state monopolies. The fact that VIUs own both generators and (transmission/distribution) networks is especially problematic as it allows VIUs to use their network ownership to increase their profits and hinder competition.

For example, VIUs can cross-subsidize their generation activities and recover their generation losses with high transmission fees. Apart from blunt refusal, VIUs have several additional tactics available to hinder access of competing generators to the network such as imposing discriminating requirements<sup>6</sup> or charging unreasonably high access and service fees.<sup>7</sup> Furthermore, VIUs have little incentive to invest in new transmission

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<sup>4</sup> EU-15: Austria (A), Belgium (B), Germany (D), Denmark (DK), Spain (E), France (F), Finland (FIN), Greece (GR), Italy (I), Ireland (IRL), Luxembourg (L), Netherlands (NL), Portugal (P), Sweden (S).

<sup>5</sup> NMS-10: Cyprus (CY), the Czech Republic (CZ), Estonia (EST), Hungary (H), Lithuania (LT), Latvia (LV), Malta (M), Poland (PL), Slovakia (SK), and Slovenia (SLO).

<sup>6</sup> An inquiry by the European Commission found that many market participants are “highly critical of the efficiency of existing unbundling obligations, believing that discrimination in favor of affiliates continues, and calling for stricter measures.” European Commission Competition DG (2006, executive summary, p.4).

<sup>7</sup> For example, the Commission of the European Communities (2005, technical annex, p.14) claims that in 2005 in 16 out of 25 EU members, the fees for balancing services were set so as to hinder competition. Balancing is the real-time equalization of electricity supply and demand by the TSO; failure of balancing

capacity<sup>8</sup> as more transmission capacity makes it more likely that generators from neighboring countries or distant areas can compete with the VIU-owned generators (European Commission Competition DG, 16.02.2006; Léautier, 2001; Brunekreeft, Neuhoff and Newbery, 2004). In addition, the European Commission Competition DG (16.02.2006, p.147) reported cases of VIUs having given commercially valuable inside information to their affiliated generators. This puts independent generators at a disadvantage and thereby decreases competition.

To prevent VIUs from using control over their networks to reduce competition, the EU required member states to unbundle (separate) their transmission and distribution networks from generation. The EU distinguishes five main types of such unbundling:

- 1) Unified ownership requires no unbundling; both network and generation activities continue to be owned and managed by the same company.
- 2) Accounting unbundling is the least drastic form of unbundling; separate accounts must be kept for the network activities and generation activities to prevent cross subsidization.
- 3) Functional unbundling (also called management unbundling) requires, in addition to keeping separate accounts, that the operational activities and management are separated for transmission and generation activities.
- 4) Legal unbundling requires that transmission and generation be put in separate legal entities.
- 5) Ownership unbundling is the most drastic form of unbundling. Generation and transmission have to be owned by independent entities. These entities are not allowed to hold shares in both activities.

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leads to electricity outages. Imbalances are caused by generators who cannot supply the exact amount they contracted for. The TSO has to make up for the shortage or excess in electricity supply and charges out-of-balance generators fees for balancing services. A TSO that is owned by a VIU can curb competition by charging excessive fees for its balancing services. This effect is aggravated by the fact that new and small entrant generators are more likely to cause imbalances than large incumbent generators (Commission of the European Communities, 2005, technical annex, p.13). See Newbery, van Damme, and von der Fehr (2003), p.16, for an example of how the balancing system in Belgium (where in 2003 the VIU owned all networks and practically all generation) impedes electricity imports from The Netherlands.

<sup>8</sup> There is a pressing shortage of transmission capacity between countries (European Commission Competition DG, 16.02.2006, p.152). This is especially serious as it obstructs the creation of one single market in electricity (Directive 96/92/EC).

Interestingly, the EU allows its member states the choice of an unbundling regime (legal or ownership) and the time path of implementation (quick or slow<sup>9</sup>) although there seems to be wide agreement that the quick implementation of ownership unbundling would be welfare-enhancing (e.g., OECD, 2001; Pittman, 2003; European Commission Competition DG, 16.02.2006, p.149). Legal unbundling leaves intact the incentives for curbing competition.<sup>10</sup> Not surprisingly, in many countries VIUs opposed ownership unbundling in favor of legal unbundling.<sup>11</sup> It is therefore an interesting question (to which our results below provide a suggestive answer) whether VIUs were able to manipulate the legislative and regulatory process in favor of the weaker form of unbundling, and whether these manipulations were a function of the integrity of legislative and regulatory processes.

