A STRATEGIC MODEL OF COMPLIANCE AND ENFORCEMENT

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ABSTRACT

This study examines the strategic non-monotonic relationship in the implementation and enforcement process of EC directives where the member states comply with the goals of EC directives in consideration of the Commission's willingness to enforce them. Applying QRE statistics to data on 299 cases of (non-)compliance with EC directives, we find that member states avoid enforcement conflicts with the Commission when they support a more contested Council directive, while the probability of non-compliance increases for directives with more obligations and less discretion. Under this condition, a less salient Commission does not sanction non-compliance when the interests of the member states are polarized and domestic interest groups in the non-compliant member state are powerful. Hence, our strategic analysis provides evidence for the argument of those scholars who conceive actors' interests as a major factor for explaining compliance with EC directives.

INTRODUCTION

What factors affect compliance success or failure with the goals of EC directives? Do the interests of the member states play an important role for compliance? And what about the role of the Commission – do the member states strategically consider the Commission's willingness to enforce the goals of EC directives when they decide about their implementation? The compliance literature is one of the most increasing literatures in the field of European integration, where scholars from a variety of disciplines study the importance of various compliance factors within both science and agencies. Early on, compliance scholars disputed the relevance of actors' interests in compliance, with opponents from the management (Chayes and Chayes 1993, 1995) and proponents from the enforcement school of thought (Downs et al. 1996). The explanatory power of the member states' interests and their utilities from compliance is more and more put under scrutiny of empirical testing, including large N-studies on the implementation of EC directives (Mbaye 2001; Mastenbroek 2003; Giuliani 2003; Kaeding 2006; Borghetto et al. 2006; Perkins and Neumayer 2007; Falkner 2007; Thomson et al. 2007; Kaeding 2008; König and Luetgert 2009; Zhelyazkova and Torenvlied 2009). However, because the Commission is in charge of supervising compliance with EC directives, the question is whether the interests and utilities of member states follow a strategic consideration of the Commission' willingness to sanction non-compliance (see, Carrubba, Stanton).

A strategic perspective on this relationship is challenging existing statistical findings because standard logit and probit models are inadequate for the analysis of non-monotonic strategic interaction (Signorino 1999; Signorino and Yilmaz 2003). The major fallacy of standard modeling is the assumption that equilibrium outcomes occur with certainty (probability of one) and non-equilibrium outcomes will not occur with certainty (probability of zero), so that the likelihood equation to be estimated will equal zero (because it is the product of the

probabilities) if only a single outcome is not predicted, regardless of the parameters specified or the values of the independent variables (Signorino 1999: 281). This zero likelihood problem generates questions on the adequate statistical modeling of data generated by strategic interaction, which requires incorporating the non-monotonic structure of strategic interaction from the game-theoretical into the statistical model.

To solve this problem Signorino et al. (1999, 2003, 2006) recommend a modeling of the structural relationship between the regressors and the dependent variable, which we conduct by a quantal response equilibrium (QRE) model developed by McKelvey and Palfrey (1995) . Assigning non-zero probabilities to every outcome, this is the first study which tests the non-monotonic strategic interaction of the Commission and the member states in the implementation and enforcement process of EC directives. Insofar, this study presents a unified theory and test of compliance with EC directives – unified in the sense that we employ our theoretical compliance model of actors' interests and utilities to our statistical test in the empirical analysis. The theoretical model is a straightforward formalization of the compliance logic in Carrubba …, complemented by private information concerning utilities. We formulate this compliance model in such a way that it guarantees positive probabilities over all actions and outcomes, and, therefore, can be used in the statistical estimation. That is, our theoretical model is our statistical model of actors' interests and utilities.

We analyze this model using a dataset on 299 cases of (non-)compliance with EC directives. The sample of EC directives and the estimates for actors' interests in the outcomes originate from the DEU dataset (Thomson et al. 2006), which we complement by data on the quality of the implementation activities of the 15 member states and the reaction of the Commission. These data allow us to specify the utilities of the actors involved and their actions. Our results demonstrate a non-monotonic strategic relationship in the implementation and enforcement process of EC directives where the member states decide about the quality of implementation in consideration of the Commission's enforcement probability. In addition to some directive-

specific characteristics we find that member states avoid enforcement conflicts with the Commission when they support a more contested Council directive. Under this condition, a less salient Commission does not sanction non-compliance when the interests of the member states are polarized and domestic interest groups in the non-compliant member state are powerful. Hence, our strategic analysis provides evidence for the argument of those scholars who conceive actors' interests as a major factor for explaining compliance with EC directives.

This article is structured in the following four sections. The first section provides a general overview of the compliance literature with a specific focus on the enforcement mechanism of the EU, which offers a strategic consideration in the relationship between the member states and the Commission. In the second section, we develop our model on the strategic interaction between member states and the Commission and derive testable hypotheses on the factors which influence the implementation decisions of the member states and the enforcement decisions of the Commission. In the third section, we test these hypotheses using a strategic probit model on our sample of 299 implementation cases in 15 member states. Finally, the fourth and last section summarizes our findings and provides suggestions for further research.

(NON-)COMPLIANCE IN THE EU: MEMBER STATES AND COMMISSION

In principle, the likelihood for strategic interaction increases when mutually dependent actors pursue different interests, have incomplete information and take decisions over more than one procedural stage. Under these circumstances, actors attempt to anticipate the reactions and decisions of the following stages and can optimize their choices in previous stages. All these elements exist for the implementation and enforcement process of EC directives, in which the member states have to implement the obligations of EC directives, before the Commission scrutinizes their implementation activities and may enforce compliance by starting an infringement proceeding.

More specifically, there are five types of possible compliance failures, against which the

Commission is authorized to issue an infringement proceeding against a member state. A member state fails to comply when it does not transpose the obligations of EC directives into domestic law. Apart from non-transposition, a member state may also incorrectly or incompletely implement these obligations. If a member state has correctly implemented these obligations, it may however still fail to correctly apply the obligations. Finally, an infringement procedure against a member state can be issued if it fails to comply with a judgment of the European Court of Justice (ECJ) or when it violates treaty provisions, regulations and decisions by non-enforcement or non-application.

The Commission is in charge of supervising compliance, monitors the implementation activities of the member states and reports about infringement proceedings in the 'Annual Reports of the Commission on the Monitoring of the Application of Community Law' since the mid-1980s. To perform this task, the Commission gathers information about the implementation activities of the member states with incomplete information. A major information deficit arises for the Commission because the member states must only notify their implementation activities without indicating whether they have correctly completed this process by a particular implementation measure.

Under this shadow of uncertainty, the Commission can initiate an infringement proceeding which starts with a formal letter when it suspects that a member state is failing to comply (Börzel 2001:806). At this consultation stage, the member state has the opportunity to respond on the Commission's request. If this response does not convince the Commission, it can submit a reasoned opinion to this member state, which gives a more detailed description of the Commission's suspicion and a legal justification for an infringement proceeding. At this stage, the reasoned opinion also defines a deadline until when the Commission will take further legal action by a referral: 'If the state concerned does not comply with the opinion within the period laid down by the Commission, the latter may bring the matter before the Court of Justice' (Article 226 EC-treaty).

The referral to the ECJ is not the last means of the Commission. According to Article 228 EC-treaty, the Commission may also open a new proceeding for post-litigation of non-compliance when a member state refuses to comply with the ECJ judgment. At this post ECJ stage, the Commission 'shall specify the amount of the lump sum or penalty payments to be paid by the Member State concerned which it considers appropriate in the circumstances' (Article 228 EC-treaty). Figure 1 displays the average number of 'Formal Letters', 'Reasoned Opinions' and 'Referrals' to the ECJ that have been issued against the member states in the period between 1979 and 2006.[1]

Figure 1 about here

According to Figure 1, the number of infringement proceedings varies for the three stages considerably over time. Until the beginning of the 1990s, the number of 'Formal Letters' steadily increased to about 100 cases per year. Ever since, this number annually varies between 70 and 100 cases. In parallel, the number of 'Reasoned Opinions' raised from 8 cases in 1979 to more than 40 cases in 1994, dropped in 1995 and ranges between 35 and 40 cases afterwards. The number of Court referrals more continuously increased from only 2 referrals in 1979 to 11 referrals in 2006.

