

## **The national impact of European Union regulatory policy: Three Europeanization mechanisms**

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**Abstract.** While much has been written about the impact of European Union (EU) regulatory policy, most of the scholarly work is concerned with developments at the European level. Only recently have attempts been made to fill this gap. Although there is a growing number of studies explicitly concerned with the Europeanization of domestic institutions, we still lack consistent and systematic concepts to account for the varying patterns of institutional adjustment across countries and policy sectors. The aim of this article is to provide a more comprehensive framework for explaining the domestic impact of European policy making. We make an analytical distinction between three mechanisms of Europeanization – institutional compliance, changing domestic opportunity structures, and framing domestic beliefs and expectations – each of which requires a distinctive approach in order to explain its domestic impact. We argue that it is the particular type of Europeanization mechanism involved rather than the policy area itself that is the most important factor to be considered when investigating the domestic impact of varying European policies.

### **Introduction**

While much has been written about the European Union (EU) in recent years, most of the scholarly work is concerned with developments at the European level and focuses on the extent to which domestic conditions affect the outcome of supranational institution-building and policy making. As a result there is still little understanding of the impact of European integration at the national level. Only recently has this gap begun to be addressed in a growing number of studies explicitly concerned with the Europeanization of domestic institutions and, more specifically, with the extent to which the implementation of European policies implies changes to domestic institutions such as dominant regulatory styles and the decision-making structures of particular policy sectors.

Despite the growing number of studies in this area, we are still confronted with rather puzzling and inconsistent empirical and theoretical findings. On the one hand, empirical evidence indicates that the domestic impact of Europe varies somewhat unsystematically across both policy sectors and countries. The same European policy might produce fundamental reforms in one country

but have no impact at all in others. We might observe considerable regulatory adjustments to some European policies while, in the same country, nothing at all happens in other areas of Europeanization (Caporaso et al. 2001; Héri-tier et al. 2001; Knill & Lenschow 1998).

On the other hand, we are confronted with rather divergent theoretical explanations for the varying impact of European integration on domestic arrangements. Some studies (Duina 1997; Héri-tier et al. 1996; Olsen 1995) identify the institutional compatibility of European and domestic arrangements (i.e., the level of change required to adapt to European measures) as the most important variable in accounting for the domestic impact of Europe. Others completely discard this institutional argument, focusing instead on the extent to which European policies have affected the domestic opportunity structures and interest constellations (Lehmkuhl 1999; Schneider 2001), while another group of scholars suggests a combination of the compatibility and opportunity structure arguments (Börzel 1999; Cowles & Risse 2001; Knill 2001a). In contrast to these suggestions, recent studies (Checkel 1998; Lavenex 1999) emphasize the cognitive impact of European policies on the beliefs and expectations of domestic actors in order to account for varying national responses to Europeanization.

It is the aim of this article to provide a more comprehensive framework for explaining the domestic impact of European policy making. In so doing we suggest a differentiation and qualification of existing perspectives by identifying different *mechanisms of Europeanization*, where each mechanism requires a distinctive approach to account for corresponding patterns of domestic change. In this context the analytical focus is on the dominant form of European policy making, namely EU regulatory policy, with Europeanization being conceptualized as the impact of these policies on national policies and institutions.<sup>1</sup>

We make an analytical distinction between three mechanisms of Europeanization – institutional compliance, changing domestic opportunity structures, and framing domestic beliefs and expectations – each of which requires a distinctive approach in order to explain its domestic impact. We argue that the distinctive basis of Europeanization rather than the particular policy area is the most important factor to be considered when investigating the domestic impact of varying European policies. In particular, this distinction departs from other studies which identify pressure to adapt domestic arrangements to meet European requirements as the necessary condition for domestic change, regardless of the underlying mechanism of Europeanization (Cowles & Risse 2001). As will be shown, European policies might trigger national reforms by altering domestic opportunity structures or beliefs even though there is com-

plete congruence between European and domestic policy and institutional arrangements.