Indeed, there is considerable variation in the unbundling regimes implemented in EU member states. Table 1 documents the distribution of regimes over the years<sup>12</sup> both for the old (EU-15) and new member states that acceded the EU in 2004 (NMS-10).

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<sup>9</sup> For transmission, legal or ownership unbundling had to be implemented by July 2004; for distribution, legal or ownership unbundling has to be implemented by July 2007. However, some countries have adopted such a slow pace of implementation that it borders on noncompliance. While 18 EU member countries report to have implemented legal unbundling, in 8 of these it has not been done effectively in that the network activities of the VIU are not overseen by a separate board of directors (Commission of the European Communities, 2005, p.80).

<sup>10</sup> There are several concrete examples of legally unbundled VIUs that curb competition through their combined ownership of generation and transmission or distribution networks, see European Commission Competition DG (6.02.2006, p.144-148).

<sup>11</sup> For example, see Mulder, Shestalova, and Lijesen (2005) for the debate in the Netherlands.

<sup>12</sup> The sources of the data are described in section 3.



Table 1: Unbundling regimes in EU member states.

EU-15					
Unbundling regime	2001	2002	2003	2004	2005
1) None	0	0	0	0	0
2) account	0	0	1 (L)	0	0
3) Functional	3 (D, F, GR)	2 (F, L)	1 (F)	1 (L)	0
4) Legal	8 (A, B, DK, E, I, IRL, NL, P)	5 (A, B, D, DK, P)	4 (A, B, D, DK)	7 (A, B, D, DK, F, GR, IRL)	7 (A, B, D, F, GR, IRL, L)
5) Ownership	3 (FIN, S, UK)	5 (E, FIN, NL, S, UK)	6 (E, FIN, NL, P, S, UK)	7 (E, FIN, I, NL, P, S, UK)	8 (DK, E, FIN, I, NL, P, S, UK)

NMS-10					
Unbundling regime	2001	2002	2003	2004	2005
1) None	1 (M)	1 (M)	1 (M)	1 (M)	1 (M)
2) Account		1 (H)	2 (EST, H)	1 (LV)	0
3) Functional		2 (CY, EST)	2 (CY, PL)	1 (CY)	1 (CY)
4) Legal		6 (CZ, LT, LV, PL, SK, SLO)	5 (CZ, LT, LV, SK, SLO)	7 (CZ, EST, H, LT, PL, SK, SLO)	4 (EST, LV, P, SK)
5) Ownership		0	0	0	4 (CZ, H, LT, SLO)

Remarkably, but perhaps not surprisingly given the available choices, many countries did not choose to implement ownership unbundling. The fact that legal unbundling is the modal choice for the NMS-10 set and the EU-15 set in 2001-2 (and a close contender even in 2003-5) is one indication that VIUs may be able to exert influence over the transmission company.<sup>13</sup> We therefore conjecture that part of the variation in the choice of unbundling regime and the speed of implementation can be explained by the influence activities of VIUs. These activities may be legal (e.g., transparent lobbying activities) or may include questionable (and possibly illegal) strategies such as under-the-table payments to allegedly independent lobbyists to effect public opinion and the legislative and regulatory process. Of course, it may also be possible that outright bribes were paid.

<sup>13</sup> The Dutch branch of the energy Company Essent provides illustrative examples of the rhetoric against ownership unbundling brought up by incumbent VIUs. Suggesting that unified ownership of the network provides protection against possible foreign take-over, Essent says: “We are now being chopped up, ready for swallowing by large foreign groups with headquarters in Munich or Paris” (<http://www.essent-finance.nl/pressroom/release36.jsp>).

A recent scandal in the Netherlands illustrates one such questionable strategy. In January 2006, it became known that energy companies Nuon, Eneco, Essent, and Delta had secretly promised, contingent on the Netherlands government deciding against ownership unbundling of the distribution network, a “success fee” of EURO 1,7 million to IMSA, an “independent”, idealistic, environmentally oriented consultancy company.<sup>14</sup> IMSA had forcefully argued against ownership unbundling of energy networks in the Dutch media and in an IMSA consultancy report (Van Dieren, Tuininga, and van Soest, 2006). This example is suggestive of the value of weaker unbundling for energy companies, but it begs the question whether the Dutch scandal was an isolated incident or unique only in that it had been exposed.