In spite of this general increase, it would be misleading to conclude that non-compliance has escalated over time. In this period, the EU experienced several enlargement rounds and added several jurisdictions by treaty reforms. This widening and deepening of the EU generally increases not only the likelihood for non-compliance by the larger number of possible defections, but also the uncertainty of the Commission about the implementation behavior of

[1] Due to non-availability of data for the infringement procedure under Article 228, Figure 1 only lists three stages.

a larger number of member states in more jurisdictions. According to Börzel (2001:816), the Commission has therefore changed its monitoring and enforcement strategy over time. Compared to the 1980s and early 1990s, when the Commission had pursued a more aggressive policy of enforcement in order to ensure the effective implementation of the internal market program (Tallberg 2002: 615), the Commission reformed its internal procedure in the mid-1990s by stating that 'Formal Letters' should be regarded merely as a request for further information rather than an explicit warning from the Commission (Börzel 2001:817). Hence, the Commission issues more 'Formal Letters' only for gathering information about the implementation behavior of the member states, which contributed after the 1995 accession of Austria, Finland and Sweden to the sharp increase in 1997. On closer inspection of these infringement cases, their number not only varies considerably over time but also across member states.

Table 1 about here

Regarding the first serious stage of an infringement proceeding, the stage of 'Reasoned Opinion', the variation between the member states was only modest in the years between 1979 and 1982, ranging from 21 cases for Denmark to 109 for Italy. In the following years, the gap between the member states has considerably increased and ranges from only 32 cases for Denmark to 302 for Italy, in the period between 2003 and 2006. Even though the number of 'Reasoned Opinions' received by the member states varies significantly over the period of study, the following pattern is visible: Italy and Greece receive most 'Reasoned Opinions' from the Commission, while the Nordic member states Denmark, Finland and Sweden receive only few.

For the stage of 'Referrals' this pattern does not change. In the period between 1979 and 1982, the variation in the number of Court referrals is more modest and considerably

increases in the following years. Among the member states, which had the highest numbers of Court referrals are Italy, Greece and France, while Denmark, Finland, Sweden and the United Kingdom are the member states with the lowest number of Court referrals. This pattern is well known in compliance research, but only few scholars discuss a possible selection bias of these numbers. For example, Börzel (2001:808) indicates that infringement data of the Commission hardly expresses the absolute level of non-compliance, because these data only list cases of non-compliance which have been detected by the Commission. To detect non-compliance the Commission has primarily to rely on the transposition notifications of the member states, while it usually requires the monitoring by citizens, companies and interest groups for detecting incorrect and incomplete implementation or bad application. Unsurprisingly, the Commission almost exclusively justifies the initiation of infringement proceedings by non-transposition, while incomplete and incorrect implementation or bad application only account for a small subsample.

Another puzzle of these data is that the 'raw data', which list each individual infringement cases, do not match with the annual aggregated data reports of the Commission. In addition to data management problems, it is possible that infringement data contain a systematic selection bias when the Commission strategically decides about initiating an infringement against a specific set of member states. In this selection, the Commission could ignore cases of non-compliance, which are difficult to win before the ECJ. This would explain Mbaye's finding (2001:268), according to which the Commission brought in front of the ECJ only cases which were decided by the Court in favor of the Commission. But if the data on infringements result from an unknown selection process, it is highly problematic to draw inferences about the true level of non-compliance based on them.

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To identify a possible selection process of the Commission, we set up a strategic game on the

interaction between the member states and the Commission as the major actors involved in the implementation and enforcement process of EC directives. Following McLean and Whang (2010), we model this game with the first step by the member states which can decide either to comply with the obligations and implement a directive correctly and on due time or to defect by non-transposition respectively incorrect implementation (C$omp, \sim Comp$). If a member state correctly implements the directive within the prescribed period, it shares interests with the Commission, which has to safeguard the smooth functioning of the Community's legal system. In this case, the Commission receives the highest possible payoff, which has a value of 1. While a complying member state does not have additional advantages from correct implementation, it avoids sanction costs from the Commission, which means that we can set utility losses to 0. If the member state decides not to comply with the directive, the enforcement threat of the Commission to sanction non-compliance obviously failed at this stage.

Figure 2 about here

At the following stage, the Commission decides whether to issue an infringement proceeding against a non-complying member state by a reasoned opinion *(*$RO, \sim RO$). If the Commission takes action by filing a reasoned opinion (RO), it attempts to enforce the directive by putting pressure on the non-complying member state. In this case, the Commission and the non-complying member state are in a conflict of interest, which will be resolved with the probability of p in favor of the Commission or 1- p in favor of the non-complying member state. In this conflict, we define the Commission's payoff for enforcement by $p \times 0 + (1-p) - C_{com} = (1-p) - C_{com}$, where p is the Commission's probability of success and C_{com} its costs of sanctioning. When the Commission decides to enforce a

directive by taking action, the member state can prevail the conflict with the probability of p, but will also burden costs from the Commission's sanctioning action (C_{ms}). Thus, we can specify a member state's payoff for enforcement by $p \times 1 + (1-p) \times 0 - C_{ms} = p - C_{ms}$.

If the Commission decides not to issue an infringement proceeding ($\sim RO$), the implementation failure of the non-complying member state remains undetected. In this case, a compliance deficit exists and the non-complying member state will receive its highest payoff, which we can set to 1. On the other side, the Commission's payoff is 0 while it saves sanction costs.

From this setup of the game, we can distinguish four possible actions ($Comp, \sim Comp, RO, \sim RO$) and three possible outcomes, (1) a smooth implementation of a directive ($Implementation$), (2) enforcement of a directive by the Commission ($Enforcement$) and (3) non-enforcement of a directive by the Commission, which we call compliance deficit ($Deficit$). The actions of each member state and of the Commission depend on their assessment of the probability p expressing their probability for conflict success associated with costs for each actor (C_{ms}, C_{com}). The actors' action and outcomes are summarized in Table 2. Note that enforcement only occurs when $p < 1 - C_{com}$ and $p \geq C_{ms}$, i.e. the costs of sanctions are sufficiently low relative to the expected gains from conflict.

Table 2 about here

To incorporate this strategic interaction between the Commission and the member states in a statistical model, we follow Signorino (1999; 2003 #199) and apply a fully structural estimation model based on the probabilities of the compliance and enforcement game. According to our specification in Figure 3, we assume that the true utility for an outcome consists of an observable and an unobservable component.

Figure 3 about here

The Commission's utility of enforcement is defined by $U^{e}_{Com}(Enforcement) = U_{d}(Enforcement) + \pi_{d4}$ where $U^{e}_{Com}(Enforcement)$ is the Commission's true utility for a conflict with a member state, $U_{d}(Enforcement)$ the observable component and π_{d4} the unobservable component or the private information known only by the Commission itself. From the perspective of the member state, π_{d4} is a random variable with a known distribution. With the additional assumptions that the error terms (π_{ij}) are distributed independently and identically with mean 0 and variance σ^2 and that the actors maximize their true (expected) utilities at each decision stage, we can follow Signorino and Tara (2006) and derive the strategic probit choice probabilities for the enforcement model by

$$p_{RO} = \Phi\left[\frac{U_{com}(Enforcement) - U_{com}(Deficit)}{\sqrt{2\sigma^2}}\right]$$

$$p_{\sim comp} = \Phi\left[\frac{p_{RO}\,U_{ms}(Enforcement) + p_{\sim RO}U_{ms}(Deficit) - U_{ms}(Implementation)}{\sqrt{\sigma^2(1 + p_{RO} + p_{\sim RO})}}\right]$$

where $\Phi()$ is the standard normal cumulative distribution. p_{RO} is the probability that the Commission enforces the goals of the directive by issuing an infringement proceeding respectively filing a reasoned opinion against the non-complying member state, while $p_{\sim Comp}$ is the probability that a member state does not comply with the directive. $p_{\sim RO}$ and p_{Comp} denote the probability that the Commission will not enforce and the member state will implement the directive correctly. These probabilities are the counterparts of p_{RO} and $p_{\sim Comp}$, denoted as $p_{\sim RO} = 1 - p_{RO}$ and $p_{Comp} = 1 - p_{\sim Comp}$.

Both equilibrium choice probabilities represent the strategic interaction with uncertainties between a member state and the Commission in the extended form game of Figure 3. Let us first consider p_{RO}, the probability that the Commission enforces the directive. The numerator of the p_{RO} equation compares the Commission's observed utility for conflict in the event of enforcement with its observed utility for non-enforcement resulting in a compliance deficit. Hence, the probability of enforcement increases with the level of the Commission's observed utility of conflict relative to the compliance deficit.