To illustrate these arguments we will draw on empirical findings from three policy areas in which the three mechanisms can be observed most clearly: environmental policy (institutional compliance), road haulage policy (changing domestic opportunity structures) and railways policy (framing). The article is organized as follows. In the next section we develop our analytical concept of varying Europeanization mechanisms and elaborate on the implications of this distinction when explaining the varying domestic impact of European policies. The validity and applicability of these considerations will be illustrated in further sections looking at empirical findings from the European Community's environmental, road haulage and railways policies.

## **How Europe matters: Distinctive patterns of Europeanization**

### *Three mechanisms of Europeanization*

European policy making might impact upon domestic regulatory styles and structures in three basic ways. European policies might be: (a) very prescriptive and demand that Member States adopt specified measures in order to comply with EU requirements; (b) confined to changing domestic opportunity structures; or (c) in their weakest form, without any direct institutional impact at all since they primarily aim to change domestic beliefs and expectations.

It is important to emphasize that this distinction between three forms of impact is *analytical* rather than empirical. Many European policies might be characterized by a mixture of different mechanisms of Europeanization as the distinctive mechanisms are linked to each other in a hierarchical way with the more explicit mechanism encompassing weaker forms of Europeanization. Thus the prescription of an institutional model for domestic compliance will generally also affect domestic opportunity structures and the beliefs and expectations of domestic actors. In a similar way, policies directed towards changes in domestic opportunity structures will concur with potential cognitive impacts on beliefs and expectations. The existence of such hybrid forms of Europeanization does not call our general argument into question, but indicates the need for careful analysis of the underlying logic of Europeanization in order to understand the domestic impact of any particular policy.

In its most explicit form European policy making may trigger domestic change by prescribing specific institutional requirements with which Member States must comply. Here EU policy prescribes an *institutional model* to which

domestic arrangements have to be adjusted. Accordingly, Member States have only limited institutional discretion when deciding the specific arrangements for compliance with European requirements. The mechanism of *Europeanization by institutional compliance* is particularly, but not exclusively, pronounced in policies of so-called 'positive integration' (Taylor 1983) including environmental protection, health and safety at work, consumer protection and sections of social policy. Community policies are explicitly directed at replacing existing domestic regulatory arrangements. They imply a real re-shaping and re-forming of existing domestic provisions (Scharpf 1999).

Somewhat less directly, European legislation may affect domestic arrangements by altering the domestic rules of the game. European influence is confined to altering domestic opportunity structures and hence the distribution of power and resources between domestic actors (Kitschelt 1986). Such changes in domestic opportunity structures may in turn result in effective challenges to existing institutional equilibria. While European policies contribute to these potential challenges, they do not prescribe any distinctive institutional model for the resulting new equilibrium. This is not to say that European policies are not directed towards achieving certain regulatory objectives at the national level. Rather, they are intended to achieve these objectives in a less direct way, by altering domestic opportunity structures rather than prescribing institutional outcomes (see also Dimitrova & Steunenberg 2000).<sup>2</sup>

Examples of *Europeanization by changing domestic opportunity structures* can be found in particular in many market-making policies of the EU (negative integration). These policies basically exclude certain options from the range of national policy choices rather than positively prescribe distinctive institutional models to be introduced at the national level.<sup>3</sup> Their impact is generally restricted to the abolition of domestic administrative arrangements which distort the functioning of the Common Market, such as national regulations protecting domestic industrial sectors against foreign competition (Scharpf 1994).

In their weakest form, European policies neither prescribe concrete institutional requirements nor modify the institutional context for strategic interaction, but seek to trigger domestic adjustments to EU regulatory objectives even more indirectly, namely by altering the beliefs and expectations of domestic actors. Changes in domestic beliefs may in turn affect strategies and preferences of domestic actors, potentially leading to corresponding institutional adaptations (Eising 1999; Kohler-Koch 1999). Hence, the domestic impact of European policies is primarily based on a cognitive logic.

The dominance of this mechanism can be particularly observed in European policies whose aim is basically to prepare the ground for subsequent, institutionally more demanding policies of positive or negative integration.

Rather than prescribing concrete outcomes or substantially altering institutional opportunity structures these policies are designed to change the domestic political climate by stimulating and strengthening the overall support for broader European reform objectives (cf. Ingram & Schneider 1990). The emergence of such policies based on *Europeanization by framing domestic beliefs and expectations* is particularly likely when the EU decision-making context, above all the underlying conflicts of interests between the Member States, only allows it to adopt policies which are vague and more or less symbolic. As we will see below, the Community's railway policy is a good example of this.