The effect of such questionable influence activities depends on the integrity of legislative and regulatory processes. Direct data that measure the integrity of such processes do not exist. We therefore proxy it with data from a widely used corruption assessment instrument: the Corruption Perception Index (CPI) of Transparency International.<sup>15</sup>

We can now formulate our claim as follows:

**Countries with a higher CPI score (less corruption) have a more complete unbundling regime**

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<sup>14</sup> See <http://www.imsa.nl/> for the idealistically flavored mission statements of IMSA. The director of IMSA and benefactor of the success fee, Mr. van Dieren, kept a public appearance as an independent environmental activist. He is a member of the Club of Rome and the founder of a Dutch militant environmental organization called “milieudefensie”.

<sup>15</sup> The CPI is a well-established (e.g., Mauro, 1995; Treisman, 2000) assessment instrument that assigns countries a score between 1 (perceived as very corrupt) and 10 (perceived as not corrupt). The score is based on a number (up to 18) of sources, not all of them just about perception. In some sense, the name of the CPI has become an anachronism. The CPI of 2005 was based on 16 sources from 10 independent institutions (Lambsdorff, 2005).

Figure 1: Relations between concepts and variables.

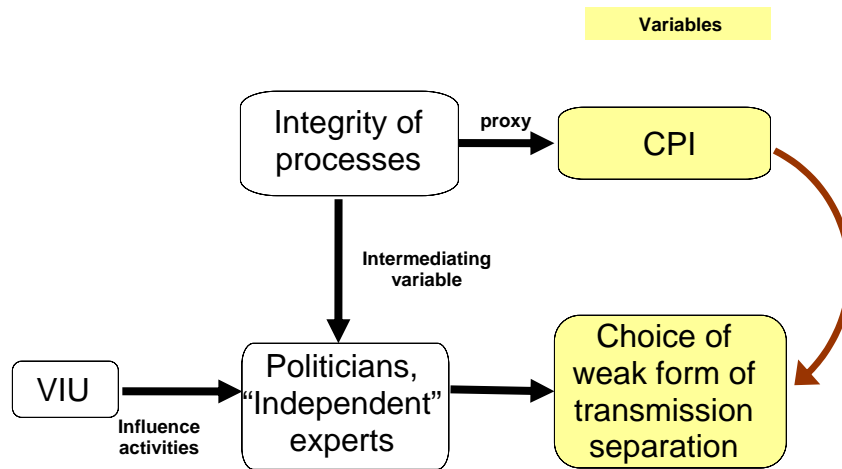


Figure 1 illustrates the relations between concepts and variables. We also use the CPI as an explanatory variable to study how the quality of implementation of the unbundling regime is influenced by the integrity of legislative and regulatory processes. The assessment of the quality of implementation consists of the results of a questionnaire that the European Commission administers and that includes the following four questions:

1. Does the VIU publish its accounts?
2. Does the VIU employ a compliance officer?
3. Do the unbundled activities have a separate corporate identity?
4. Are the unbundled activities located at separate locations?

Our study relates to an established literature on rent-seeking and corruption (Mauro, 1995, 1997; Tanzi and Davoodi, 2000; Treisman, 2000). Mauro (1997) reviews studies that show how government policies (e.g. trade, price, and industrial policies) create rents, which invite influence activities and corruption. In our view, the unbundling policy is such a source of government-induced rents since the implementation of unbundling regimes less stringent than ownership unbundling are likely to bring about higher profits for VIUs. In line with the literature on rent-seeking and corruption, we expect VIUs to attempt to seize this rent by persuading politicians to allow the less stringent unbundling regime, and we expect that VIUs will be more successful in these attempts at persuasion in more corrupt countries.

### 3. Data and analysis

The data on unbundling regimes and the quality of implementation were collected from reports of the EU Commission (2002, 2003, 2004, 05.01.2005, 15.11.2005 and 12.01.2006) that monitor the implementation of DIRECTIVE 2003/54/EC and REGULATION 1228/2003. For consistency we use these official data for our main analysis.<sup>16</sup>

The electricity networks of Malta and Cyprus are small and isolated and we therefore exclude them from our sample.<sup>17</sup> We run robustness checks by including them together with a dummy variable, *Small\_Isolated*.<sup>18</sup> Also, the categorization of the transmission unbundling regime in Latvia in the report of the Latvian regulator (The [Latvian] Public Utilities Regulation Commission, 2005) is in conflict with the categorization in the DG Tren reports. While we stick to the official EU data (the DG Tren reports) for consistency, we do a robustness test using the categorization of the Latvian regulator.