Likewise, the numerator of the equation for $p_{\sim Impl}$ expresses the difference between a member state's observed expected utility for non-compliance and its observed utility for compliance. The member state's observed expected utility for non-compliance captures the gamble over the outcomes of dispute by enforcement and deficit, based on the member state's belief of whether the Commission will enforce the directive. The higher the member state's observed expected utility for non-compliance relative to compliance, the higher is the probability that the member state will not comply with the goals of a directive.

The denominator of each equation is a variance term, reflecting the amount of uncertainty associated with each decision stage. As σ^2 increases relative to the observable components, the uncertainty of the actors over their decisions increases. In contrast, when σ^2 is small, the actors have more accurate information about the true utilities and the enforcement model becomes a game of perfect and complete information. According to the structure of the game, which is based on the assumptions of utility maximizing behavior of the actors and uncertainty about $\pi_{ij}{}'s$, we can only make probabilistic statements about the equilibrium choices of each actor. Under the assumption of independence between the different outcome probabilities, the probability of any outcome follows directly from the action probabilities along the game path. Thus, the outcomes are defined as:

$$p_{(Implementation)} = p_{Comp}$$

$$p_{(Deficit)} = p_{\sim Comp} p_{\sim RO}$$

$$p_{(Enforcement)} = p_{\sim Comp} p_{RO}$$

where $p_{(Implementation)}$, $p_{(Compliance\ Deficit)}$, $p_{(Enforcement)}$, define the probabilities for implementation, deficit and enforcement outcomes. According to this setup, the equilibrium-based strategic enforcement model is also a statistical (probabilistic) model, which we can employ in our statistical estimation. Thus, the strategic enforcement theory and its empirical test are unified.

Figure 4 about here

Figure 4 illustrates the general specification of the actor's utilities, i.e. the association of their utilities with our explanatory variables. In our case, the member state's utility for implementation $U_{ms}(Implementation)$ is a linear function $X_{13}\beta_{13}$, where β_{13} is a vector of coefficients to be estimated, its observed utility for the Commission's inaction $U_{ms}(Deficit)$ is estimated as a constant β_{13}, and its observed utility for conflict $U_{ms}(Enforcement)$ as a linear function $X_{14}\beta_{14}$. The Commission's utility for non-enforcement $U_{com}(Deficit)$ is normalized to zero and its utility for enforcement $U_{com}(Enforcement)$ is defined as a linear function $X_{24}\beta_{24}$ of explanatory variables. Following the estimation method of Signorino (2003), the equilibrium outcome probabilities of $p_{(Implementation)}$, $p_{(Deficit)}$, and $p_{(Enforcement)}$ are used as the basis for the maximum likelihood estimation. The log-likelihood to be maximized with respect to the explanatory variables (β) is defined as:

$$lnL = \sum_{i=1}^{N} [y_{Implementation,i}\ lnp_{Implementation,i} + y_{Deficit,i}\ lnp_{Deficit,i} + y_{Enforcement,i}\ lnp_{Enforcement,i}]$$

where $y_{Implementation,i} = 1$ if the enforcement game in situation i leads to implementation, $y_{Deficit,i} = 1$ if the enforcement game results in a deficit outcome, and $y_{Enforcement,i} = 1$ if the goals are enforced.

DATA AND EMPIRICAL ANALYSIS

One of the major empirical challenges for testing the explanatory power of strategic models concerns the gathering of information about actors' utilities. Fortunately, the DEU dataset provides estimators for actors' issue-specific interests in the 40 contested goals of 21 EC directives (Thomson et al. 2006). To assess the compliance behavior of the member states, we added information to this dataset by a computerized keyword search for the legal expressions of these 40 goals in every transposition document of each member state. Following, we asked legal scholars to evaluate the implementation quality of the sometimes overlapping and partly even contradicting implementation regulations found in these documents. This procedure led to a dataset of 299 (non-)compliance cases where the member states complied with the legal obligations of EC directives and implemented their goals correctly and in due time in 195 cases.[2] In the remaining 104 cases, the member states failed to comply, but the Commission issued an infringement procedure against the respective member states only in 85 cases.

According to our strategic model, the decision of a member states to comply is determined by their utility associated with the implementation outcome and the probability that the Commission will enforce the goals of the directive. To estimate these decisions, we begin with assigning explanatory variables to the two main terms in the actors' utilities for

[2] Due to inconsistencies and missing data regarding the information on the infringement procedures issued by the Commission we were required to delete 15 cases from our original 314 cases. An example of missing data on the Commission infringement procedure would be the case of the implementation directive 2002/7/EC in Spain. Here our collected infringement record shows that the Commission issues a 'Reasoned Opinion' against Spain although, according to our dataset, the Spanish government has not received a 'Letter of Formal Notice'.

enforcement, the probability of conflict success (p) and the cost of sanctioning (C). In addition to these main explanatory variables, we also include several control variables, which are mentioned in the compliance literature (e.g.).

For the probability of conflict success (p) we introduce the polarization of the member states' interests as a crucial explanatory factor. We define polarization as the sum of the standard deviations of all member states' most preferred outcome for the goals of each directive. The more split the member states are on these outcomes, the higher is their directive-specific polarization. In our view, it is difficult if not impossible for the Commission to find enough support for an enforcement decision when the member states are split on a directive. In this scenario of polarized interests, some member states may even support implementation failures (Torenvlied 2000). In the end, a highly contested directive typically leads to the adoption of ambiguous and incoherent goals. McCubbins et al. (1987, 1989) find that conflict between major legislators leads to 'preference-induced discretion' for the implementers of the respective policy. Furthermore, König and Junge (2009) show that Council decision making requires intense logrolling. Hence, we expect that a polarization of the member states' interest positively influences the member state's utility, while it has a negative effect on the Commission's utility for enforcement.

To operationalize the sanctioning costs of each actor (C_{Com}, C_{ms}) we argue that the member state's relative costs of sanctioning decrease with the level of their (weighted) disagreement with a directive's goals. We measure the level of disagreement by the sum of each actor's absolute distance to the goals of a directive. Regarding the weights, we sum up each actor's saliency on the goals of a directive. We expect that a member state that strongly disagrees with an EC directive will have a high incentive for non-compliance and is therefore more willing to bear the costs of sanctions. In other words, member states with a high level of disagreement regard sanction costs as sufficiently low relative to their expected gains from a

conflict with the Commission. Similarly, the agreement of the Commission should provide an incentive for taking action to enforce the directive. The gains from this enforcement decision should increase with the Commission's level of agreement on the one, while the costs of sanctions should decrease on the other side. Accordingly, we expect a positive relationship between the level of a member state's and the Commission's (weighted) (dis-)agreement and their utilities for enforcement. The DEU data on polarization of the member states' interests, their (dis-)agreement with the goals of a directive and the level of their saliency helps us to operationalize the main variables of our strategic model. Table 3a provides a detailed summary of our main explanatory variables, listing their minimum, low, mean, moderate and maximum values.

Table 3a about here

Besides our two main explanatory variables, we also include several control variables in our empirical analysis. All of these control variables relate to the compliance literature, which proposes numerous explanations for implementation. Compared to the specification of the utilities of the actors involved, they relate to either directive- or country-specific characteristics.

Regarding the member state's utility for implementation we included three variables, namely the complexity of the directive, the delegation ratio of implementation authority, and a measure of the member states administrative capacities. Several studies of EU compliance (Mastenbroek 2003; Falkner et al. 2005; Kaeding 2006) mention the complexity of EC directive as a crucial explanation for non-compliance. Accordingly, we expect that member state's utility for implementation decreases as the directive's complexity increases, since complex directive are more difficult to implement correctly and in due time. Furthermore EC directives delegate more powers to the member states in those areas in which the link between

policy and outcome is uncertain (Franchino 2004: 274). Thus the level of the delegated implementation authority should be associated with a higher risk of non-compliance at the implementation stage and we assume that the delegation ratio has a negative effect on the member state's utility for implementation. The used measure of delegation ratio is based on Franchino's (2004) adaptation of Epstein and O'Halloran's (1999). Finally we included in the utility of the member state for implementation a measure of bureaucratic efficiency (Kaufmann et al. 2006) since several studies on EU compliance argue that member states fail to fulfill their implementation obligations due to a general lack of administrative capacity (Pridham 1994: 99; Mbaye 2001: 261-262; Falkner et al. 2005: 302-303; Thomson 2007: 997).