### *Consequences for the explanation of domestic change*

Following the above considerations it becomes obvious that there is no single approach for explaining the variable domestic impact of European policies. We have to consider different explanatory factors in order to account for the varying domestic responses in the light of European requirements. In the case of *Europeanization by institutional compliance*, domestic responses can be understood on the basis of a two-step approach. In the first explanatory step we consider the institutional compatibility of the European model with domestic arrangements ('goodness of fit'). According to the level of fit we are able to develop *ex ante* hypotheses on constellations where domestic adjustment is either highly unlikely or *potentially* may occur.

The fact that domestic adjustments are actually possible from an institutional compatibility perspective, however, does not mean that such changes actually take place. To answer this question we have to complement our analysis with a second explanatory step that considers the particular interest constellation and institutional opportunity structures at the domestic level. In this context, actual adjustments to European requirements can only be expected if they are facilitated by conditions prevailing in the domestic context which might in turn, of course, have been affected by European requirements. To what extent is there sufficient domestic support for adjusting to EU requirements? To what extent do domestic actors who support regulatory change have sufficient powers and resources to ensure that their interests prevail?

Thus the two-step approach allows us to identify *ex ante* where domestic adjustment is unlikely in view of either too high or too low institutional incompatibility of domestic arrangements and European requirements. It is only where domestic change is potentially possible from this perspective that we have to complement our analysis with a second step focusing on the prevailing actor constellations and opportunity structures.

Unlike policies which prescribe institutional models for domestic compliance, the explanation of domestic responses looks quite different when Euro-

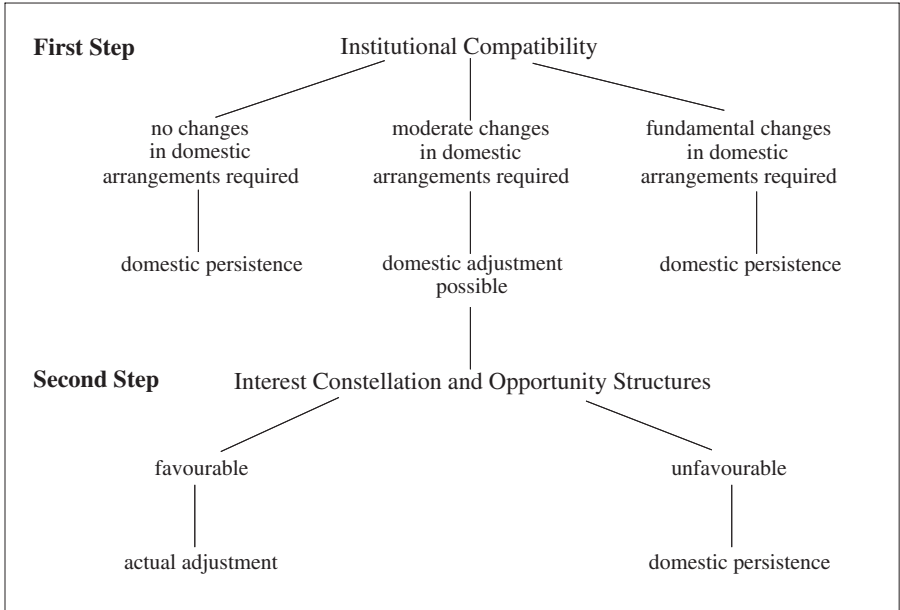


Figure 1. Europeanization by institutional compliance: Explaining varying domestic responses.

Europeanization primarily relies on *changing domestic opportunity structures*. Such policies only redistribute powers and resources between domestic actors and hence challenge existing equilibria rather than prescribe the precise shape of the new equilibrium. Domestic change or persistence is not primarily a matter of pressures on domestic institutions to adapt (which can generally be considered as low given the considerable degree of institutional discretion for domestic compliance), but must be explained by analyzing the extent to which European policies have altered the strategic position of domestic actors. For example, EU transport liberalization policies give new strategic options to consumers of services (e.g., companies can decide whether to have their goods transported by foreign or domestic hauliers), while other strategies are no longer feasible (e.g., in the light of European competition, domestic tariff regimes for road transport are no longer effective in promoting the market position of national hauliers). How may European policies alter domestic opportunity structures so that national actors can successfully challenge existing regulatory arrangements?