Bulgaria and Romania acceded the EU in January 2007. These countries joined 3 years later than the NMS-10 and therefore had a different time schedule for implementing EU directives. We therefore believe that including Bulgaria and Romania together with NMS-10 would not be appropriate; robustness tests including Bulgaria and Romania confirm our conjecture.

The DG Tren reports do not indicate when exactly a particular unbundling regime was in place. We therefore used the following decision rule: If the report said that the data were,

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<sup>16</sup> The sources used to determine the transmission unbundling regime are summarized in Table 2.

<sup>17</sup> Countries that operate a small isolated system (Cyprus and Malta) have little to gain from unbundling as the low demand for electricity and the absence of interconnectors leave no room for effective competition (The Ministry for Resources and Infrastructure of Malta, 2006, p.42). In Malta the total installed capacity is 550 MW and in Cyprus the total installed capacity is 988 MW (Cyprus Energy Regulatory Authority, 2005, p. 17). The European Commission has indeed granted Malta and Cyprus a derogation on the unbundling requirements; both countries are exempted from the obligation to implement transmission unbundling before July 2004. We decided that these facts are substantial enough to affect the fundamental dynamics of the choice of unbundling regime.

<sup>18</sup> Malta is such a small country that it makes do without a transmission network; electricity is transported through the distribution network. In the robustness test we use the status of the Maltese distribution network. One typically does not find an assessment of the unbundling regimes in Malta or Cyprus in the DG Tren reports. Therefore, we draw on information from the Malta Resources Authority (2005); the Ministry for Resources and Infrastructure of Malta (2006); and the Cyprus Energy Regulatory Authority (2005).

say, collected in 2001, then we report them in the column “2001” even if the report itself was published in 2002. Likewise, it does not matter whether a legislative or regulatory change was enacted in January or December. We can not think of any reason why our (strong) results reported below should be significantly affected by these caveats.

The data on the CPI were obtained from Transparency International.<sup>19</sup> The data on per capita GDP in thousands of Euros (fixed series at 1995 prices and exchange rates); GDP in billions of Euros (fixed series at 1995 prices and exchange rates); electricity prices (per kWh in Euro without taxes) and net electricity import relative to total available production were obtained from Eurostat.<sup>20</sup>

To test our hypothesis, we ran ordered logit regressions with transmission unbundling regime and quality of implementation, respectively, as the dependent variable and the CPI and various controlling variables as regressors.

As controlling variables, we use a timetrend,  $t$ , the per capita gross domestic product corrected for purchasing power parity,  $GDP_{pc}$ , the gross domestic product corrected for purchasing power parity,  $GDP$ , and the net import of electricity relative to the total net generation of electricity<sup>21</sup>,  $NetElecIMP$ . We expect a timetrend to have a positive effect (more unbundling) because through time, the European Commission dictates more drastic unbundling. We included the per capita gross domestic product and the gross domestic product because we suspect that wealth and economic size of a country influence the choice of the transmission unbundling regime. We have no prior about the effect of  $NetElecIMP$ , the net import of electricity<sup>22</sup>. On the one hand, we expect a VIU that is a net exporter to gain more from owning the network. On the other hand, a VIU that is a net importer can hamper competing imports from abroad and thereby increase its profit.

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<sup>19</sup> Available on <http://www.transparency.org/>

<sup>20</sup> Eurostat website for energy.

<sup>21</sup> Net imports (Eurostat code: 100600) divided by total net electricity generation (Eurostat code:107100), from the Eurostat website for energy.

<sup>22</sup> Gerard Roland urged us to include the net import of electricity as a variable.