In addition to our main explanatory variables we included two type of directive and an index of domestic interest group influence in the utility for enforcement of both actors. The type of directive is a dummy variable, coded as 0 if the respective directive is a Council directive or as 1 if it is a Council and EP directive. In order to measure the influence of interest groups in each of the member states we use an index of interest group pluralism proposed by Lijphart (1999: 171-185), where high values of the index indicate a relative low influence of domestic interest groups.

Regarding the member state's utility for enforcement we also include a measure of discretionary power. As a measure of discretionary power we use the number of obligations contained in each directive and assume that the level of discretionary power has a negative relationship with the member state's utility for enforcement. Member states with substantial discretionary power should have fewer difficulties to fulfill their implementation obligation, since their room of maneuver increases, and should therefore be less willing to bear the possible sanction costs imposed by the Commission.

Finally, in the case of the Commission's enforcement utility we included a dummy variable whether or not the respective directive includes an issue concerned with the deadline for

implementation. Since the monitoring system of the Commission, due to limited resources, is not able to pursue all cases of compliance failures and cases of late implementation are much easier to detect than cases of incorrect implementation we assume that a issue concerned with the deadline increases the utility of the Commission for enforcement. Table 3b provides a detailed summary of our control variables.

Table 3b about here

Strategic Probit Analysis

Before presenting our QRE results, Table 4 lists the findings of two standard probit models, which estimate the effects of our independent variables on the likelihood of either enforcement or compliance deficit versus both other possible outcomes. These models ignore the fact the strategic relationship postulated by our theoretical model. They commonly find polarization of member states' interests is insignificant for both outcomes, while disagreement positively contributes to enforcement by the Commission and compliance deficit. Only number of major provisions still matters for both outcomes, while a number of control variables are relevant for either outcome.

Table 4 about here

Table 5 reports the results of our strategic analysis, in which the columns list the estimates of the four utility functions as depicted in Figure 4. The cell entries are maximum likelihood estimates with standard errors shown below in parenthesis. Overall our model has a relatively high model fit with over 71% of the outcomes predicted correctly. Regarding the member state's decision for implementation, our model correctly predicts more than 86% of the 195 cases, while we overestimate their implementation behavior vis-à-vis enforcement (43%) and

deficit (27%). Column 1 of Table 5 displays the estimate ($\hat{\beta}_{11}$) for the member states' utility for implementation – the $\hat{\beta}_{11}$ from $U_{ms}(Implementation) = X_{11}\beta_{11}$, column 2 the estimates ($\hat{\beta}_{13}$) for the member states' utility of enforcement, and column 3 the estimates ($\hat{\beta}_{14}$) for the member states' utility for a compliance deficit, while he last column shows the estimate ($\hat{\beta}_{24}$) for the Commission's utility of enforcement.

Table 5 about here

Similar to the results of the standard probit models, we find that the member states' decision for compliance is mainly influenced by disagreement as well as the complexity, delegation ratio, level of discretion and type of the directive. However, the polarization of member states' interests, the Commission's saliency and the influence of domestic interest groups significantly affect the enforcement decision of the Commission. Figures 6 a-f display the differences between the QRE model (solid line) and the probit models (dashed line).

Figures 5 a-f about here

The plots show the outcome probability of enforcement and compliance deficit as a function of our main explanatory variables, while holding the other independent variables fixed as their mean values. According to Figure 5a, the simple probit model is unable to detect the non-monotonic relationship between the polarization of member states' interests and the probability of enforcement. Furthermore, Figures 5 b-f reveal significant differences between the effects of the QRE and the standard probit models.

According to the QRE models, the utility of the Commission for enforcement is higher, and hence the Commission is more likely to enforce directives, when the (1) the polarization of the member states' interests in the Council is lower, (2) the Commission's saliency regarding

the directive is higher, (3) and the weaker the influence of domestic interest groups is. Furthermore, the enforcement decision of the Commission is influenced by neither its agreement with the goals and the type of a directive nor whether an issue concerning the deadline is included in the directive. Confirming our expectation, the Commission's decision to enforce the goals of a directive is significantly influenced by the probability (p) of its conflict success and the associated costs of sanctioning (C_{Com}). In the event of polarized interests of the member states, the Commission has difficulties to find enough support for enforcement by other member states. This decreases the probability of filing a reasoned opinion, and hence decreases the Commission's utility for enforcement. Likewise, the Commission is only willing to bear the cost of sanctioning when its saliency for the respective directive is high. However, that the Commission's utility for enforcement increases when interests groups are less powerful in the non-complying member state is.

Regarding the member states' utility for enforcement we find that they are more likely not to comply with the goals of a directive, the more they disagree with them. The results further reveal that the member states' utility for enforcement is higher for Council & EP directives than for directives decided solely by the Council. Furthermore, a member state's utility for dispute significantly decreases with the level of discretionary power. All other variables, such as the polarization of state's interests, their saliency for the directive and the influence of domestic interest groups, have no statistical significant effect for their enforcement decision. Leaving aside significance, the member state's utility of enforcement, which means conflict with the Commission, increases with the polarization of state's interests within the Council, while it decreases with the influence of domestic interest groups and with the level of saliency.

The utility of the member states for implementation is significantly affected by two directive-specific factors, (1) the complexity of the directive and (2) the delegation ratio of implementation authority by the directive. The state's utility for implementation decreases

with the complexity of the directive and the level of delegation ratio. Hence, member states are less likely to comply with very long and complex directives, which delegate substantial implementation duties to their domestic administrations. However, the results suggest that the efficiency level of their administration have no significant effect for their implementation decision. This seems to reject a main explanatory factor of the management school of thought, but the coefficient however indicates that the utility of the member states for implementation increases with the efficiency of their administration.

THE PROBABILITY OF COMPLIANCE AND ENFORCEMENT

To interpret the relationship the findings of our strategic model more substantially we take a closer look at the marginal effects of our independent variables – i.e. the change in the estimated probabilities of the outcomes as the values of the explanatory variables change. Our model allows us to assess the impact of our explanatory variables not only on the probability of member states' compliance but also on any other actions and outcomes of the model. Thus, in addition to interpreting the effects of our independent variables on the probability of member states compliance behavior ($p_{Implementation}$) we can also examine the changes in the probabilities of enforcement ($p_{Enforcement}$) and compliance deficit ($p_{Deficit}$).

According to our model, the member states' decision to implement the goals of directives does not only depend on their own utility for implementation but also on the Commission's utility for enforcement. Member states comply if and only if their true expected utility for non-compliance is greater than their true expected utility for implementation, which means that $p_{RO}\,U^{*}_{ms}(Enforcement) + p_{\sim RO}\,U^{*}_{ms}(Deficit) > U^{*}_{ms}(Implementation)$. It is important to note, that p_{RO} is a function of the explanatory variables in the Commission's utility for enforcement. Insofar, these variables not only affect the Commission's enforcement decision but also indirectly the implementation decision of the member states. While the variables that enter into the Commission's utility only have an indirect effect on the member

states' decision, the variables that enter in both the member states and Commission's utilities have a direct as well as an indirect effect.

We start the interpretation of the marginal effects with the significant binary variable type of EC directive, before we continue with the interpretation of the continuous variables.[3]. Table 6 reports the outcome probability of member state's compliance behavior (labeled "Impl."), the outcome probability of enforcement by the Commission (labeled Enf."), and the outcome probability of a compliance deficit (labeled "Def."). For the calculation of the outcome probabilities we use the equilibrium probabilities as specified in the equations reported on page X and the estimates displayed in Table 4. The first row of Table 6 displays the probabilities for the three outcomes for four baseline categories, where each of the independent variables are set either to their minimum, low, mean, or moderate values[4]. These values are displayed in Tables 3a and 3b. The second row of Table 6 display the outcome probabilities as the directive type changes from a Council directive to a Council & EP directive. The baseline category serves as a reference category for the lower row, where the effect of the independent variable is equal to the difference between the baseline probability and the row probabilities.

Table 6 about here

Considering the outcome probabilities of our four baseline scenarios, the probability of implementation is .980 when we hold all variables at their minimum values. In this scenario the directive is not very complex, it delegates only a minimum of implementation authority to

[3] Here we limit our discussion to only substantive important results.