Héritier and Knill (2001) argue that the potential for European impact on national regulatory styles and structures increases with the extent to which a domestic policy context is characterized by a *contested interest constellation*

and a relatively *even distribution of powers and resources* across opposing actor coalitions. In view of such balanced constellations, Europe-induced changes in domestic opportunity structures are potentially more likely to tip the scales in favour of one actor coalition, hence triggering regulatory reform.

By contrast, if domestic opportunity structures and interest constellations are characterized by the clear dominance of one actor coalition – as a result of the particular interest constellation and the highly uneven distribution of power and resources between different actors – the potential domestic impact of Europe will be much lower. In these cases new opportunities and constraints for domestic actors are less likely sufficiently to alter the existing distribution of powers and resources between domestic actors. On the one hand, it will hardly make any difference where European influence strengthens the position of those actors who are already in a dominant position. On the other hand, European influence will generally not be sufficient to alter the position of opposing actors in such a way as to enable them to overcome the dominant position of institutional veto players.

This first explanatory step only allows us to identify the constellations of domestic interests and opportunity structures where Europe-induced changes are more or less likely. However, it tells us nothing about the direction of any domestic change. Given the wide discretion for domestic adjustment in the absence of a European model which must be complied with, national changes might take various forms that need not necessarily follow the regulatory objectives underlying European legislation.

To account for the direction of domestic change, we must therefore introduce a second explanatory step focusing on the fit between domestic reforms and European regulatory objectives. This question, however, can hardly be answered from an *ex ante* perspective as it requires detailed analysis of the specific context constellation given at the national level. Thus we can only expect domestic reforms which conform to European objectives when European changes in domestic opportunity structures actually strengthen those actor coalitions which support these objectives. By contrast, it might well be the case that domestic changes go in the opposite direction if European policies strengthen – somewhat paradoxically – domestic actor coalitions which oppose the changes (Héritier & Knill 2001).

As will be shown below this was actually the case in French transport policy where European liberalization led to a domestic counter-reaction which resulted in the already liberalized French regime being considerably re-regulated. At the same time, this development illustrates the limited explanatory value of an institutional goodness of fit perspective in cases where EU policy does not mandate an institutional model. The French case demonstrates that even in cases of high compatibility, Europe-induced changes in domestic

opportunity structures might lead to national reforms which to some extent diverge from EU regulatory objectives.

The lack of explicit institutional pressure for domestic adaptation, and hence the limited explanatory value of a perspective that considers the institutional compatibility of European and domestic arrangements, applies similarly to the third mechanism: *Europeanization by framing domestic beliefs and expectations*.

Unlike European policies whose domestic impact emerges from changes in domestic opportunity structures, policies based on the framing mechanism are basically confined to altering the 'cognitive input' into these opportunity structures rather than directly affecting these structures. The question is whether European legislation has contributed to altering expectations and beliefs of domestic actors in such a way as to motivate domestic institutional change. Has European legislation sufficiently altered the constellation of domestic interests and hence favoured reforms that would otherwise not have emerged? If varying adaptation patterns are not explained by EU-induced changes in different domestic opportunity structures, the question arises as to the circumstances in which such policies may yield domestic institutional