We estimate the following equation:

$$\Pr(t\_unbund = i) = \Pr(\kappa_{i-1} < \alpha + \beta_1 \cdot CPI + \beta_2 \cdot t + \beta_3 \cdot GDP\_pc + \beta_4 \cdot GDP + \beta_5 \cdot NetElecIMP + u_j < \kappa_i)$$

where the relevant group of variables is defined as follows:

- *t\_unbund* stands for the transmission unbundling regime implemented and can take the categorical values  $i \in \{\text{Unified ownership, Accounting unbundling, Functional unbundling, Legal unbundling and Ownership unbundling}\}$ .
- *CPI* stands for the Corruption Perception Index.
- *t* stands for time trend.
- *GDP\_pc* stands for the per capita Gross Domestic Product in thousands of Euros (fixed series at 1995 prices and exchange rates).
- *GDP* stands for Gross Domestic Product in billions of Euros (fixed series at 1995 prices and exchange rates).
- *NetElecIMP* stands for the net import of electricity relative to the total net generation of electricity.

Our main hypothesis is:

$H_0$ :  $\beta_1$ , the coefficient on the CPI, is equal to zero.

$H_A$ :  $\beta_1$ , the coefficient on the CPI, is greater than zero.

We suspect that results might differ for the old EU member states (EU-15) and the new member states (NMS-10) that acceded in 2004, as the latter were under pressure to qualify for entrance into the EU. Hence, we run separate regressions for EU-15 and NMS-10. We assume that the variables that we control for are clustered by country, and we therefore use the robust Huber/White/sandwich estimator clustered by country for the variance (Froot, 1989).

#### 4. Results

Table 2 shows the results for the EU-15 and the NMS-10.<sup>23</sup> Model 1 includes all observations and all control variables.

Table 2: Regression models.

	Model 1 EU-15	Model 2 NMS-10
<i>CPI</i>	2.72*** (.82)	-1.20*** (.35)
<i>T</i>	1.11*** (.28)	1.32** (.57)
<i>GDP_pc</i>	-.57*** (.12)	.08** (.04)
<i>GDP</i>	-0.18 (0.57)	-16*** (4.76)
<i>NetImportElec</i>	8.1** (3.33)	-2.63** (1.10)
N	68	32

- \*\*\* Significant at the 1% confidence level
- \*\* Significant at the 5% confidence level
- \* Significant at the 10% confidence level
- () Robust standard errors within parentheses

Model 1 shows that for the EU-15, the effect of the *CPI* is significant and positive.<sup>24</sup>

<sup>23</sup> We obtained basically the same results using survival analysis, an alternative method of data analysis. In the survival analysis for the EU-15, we categorized a country as being “alive” as long as it has not implemented ownership unbundling, a country “fails” at the moment it implements ownership unbundling. In the survival analysis for the NMS-10, a country “fails” at the moment it implements legal unbundling. All variable work in the same direction and for the EU-15, the variables *CPI* ( $p < 0.05$ ) and *GDP\_pc* ( $p < 0.01$ ) are significant. For the NMS-10, the variable *CPI* ( $p < 0.01$ ), *GDP* ( $p < 0.05$ ) and *NetImportElec* ( $p < 0.1$ ) are significant.

<sup>24</sup> It takes time to decide on and implement an unbundling regime. It can therefore be argued that the unbundling regime should be regressed on the lagged *CPI*. However, the *CPI* is a moving average over the past three years; the *CPI* of a certain year is based on numerous indexes and reports over a time period including the two previous years (Lambsdorf, 2005). For example, the *CPI* of 2005 is based on information over the period 2003-2005. Performing a regression on the *CPI* lagged by one year gives coefficients and significance levels that are virtually identical to the ones in model 1 and 2. Including Cyprus and Malta together with a dummy variable *Small\_Isolated* in model 2 increases the significance of the coefficient on the *CPI*. The coefficient on the dummy *Small\_Isolated* is negative (less unbundling for small and isolated systems) and significant ( $p < 0.01$ ), as expected. Including the newest EU member states Bulgaria and Romania slightly lowers the significance of the coefficient on the *CPI* ( $p < 0.05$ ) and makes the coefficient on the *GDP* insignificant. Artificially shifting the time trend of Bulgaria and Romania 3 years back, in order to align their accession date with the NMS-10, results in a high significance of all **variables in table 3** ( $p < 0.01$ ). This confirms our conjecture that the later accession date of Bulgaria and Romania sets these countries apart from NMS-10. Using data on the per capita Gross Domestic Product and on the Gross