[4] In each of the four baseline scenarios the two included binary variables, i.e. type of directive and issue of timeliness, are all set equal zero.

the member states, and the member states are almost in line with the directive's content. Thus, member states have almost no incentive to not comply with the directive and the Commission has no need to enforce the respective directive. Thus the model's resulting outcome probabilities for the outcomes of enforcement (.017) and of compliance deficit (.003) are extremely low. In the low scenario, the member states have a somewhat higher incentive not to comply with the directive, resulting in a slight decrease of the implementation probability to .980. In addition, the Commission is more likely to enforce the respective EC directives, which leads also to minor increase in the probability of the enforcement outcome to .058 and an only very moderate increase in the probability of the compliance deficit to .019. In the following mean scenario the outcome probability of implementation further decreases to .814 while the outcome probability of enforcement and deficit further increase to .140 and .046 respectively. In the last scenario, where we hold all variables at their moderate values, the member states have an much higher incentive not to comply, leading to a lower outcome probability for implementation of .707, and the Commission has a high incentive for enforcement, resulting in a high probability of enforcement .283 and a low probability of the compliance deficit .010. Summing up these results of our baseline scenario, we interestingly find a general nonmonotonic effect for the outcome probability of the compliance deficit while we only find strict monotonic effects for the two other outcome probabilities. As the explanatory variable for utilities of the member states and the Commission change from the minimum to the mean values the outcome probability of deficit increase from .017 to .046, while the probability decreases to only 0.010 as the values change from mean to the moderate. When we consider the effects of the type of EC directive we find a similar nonmonotonic effect for the outcome probability of a compliance deficit and similar strict monotonic effects for the two other outcome probabilities. The outcome probability of implementation drops in the minimal case from over .980 to .913 as the type of directive changes from a Council to a Council & EP directive while the probability of enforcement increases from .017 to .079. Also

the risk of a compliance deficit increases from .003 to .008. In the low and mean cases the probability of implementation further decreases to .604 while the outcome probability for enforcement and the compliance deficit further increase to .316 and .080. In the moderate case the probability of implementation is only .423 while the probability of enforcement is over .5. Interestingly, the probability for the outcome of a compliance deficit is only .013, thus it decreased relatively compared to the mean scenario. According to this result the type of EC directive has as nonmonotonic effect on the likelihood of the outcome of a compliance deficit. Put in other words, the change in the type of directive, from a Council to a Council & EP directive does not always lead to a higher risk of compliance deficit but depends on the explanatory variables for the utility of the Commission.

The effects of our main continuous explanatory variables are displayed in Figure 5(a-f). The outcome probability of enforcement and compliance deficit are plotted as a function of the polarization of member states' interests, the member state's disagreement, and the level of Commission's saliency, while holding the other independent variables fixed as either their low (dashed lines), their mean (solid lines) or their moderate (dotted lines) values.

Figure 5a displays the effect of the polarization of member states' preferences in the Council on the probability of enforcement. Recall from Table 4 that we find a contrary effect of the polarization of member states' interest. While the increase in the polarization of member states' interest is associated with (1) a decrease in the utility of the Commission for enforcement, making it less likely to enforce it is also associated with (2) an increase in the member state's utility for enforcement, making it more likely not to comply and to risk an enforcement decision by the Commission. Accordingly, Figure 5a indicates that the variable has a nonmonotonic effect on the probability of enforcement. Considering the moderate scenario (dotted line), the figure reveals that the increase in the polarization of member states' interests also leads to an increase in the probability for enforcement up to a certain point

(0.32) before the enforcement probability sharply drops and a the probability of an enforcement decision by the Commission is near zero.

Examining Figure 5b we find a strict monotonic relationship between the polarization of member states interests and the probability of a compliance deficit. The increase in the polarization of member states interests is always associated with an increase in the probability of a compliance deficit. This is a quite intuitive result, as the increase in the polarizations of member states' interests always favors the non-complying member states and always decreases the chance of a strict enforcement decision by the Commission, even in cases where a non-complying behavior is detected. Interestingly, Figure 5b also reveals that the point at which the effect kicks in and the overall size of the effect mainly depends on the values at which the other variables are held constant. As we would expect, Figure 5b reveals that the effect of the variable is greatest when we hold all other values at their moderate value (dotted lines). However the increase in the probability of compliance deficit starts to kick in earlier for the low value line (dashed line), followed by the mean value line (solid line), and the moderate line (dashed line).

Regarding Figure 5c and d, we find a strict monotonic effect of the member state's disagreement on the probability of enforcement and compliance deficit. As seen in Figure 5c and d, an increase in level of member state's disagreement is always associated with an increase in the probability of enforcement or compliance deficit. However, according to Figure 5d, the level of member state's disagreement has only a weak effect on the probability of compliance deficit for low and mean values of the other variables while it is absent in case of moderate values.

Similar to the effect of member state's disagreement we find a strict monotonic effect of the saliency of the Commission on the probability of either enforcement or compliance deficit. According to Figure 5e, an increase in the Commission's saliency is always associated with an increase in the probability of enforcement. Again like in the case of Figure 5b, the point at

which the effect kicks in and the overall size of the effect depends on the values at which the other variables are held constant. While the dotted line (moderate values) reaches the highest probability level of enforcement it starts to increase much later than the solid (mean values) and the dashed (low values) line. Finally, Figure 5f displays a strict decreasing, monotonic effect of Commission's saliency on the probability of compliance deficit. For directives associated with high levels of saliency the likelihood that the Commission ignores cases of member state's non-compliance is near zero.

Another possibility to analyze the data and to explore the compliance decision of the member states and the enforcement decision of the Commission is to use a simple probit model. As argued and demonstrated by {Signorino, 2003 #197} simple probit models do not fully capture the strategic interaction between the two players and the failure to statistically model the interdependence between the players' decisions may lead to omitted variable bias. Nevertheless, simple probit analysis is usually applies as the starting point of many analyses of strategic models in political science.

The two Probit models, displayed in Table 8, assess the effects of our independent variables on the likelihood of either the enforcement or the compliance deficit outcome versus both other possible outcomes. Hereby, we simply ignore the fact of the much more complex relationship postulated by our theoretical model. In Figure 6 (a-f) we compare the estimates of our QRE model (solid line) with those of our simple probit model (dashed line). The plots show the outcome probability of enforcement and compliance deficit as a function of our main explanatory while holding the other independent variables fixed as either their mean values. As revealed by Figure 6a the simple Probit model is unable to detect the nonmonotonic relationship between the polarization of member states' interests and the probability of enforcement. The probit model simply postulates a monotonic increasing effect, i.e. as the polarization of member states' interests increase so does the probability of

enforcement. In addition Figure 6 (b-f) reveal significant differences between the effects of the different models.

Table 1: Number of 'Reasoned Opinion' and 'Referrals' issued between 1979 and 2006 (aggregated over four year periods)

	1979-82		1983-86		1987-90		1991-94		1995-98		1999-2002		2003-06	
	RO	Ref.	RO	Ref.	RO	Ref.	RO	Ref.	RO	Ref.	RO	Ref.	RO	Ref.
Austria	-	-	-	-	-	-	-	-	78	5	156	39	108	57
Belgium	67	29	77	46	113	44	135	31	192	64	148	41	139	52
Denmark	21	4	13	7	21	7	24	1	12	1	31	5	32	7
Finland	-	-	-	-	-	-	-	-	24	1	58	8	80	31
France	75	19	116	48	99	32	113	15	206	55	207	115	178	63
Germany	39	8	55	31	77	19	132	15	143	42	151	48	132	54
Greece	2	0	85	27	151	45	204	34	152	55	197	70	234	83
Ireland	31	8	36	15	77	16	112	24	99	26	143	54	102	38
Italy	109	52	139	73	217	96	225	53	234	62	198	101	302	103
Luxembourg	38	8	36	13	57	14	121	35	90	26	144	56	161	79
Netherlands	39	7	28	9	54	14	81	21	47	8	67	25	104	39
Portugal	-	-	-	-	24	3	200	8	163	29	174	40	192	35
Spain	-	-	-	-	42	10	150	21	104	28	123	40	128	60
Sweden	-	-	-	-	-	-	-	-	21	1	53	8	70	22
UK	26	6	33	11	43	9	60	4	72	5	136	42	105	34
Total	447	141	618	280	975	309	1557	262	1637	408	1986	692	2067	757

Table 2: Theoretical Effects of Costs and Probability of Success on Outcomes

Commission's enforcement condition	Member state's compliance condition	Equilibrium outcome
$p \geq 1 - C_S$	For all $p \in [0,1]$	*Deficit*
$p < 1 - C_S$	$p \geq C_R$	*Enforcement*
$p < 1 - C_S$	$p < C_R$	*Implementation*