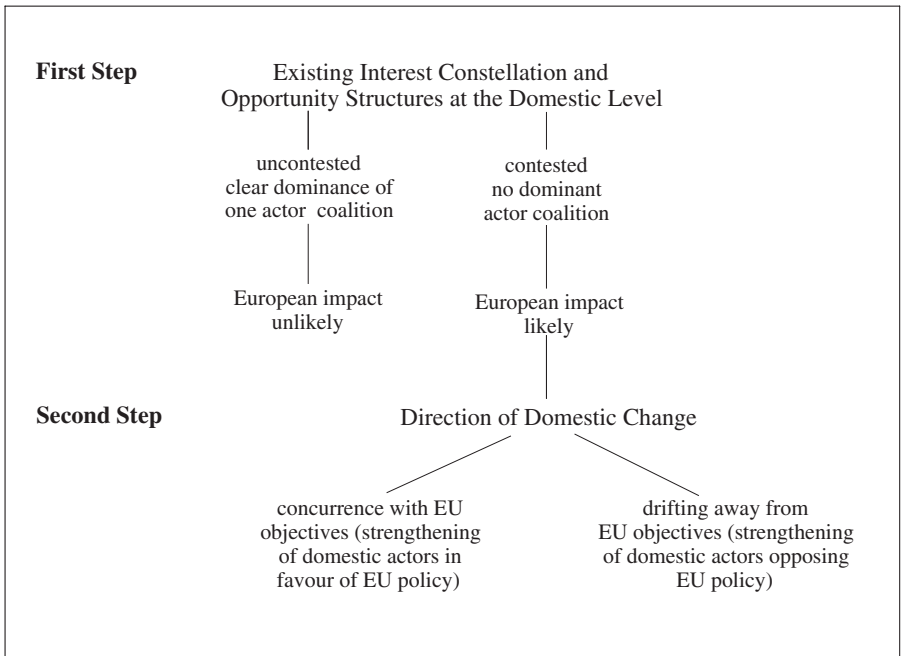


Figure 2. Europeanization by changing domestic opportunity structures: Explaining varying domestic responses.



change. We argue that domestic impacts can basically be expected under two sets of conditions.

First, the impact of European framing might change the *outcome* of national reforms that occur independently of European influence. This might be expected when there is already a broad consensus for reform at the domestic level with the direction of the intended reforms being basically in line with the overall objectives behind European legislation. In this context, European beliefs and ideas might provide a ‘focal point’ for domestic developments, offering potential solutions or ideas to deal with domestic problems. In other words, European beliefs, while being well in line with the ‘core beliefs’ of the dominant domestic actor coalition, shape domestic reform outcomes by altering ‘secondary aspects’ within the domestic belief systems (Lavenex 1999; Sabatier 1998).

Second, European policies might not only affect the outcomes of domestic reforms, but also the *reform process* itself. More specifically, by affecting the beliefs and expectations of domestic veto players, European framing can play a decisive role in bringing about a consensus on national reforms. Europe-induced changes in the belief systems of such veto players might alter the domestic constellation of interests, thereby increasing the support for regulatory change as actors who previously opposed regulatory change no longer rely on their veto position. In this way European influence contributes to the emergence of a dominant advocacy coalition (Lavenex 1999) whose core beliefs are fairly congruent with the ideas behind European legislation.

In this context, the extent to which European framing can potentially help to establish a domestic reform consensus is basically dependent on the initial constellation of interests and opportunity structures. European policies can thus hardly be expected to have a substantial impact if the initial level of domestic support is very low and institutional opportunity structures are characterized by numerous veto points. Here, European framing is unlikely to be able to overcome the resistance of actors who oppose regulatory adjustment to European objectives. The domestic impact of European framing in any particular area therefore varies greatly according to the nature of the dominant national belief systems and the existing institutional opportunities for and constraints on reform.

### **Europeanization by institutional compliance: The case of environmental policy**

We have argued above that the variable domestic impact of European policies that explicitly prescribe institutional models for domestic compliance can

be understood on the basis of a two-tier explanatory approach. The first step considers the institutional compatibility between European requirements and domestic arrangements and allows us to identify conditions in which domestic adjustments are either highly unlikely or potentially possible. To explain whether possible adjustments actually take place or not, the particular constellation of domestic interests and opportunity structures is investigated in a second step. To illustrate our analytical considerations we draw on recent cross-national studies on the implementation of EU environmental policy (Knill & Lenschow 1998; Knill 2001a). Similar arguments, however, are also advanced by other scholars investigating the domestic impact of positive integration in the field of social policy (Duina 1997) and health and safety at work (Eichener 1996).

### *Europeanization of environmental issues*

As there is generally a close link between European policy content and the necessary arrangements for domestic application, European policies in this area imply detailed institutional prescriptions for the adjustment of national regulatory styles and structures. For reasons of space, we are unable to consider this argument for each of the over 200 pieces of EU environmental legislation so far enacted. Instead, we will illustrate our argument by focusing on three measures that represent the regulatory variety of command-and-control, procedural and self-regulation.