This supports our hypothesis: The less corrupt of the EU-15 countries (a high *CPI* score) tend to implement more rigorous transmission unbundling. The significant effect of the *CPI* is robust to varying our treatment of problematic observations.<sup>25</sup>

Not surprisingly, given that the EU directives require legal unbundling by 2004, the time trend variable shows that in later years it is more likely for any country to have more unbundling. Further it shows that the richer of the EU-15 countries (as measured by per capita GDP) are less likely to implement rigorous transmission unbundling. The effect of *NetImportElec* is positive and significant ( $p < 0.05$ ), but not very large. When we use our regressions to predict the binary choice between ownership and less binding unbundling regimes (legal unbundling, functional, account and unified ownership), the exclusion of *NetImportElec* from the regression decreases the percentage of correct classifications by only 3% (from 91% to 88%).

Interestingly, in model 2 the effect of the *CPI* in NMS-10 countries is opposite to what we found before; more corrupt NMS-10 countries tend to implement *more* rigorous transmission unbundling. Also the effect of wealth is reversed; richer NMS-10 countries (as measured by *GDP\_pc*, the per capita GDP) are *more* likely to implement rigorous transmission unbundling. The effect of being a net importer, captured by *NetImportElec*, is also reversed; countries that are a net importer are less likely to choose a stricter unbundling regime<sup>26</sup>. Further, the economic size of a country (as measured by *GDP*) has a strongly significant effect; economically larger countries are less likely to implement rigorous transmission unbundling.

A possible explanation is that the reverse *CPI* effect is spurious; indeed we have reasons to suspect that the transmission unbundling regime has not always been reported accurately for NMS-10 countries. In the case of Latvia, our robustness check (see Appendix) indicates that misreporting could have caused a spurious relationship; running

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Domestic Product not as fixed series at 1995 prices and exchange rates, but corrected for purchasing power parity lowers the significance of *netimp\_gen*, but leaves the significance of all other variables unaffected.

<sup>25</sup> See Appendix.

<sup>26</sup> While the effect is significant, the variable does probably not exert a large influence. When we use our regressions to predict the binary choice between ownership or legal unbundling and less binding unbundling regimes (functional, account and unified ownership), the exclusion of *NetImportElec* from the regression does not lower the percentage of correct predictions.



the ordered logit regression for NMS-10 countries using the data provided by the Latvian regulator instead of those provided by the European Commission renders the coefficient on the *CPI* ( $P<.34$ ) and on the economic size of the country ( $P<.60$ ) insignificant.<sup>27</sup>

However, it seems likely that the occurrence of misreporting is related to the level of corruption in the NMS-10 countries. After all, in the pre-accession stage the European Commission has exerted strong pressure on the NMS-countries to show clear signs of reform to be eligible for EU membership. Compliance with the unbundling requirements is a step towards creating a liberal market-economy and a way for an accession country to signal its commitment for reform to the EU.<sup>28</sup> Especially for very corrupt countries such formal compliance is a cheap signal relative to curbing anticompetitive practices and governmental corruption. This might explain why more corrupt countries choose (at least formally) more rigorous unbundling. Furthermore, this pressure was most likely more intense for economically smaller countries, as they had less bargaining power vis-à-vis with the EU. This would explain that economically large NMS-10 countries (as measured by the GDP) are less likely to implement rigorous transmission unbundling.

### **Marginal effects for EU-15 and NMS-10**

To explore the size of the effect of the *CPI* on the transmission unbundling regime,<sup>29</sup> we calculate the marginal effect of the *CPI* on the probability of choosing an unbundling regime<sup>30</sup>.

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<sup>27</sup> Likewise, using the data from the Latvian regulator in a survival analysis for the NMS-10 countries renders the coefficient on the *CPI* ( $P<.58$ ) insignificant.

<sup>28</sup> Prior to the accession of a selected group of candidate countries in 2004, these candidate countries were evaluated by the European Commission, see for example the European Economy Enlargement Papers. As can be seen in the European Economy Enlargement Papers, one of the criteria on which the candidate countries were evaluated was the state of liberalization and regulation of the energy sector. The European Economy Enlargement Papers are available at [http://ec.europa.eu/economy\\_finance/publications/enlargementpapers\\_en.htm](http://ec.europa.eu/economy_finance/publications/enlargementpapers_en.htm)

<sup>29</sup> We expected that the same effect could be found for the unbundling regime for distribution. Running an ordered logit regression of the distribution unbundling regime on the *CPI* and controlling variables results in a positive (0.27) but insignificant ( $P<0.52$ ) coefficient. A possible explanation is that distribution unbundling was scheduled to be implemented later (July 2007) than transmission unbundling (July 2004), and that the effect of the *CPI* will show up significantly once data over 2005-2007 are available.