Table 3a: Summary of the main independent variables

Theoretical concepts	Operationalization	Min	Low	Mean	Moderate	Max
Probability of infringement procedure success	Polarization of states' interests	-1,348	-0,776	0,000	0,418	2,570
Sanctioning costs	Member state's disagreement	-0,961	-0,662	0,003	0,385	4,035
	Meber state's saliency	-1,252	-0,663	-0,009	0,635	2,758
	Commission's agreement	-1,119	-0776	-0,004	0,459	2,705
	Commission's saliency	-1,150	-0,764	-0,010	0,777	2,063

Table 3b: Summary of the control variables

Independent Variables	Min	Low	Mean	Moderate	Max
Number of provisions	-1,302	-0,619	-0,005	0,140	2,189
Delegation ratio	-1,854	-0,969	-0,032	0,664	1,797
Bureaucratic efficiency	-3,012	-0,344	-0,005	0,777	1,270
Type of directive (1 - CM & EP)	0	0	0	0	1
Domestic interest group influence	-1,732	-0,789	0,004	0,869	1,309
Discretionary power	1	1	1,906	2	5
Issue of timeliness	0	0	0	0	1

Table 4: Probit Regression Models for Enforcement and Compliance Deficit

Dependent variable	Probit 1 Enforcement	Probit 2 Compliance Deficit
Constant	-1.195**	-4.005**
	(0.582)	-1568
Number of major provisions	0.420***	0.481*
	(0.112)	(0.255)
Delegation ratio	0.518***	0.172
	(0.138)	(0.317)
Bureaucratic efficiency	-0.191*	0.104
	(0.112)	(0.213)
Polarization of states' interests	0.190	0.988
	(0.384)	(0.888)
Member state's disagreement	0.233*	0.555**
	(0.126)	(0.248)
Member state's saliency	0.234	-0.565
	(0.220)	(0.373)
Commission's agreement	-0.200	-0.385
	(0.190)	(0.398)
Commission's saliency	-0.379	-1.706**
	(0.346)	(0.792)
Type of directive (1 - CM & EP)	1.167***	0.761
	(0.341)	(0.556)
Domestic interest group influence	0.186	-0.142
	(0.117)	(0.183)
Discretionary power	-0.239	0.934
	(0.292)	(0.713)
Issue of timeliness	0.692*	-
	(0.360)	-
N	299	299
Prob > chi2	0.000	0.000
Pseudo R2	0.221	0.216

Standard error in parenthesizes. Significant level: ***p<0.001; **p<0.05; *p<0.10

Table 5: Strategic Probit Regression Based on the Model in Figure 3

	U_{com} (Enforcement)	U_{ms} (Enforcement)	U_{ms} (Deficit)	U_{ms} (Implementation)
Constant	0.984		-0.294	
	(0.598)		(0.590)	
Number of major provisions				-0.554***
				(0.143)
Delegation ratio				-0.352**
				(0.174)
Bureaucratic efficiency				0.134
				(0.139)
Polarization of states' interests	-3.849**	0.282		
	(1.276)	(0.346)		
Member state's disagreement		0.586**		
		(0.246)		
Member state's saliency		-0.080		
		(0.265)		
Commission's agreement	-0.619			
	(0.631)			
Commission's saliency	3.836**			
	(1.328)			
Type of directive (1 - CM & EP)	0.191	1.063*		
	(0.744)	(0.566)		
Domestic interest group influence	0.670**	0.232		
	(0.285)	(0.228)		
Discretionary power		-0.743**		
		(0.313)		
Issue of timeliness	4.231			
	(3.366)			
N	299			
Log Likelihood	-197.607			
PCP Outcomes	71.24			
PCP Enforcement				
PCP Compliance	86.15			

Standard error in parenthesizes. Significant level: ***p<0.001; **p<0.05; *p<0.10

Table 6: Effects of Independent Variables on the Predicted Probabilities

	Holding all independent variables at											
	Minimal			Low			Mean			Moderate		
	Impl.	Enf.	Def.	Impl.	Enf.	Def.	Impl.	Enf.	Def.	Impl.	Enf.	Def.
Baseline model:												
Type of directive (CM)	0,980	0,017	0,003	0,923	0,058	0,019	0,814	0,140	0,046	0,707	0,283	0,010
Individual variable:												
Type of directive (CM & EP)	0,913	0,079	0,008	0,787	0,170	0,043	0,604	0,316	0,080	0,423	0,564	0,013

Figure 1: Average number of infringement procedures issued between 1979 and 2006

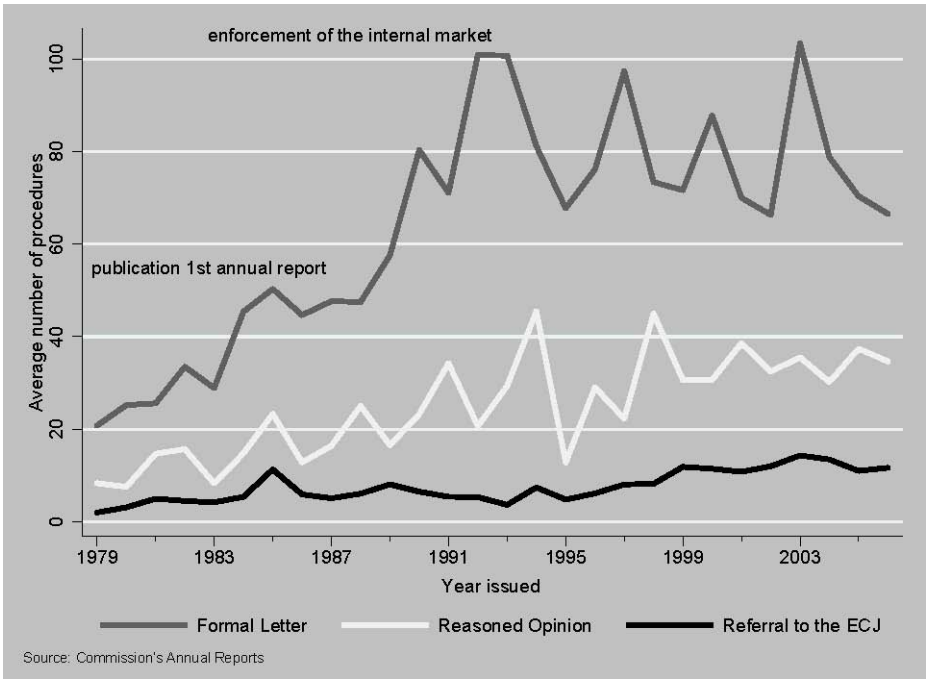


Figure 2: Game Tree of the Compliance and Enforcement Model

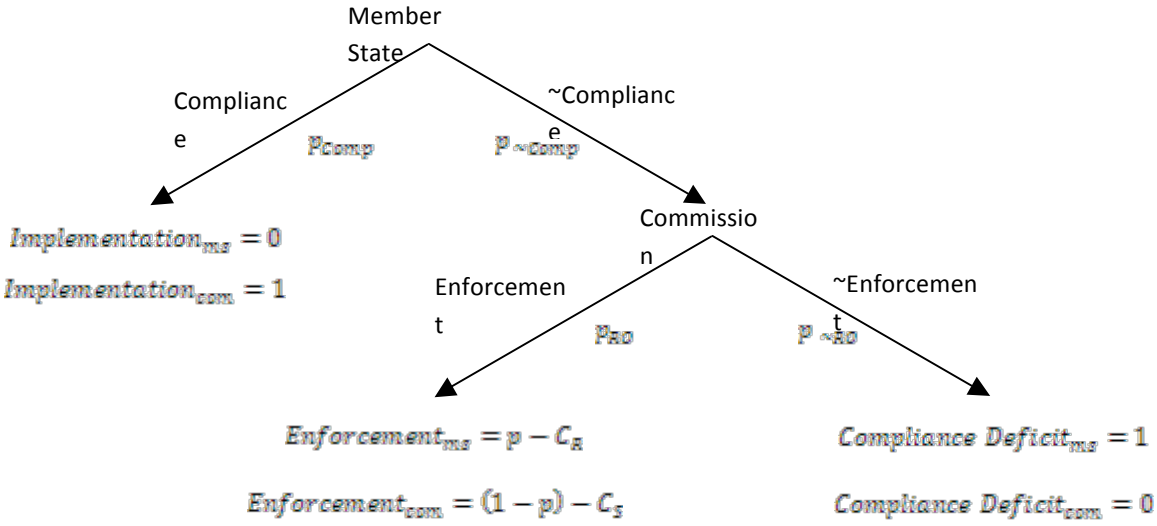


Figure 3: The Compliance Model with Uncertainty Concerning Utilities

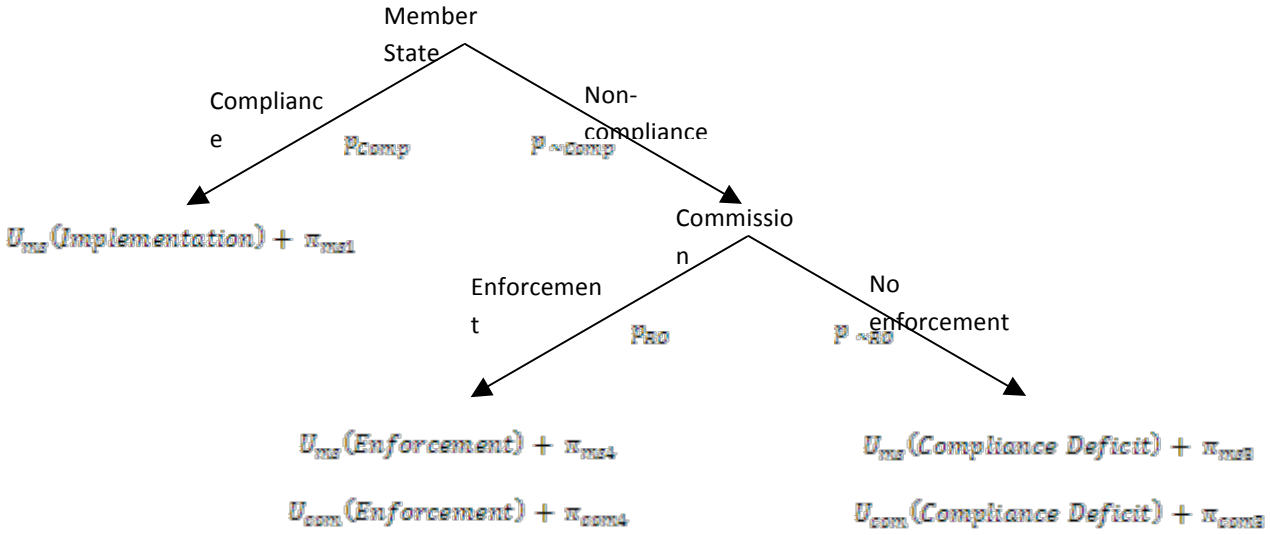


Figure 4: Specification of Utilities in Terms of Regressors

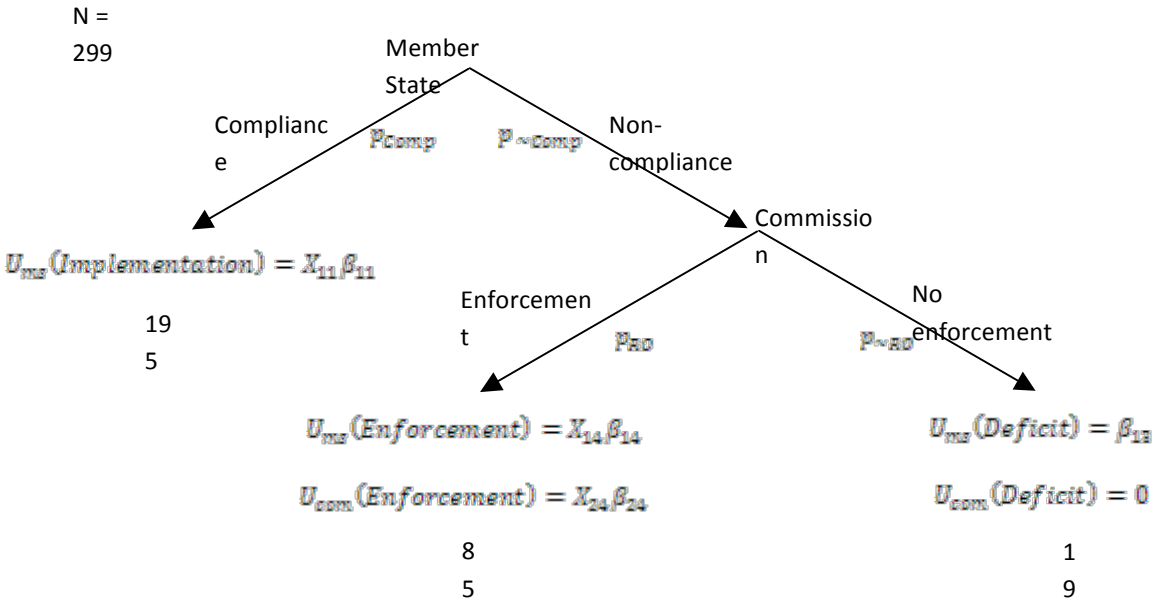
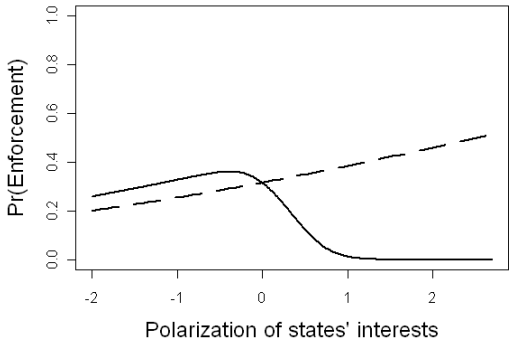
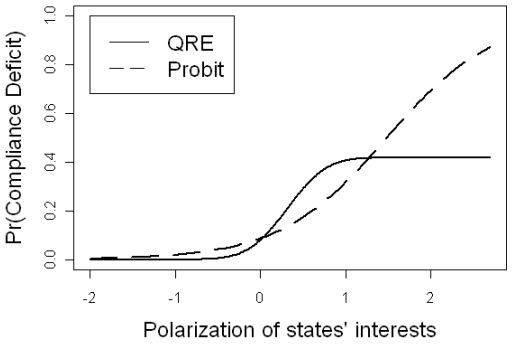


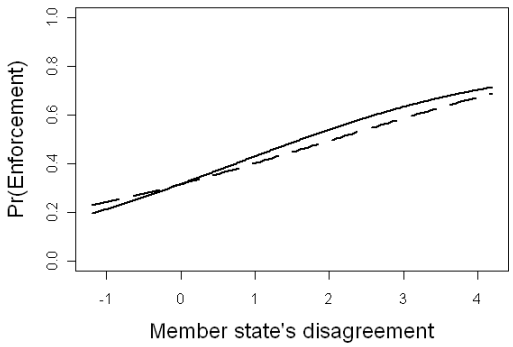
Figure 5: Comparison between the QRE Estimates and Probit Estimates



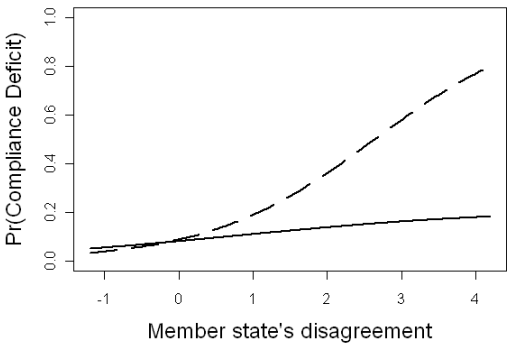
a) Effects of polarization of states' interests on the probability of enforcement



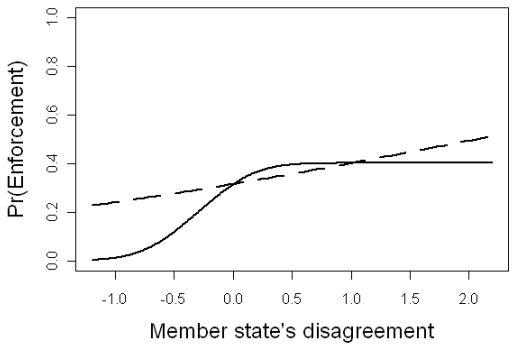
b) Effects of polarization of states' interests on the probability of compliance deficit