<sup>30</sup> Note that as we have excluded Malta and Cyprus from the sample, no country chooses unified ownership (no unbundling at all).

Table 3: Marginal effects (in percentages) for EU-15.

	Account	Functional	Legal	Ownership
<i>CPI</i>	- 0.0% (0.00)	-1.2% (.010)	-52%*** (0.13)	54%*** (0.13)
TimeTrend	-0.0% (0.00)	-0.5% (.004)	-21%*** (0.07)	22%*** (0.08)
GDP_cp	0.01% (0.00)	0.2% (.002)	11%*** (0.03)	-11%*** (0.03)
<i>NetImportElec</i>	-1.6% (0.00)	-3.9% (.036)	-161% (0.69)	165%** (0.71)

- \*\*\* Significant at the 1% confidence level
- \*\* Significant at the 5% confidence level
- \* Significant at the 10% confidence level
- () Robust standard errors within parentheses

Table 3 shows that an increase in the *CPI* with one point (the country is *less* corrupt) increases the likelihood for the average EU-15 country to choose ownership unbundling for transmission by 54%. Likewise, a decrease in the *CPI* (the country is *more* corrupt) increases the probability to have legal, functional or accounting unbundling.

Table 4: Marginal effects for NMS-10.

	Account	Functional	Legal	Ownership
<i>CPI</i>	5.6%* (.033)	3.9% (0.029)	-3.3% (.041)	-6.1%** (0.03)
TimeTrend	-6.2%* (.035)	-4.2% (0.026)	3.7% (.039)	6.7%** (0.033)
GDP_cp	-2.0% (.013)	-1.4% (.011)	1.2% (0.016)	2.2%*** (0.007)
GDP	75.4%** (.34)	51.8%* (.305)	-4.5% (0.434)	-82%** (0.373)
<i>NetImportElec</i>	12.4%** (.049)	8.5%* (.049)	-7.4% (.065)	-13.3% (0.064)

- \*\*\* Significant at the 1% confidence level
- \*\* Significant at the 5% confidence level
- \* Significant at the 10% confidence level
- () Robust standard errors within parentheses

Table 4 shows that an increase in the *CPI* by one point (the country is *less* corrupt) lowers the likelihood for the average NMS-10 country to chose ownership unbundling for transmission with 6.1%. It lowers the likelihood to choose legal unbundling for

transmission with 3.3%. Likewise, a decrease in the *CPI* (the country is *more* corrupt) increases the probability to have functional or accounting unbundling.

### Additional tests

To further illustrate the importance of the *CPI*, we used our regressions to predict the binary choice between ownership unbundling and less binding unbundling regimes (legal, functional, account and none)<sup>31</sup>. Inclusion of the *CPI* generally adds 18% to the percentage of correct predictions for EU-15 and 27% to the percentage of correct predictions for NMS-10. Focusing on the data for NMS-10, we used our regressions to predict the binary choice between ownership or legal unbundling and less binding unbundling regimes (functional, account and unified ownership) for our observations. Inclusion of the *CPI* adds 41% to the percentage of correct predictions.

The *CPI* also has a significant effect on the quality of implementation, as assessed through a questionnaire that the European Commission administers. Performing a binary logit regression on the *CPI* and controlling variables resulted in significant coefficients for the first two questions (see Table 5).

Table 5: Quality of implementation.

Questions	EU-15		NMS-10	
	Coefficient	N	Coefficient	N
Published Accounts?	<i>CPI</i> > 4.3 predicts data perfectly	44	data completely determined	16
Compliance officer?	0.77** (.34)	46	data completely determined	16
Separate corporate identity?	-0.21 (1.0)	60	0.41 (1.0)	16
Separate locations?	0.34 (0.44)	60	0.41 (1.0)	16

Mapping the answers to these questions into affirmative (=1) or negative (=0) and assuming that the answer to each question has the same weight, an ordered logit regression of the total score on the *CPI* and the controlling variables displayed in Table 2 gives a highly significant result ( $P < 0.000$ ).