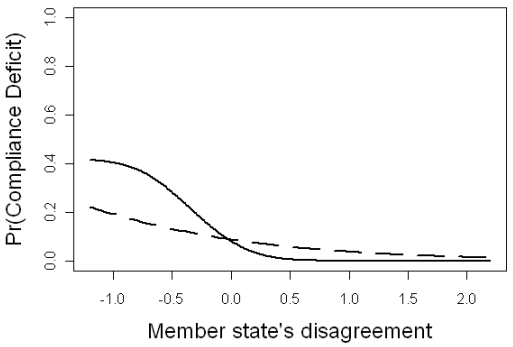
c) Effects of member state's disagreement on the probability of enforcement



d) Effects of member state's disagreement on the probability of compliance deficit

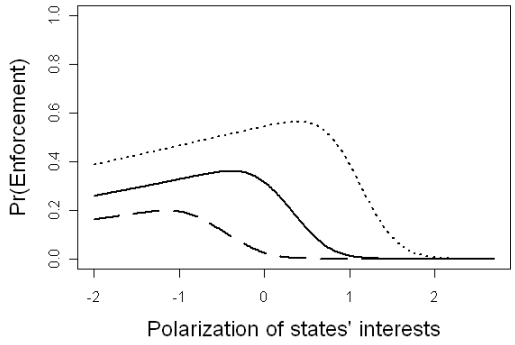


e) Effects of Commission's saliency on the probability of enforcement

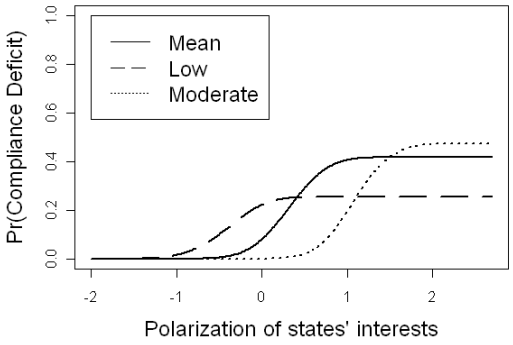


f) Effects of Commission's saliency on the probability of compliance deficit

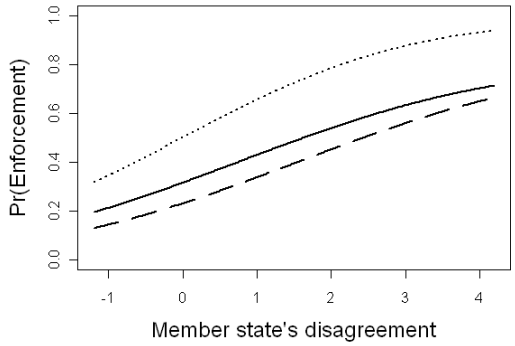
Figure 6: Effects of Major Explanatory Variables



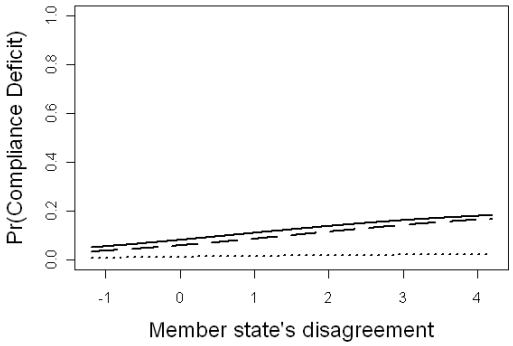
a) Effects of polarization of states' interests on the probability of enforcement



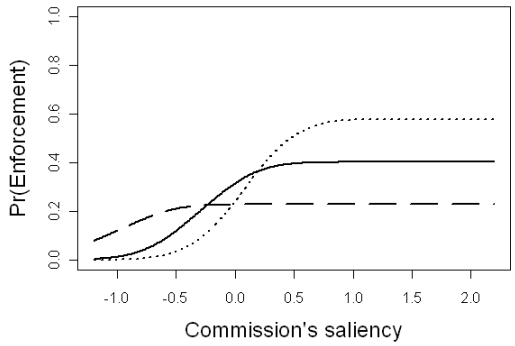
b) Effects of polarization of states' interests on the probability of compliance deficit



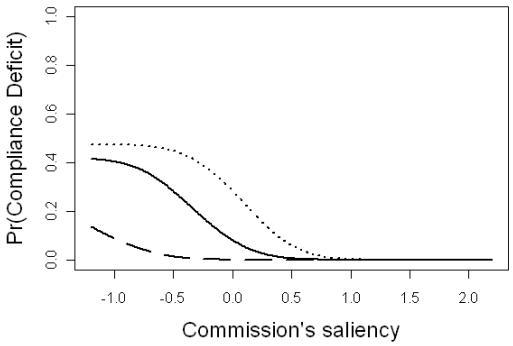
c) Effects of member state's disagreement on the probability of enforcement



d) Effects of member state's disagreement on the probability of compliance deficit



e) Effects of Commission's saliency on the probability of enforcement



f) Effects of Commission's saliency on the probability of compliance deficit

APPENDIX:

Derivation of Strategic Choice Probabilities

The derivation of equilibrium choice probabilities is based on the two strategic random utility models shown in Figure 2.

The member state's utilities for the three possible outcomes (I (Implementation); C (Capitualtion); D (Dispute)) are assumed to be:

$$U^{*}_{ms}(Implementation) = U_{ms}(Implementation) + \pi_{ms1}$$

$$U^{*}_{ms}(Compliance\ Deficit) = U_{ms}(Compliance\ Deficit) + \pi_{ms3}$$

$$U^{*}_{ms}(Enforcement) = U_{ms}(Enforcement) + \pi_{ms4}$$

where $U^{*}_{ms}(.)$ is the true utility, $U_{ms}(.)$ is the observed component, and π_{msj} is a random component that is private information to the member state.

The Commission's utilities for the two possible outcomes (C (Capitulation); D (Dispute)) are assumed to be:

$$U^{*}_{com}(Compliance\ Deficit) = U_{com}(Compliance\ Deficit) + \pi_{com3}$$

$$U^{*}_{com}(Enforcement) = U_{com}(Enforcement) + \pi_{com4}$$

Under the assumption that π_{ij} are i.i.d. $N(0, \sigma^2)$ and that the member state and Commission are utility maximizer. The Commission will enforce the respective EU policy (send a Reasoned Opinion to the respective member state) if $U^{*}_{com}(Enforcement) > U^{*}_{com}(No\ Enforcement)$, and will back down otherwise.

$$p_{RO} = \Pr[RO] = \Pr[U^{*}_{com}(Enforcement) > U^{*}_{com}(Compliance\ Deficit)]$$

$$= \Pr\ [U^{*}_{com}(Enforcement) > U^{*}_{com}(Compliance\ Deficit)]$$

$$= \Pr\ [U_{com}(Enforcement) + \pi_{com4} > U_{com}(Compliance\ Deficit) + \pi_{com3}]$$

$$= \Pr\ [U_{com}(Enforcement) - U_{com}(Compliance\ Deficit) > \pi_{com3} - \pi_{com4}]$$

$$= \Phi\left[\frac{U_{com}(Enforcement) - U_{com}(Compliance\ Deficit)}{\sqrt{2\sigma^2}}\right]$$

The member state's choice probability is derived in the same way. The only difference is that, because the member state is uncertain whether the Commission will enforce the respective EU policy, the member state's utility will be an expected utility.

The probability that member state will try to attack the Community legal order and not implement the previously adopted EU policy:

$$p_{\sim Impl} = \Pr[\sim Implementation] = \Pr[U^{*}_{ms}(\sim Implementation) > U^{*}_{ms}(Implementation)]$$

$$= \Pr\ [p_{RO}U^{*}_{ms}(RO) + p_{\sim RO}U^{*}_{ms}(\sim RO) > U^{*}_{ms}(Implementation)]$$

$$= \Pr\ [p_{RO}(U_{ms}(Enforcement) + \pi_{ms4}) + p_{\sim RO}(U_{ms}(Compliance\ Deficit) + \pi_{ms3}) > U_{ms}(Implementation) + \pi_{ms1}]$$

$$= \Pr\ [p_{RO}U_{ms}(Enforcement) + p_{\sim RO}U_{ms}(Compliance\ Deficit) - U_{ms}(Implementation) > \pi_{ms1} - p_{RO}\pi_{ms4} - p_{\sim RO}\pi_{ms3}]$$

$$= \Phi\left[\frac{p_{RO}U_{ms}(Enforcement) + p_{\sim RO}U_{ms}(Compliance\ Deficit) - U_{ms}(Implementation)}{\sqrt{\sigma^2(1 + p_{RO} + p_{\sim RO})}}\right]$$

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