<sup>31</sup> See Appendix. We thank Jan Hanousek for this suggestion.

A final question is whether we can see an increase in rents from less unbundling<sup>32</sup>. Here we consider the industrial electricity price relative to the domestic electricity price. We expect this indicator to be lower for countries with more rigorously unbundled transmission networks. Industrial consumers have more bargaining power than domestic consumers and therefore profit more from rigorous unbundling.<sup>33</sup> A higher indicator value therefore reflects the stronger bargaining position of VIUs thanks to their control over transmission and can be used as a proxy for rents captured by the VIU. Indeed the regression of the indicator on the unbundling system (and controlling variables) shows a positive (0.10) and significant effect ( $p < 0.01$ ).

## 5. Discussion

For the EU-15 member states, we found a significant and robust effect of corruption on the realized unbundling regime; countries that are more corrupt are more likely to have chosen weaker unbundling regimes than would be desirable. The fact that politicians that are likely to be more corrupt allow less unbundling is an indication that less unbundling is indeed a way to grant VIUs higher rents. It also suggests that the choice EU law provides – a choice not suggested by economic theory – might be the result of a legislative process that has been compromised through questionable means of persuasion.

Our result adds empirical evidence to a literature that casts doubt on the wisdom of allowing a weak unbundling regime which facilitates the continuing existence of large utilities that are effectively still integrated. Our results suggest specifically that the questionable practices of persuasion that were uncovered in the Netherlands (and that we discussed in section 2) may be systemic; our results also suggest that VIUs in countries that are more corrupt might use -- apart from legal lobbying channels and questionable (but not illegal) practices -- illegal means to further their interests.

The analysis which focused only on the NMS-10 shows a weaker but statistically significant effect in the opposite direction. In our framework, this suggests that NMS-10

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<sup>32</sup> We thank Libor Dusek for his suggestion.

<sup>33</sup> Steiner (2001) states that industrial consumers are larger – they have the scale to contract their own generator or access spot markets – and therefore have more elastic demand.

countries reported early adoption of formal EU requirements as a cheap means to increase their chances to be judged eligible for accession into the EU. This strategy should be especially attractive for corrupt countries, for which it is costly to implement other EU requirements such as curbing anticompetitive practices and governmental corruption.

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<sup>34</sup> At the time of writing the authors, most likely because of the turmoil caused by their compromised independence, did not allow the final version of the report to be downloaded anymore. However, the concept version of the disputed report was still available at <http://www.imsa.nl/uploads/ManifestCONCEPT.pdf>.



## Appendix

In this section, we report on a variety of tests we performed to verify our results. We performed robustness tests for the observations that report a mixed transmission unbundling regime and for contradictory data on Latvia. All tests support our results.

### 1. Mixed transmission unbundling regime

To assess whether the removal of observations that report a mixed transmission unbundling regime - Legal/Management (L/M) for Ireland and Greece and Ownership/Legal (O/L) for Italy – affects the results in model 1, we did three robustness tests.<sup>35</sup> In the first test, we included the mixed regimes as ordered categories; for example L/M is more unbundled than Management unbundling, but less than Legal unbundling. The significance of the coefficient of the *CPI* is unaffected. The second test assigns the lower unbundling regime to each combination e.g. L/M becomes Management unbundling. The significance of the coefficient of the *CPI* is unaffected. The third test assigns the higher unbundling regime to each combination e.g. L/M becomes Legal unbundling. As a result, the significance of the coefficient of the *CPI* falls to 0.014.

### 2. Contradictory data on Latvia

In the DG Tren reports the unbundling regime of Latvia is classified as accounting unbundling in 2003, and as legal unbundling before 2002 and after 2004 and 2005 (Commission of the European Communities, 2002, 2003, 2004, 2005). The (Latvian) Public Utilities Regulation Commission (2005) indicates that Latvia implemented legal unbundling only in 2005 and had accounting unbundling up to 2004. For consistency, we use the classification officially reported by the Commission of the European Communities. However, we ran a robustness check with the data from the (Latvian) Public Utilities Regulation Commission (2005). The correction in the data renders the coefficient on the *CPI* in model 2 (for NMS-10) insignificant ( $P < .34$ ).

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<sup>35</sup> As Ireland and Greece belong to EU-15, the results for NMS-10 are unaffected.



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