The 1980 Drinking Water Directive is a good example of command-and-control regulation.<sup>4</sup> The Directive specifies quality standards for water intended for human consumption. The prescription of uniform and legally binding standards assumes hierarchical structures of intervention and quite formal and legalistic patterns of administrative interest intermediation at the domestic level. The standards defined in the Directive are not negotiable and apply uniformly to all water providers. In view of these detailed specifications, national regulatory authorities have limited discretion and flexibility in implementing European legislation. In other words, there is a close link between policy content (uniform standards) and corresponding institutional arrangements for domestic compliance (formalist and legalist patterns of intervention).

The prescription of regulatory arrangements for the domestic implementation of European requirements is not restricted to substantive measures, but can also be observed in policies with a merely procedural focus. The directive on the freedom of access to environmental information (Information Directive)<sup>5</sup> is a good case in point. It aims to ensure free access to the information

on the environment held by public authorities and lays down detailed conditions for making such information accessible, including appeal procedures against refusal or failure to provide information, charges for the provision of information and exemptions from disclosure (Winter 1996). In view of these detailed procedural prescriptions, the Directive has important implications on national patterns of administrative interest intermediation, namely by demanding a more open and transparent style of environmental regulation with different societal interests having equal opportunities in access to administrative decision making. In this way, the scope for secretive and closed interaction patterns between regulatory authorities and the regulated industry found in many Member States is significantly reduced.

The direct institutional impact of EU legislation is also found in the context of the so-called 'new instruments' of EU environmental policy which emphasize industrial self-regulation. For example, the 1993 Environmental Management and Auditing Systems (EMAS) Regulation<sup>6</sup> established a management tool to help European companies evaluate the environmental impact of their activities. Companies voluntarily adopt an environmental policy and conduct an environmental review. The environmental statement subsequently prepared by the company is validated by an officially appointed, independent and accredited environmental auditor. Although it leaves some leeway for domestic compliance, there is an implicit, clear shift in the regulation in favour of industrial self-regulation by the voluntary introduction of an environmental management system as opposed to interventionist top-down approaches. Instead, the state's role is to facilitate self-regulatory processes by providing and maintaining the institutional framework for the auditing process.

Although the above-mentioned measures cover only a small, albeit representative, part of the many pieces of European legislation in the environmental field, the direct impact on domestic institutions underlying EU environmental policies is clear. In view of the close link between policy contents and corresponding requirements for domestic implementation, European legislation prescribes detailed institutional models to which regulatory arrangements at the domestic level must be adjusted.

### *Explaining domestic patterns of adaptation*

An investigation of the domestic responses to the institutional requirements of the three policies for Britain, France and Germany (i.e., nine cases) reveals a great variety of adjustment patterns across both policies and countries which is summarized in Table 1 (cf. Knill & Lenschow 1998).

*Table 1.* Patterns of domestic adjustment to EU environmental policy

Policy/Country	Britain	France	Germany
Drinking Water	Change	Persistence	Persistence
Access to Information	Persistence	Persistence	Persistence
EMAS	Persistence	Persistence	Change

When the two-step explanatory framework developed above is applied, it becomes apparent that domestic responses in six of the nine cases can be explained on the basis of the first explanatory step alone which takes into account the institutional compatibility between European requirements and domestic arrangements. Only in the three remaining cases do we have to go on to analyze the specific domestic context conditions in order to understand the actual occurrence or non-occurrence of regulatory change.

Beginning with the perspective of institutional compatibility, four persistence cases (EMAS and information access in Britain, access to information in France and drinking water in Germany) can be explained by the fact that existing regulatory arrangements at the national level were already well in line with European requirements. Hence, there was low European pressure for domestic adjustment. In the British EMAS case this can be explained by the fact that the domestic environmental management system served as a reference point for the subsequent European EMAS Regulation. Turning to the Information Directive, both Britain and France had already established regulatory arrangements that corresponded with and partially went even beyond EU requirements. Hence, effective compliance was possible without any legal or practical changes. The same holds true for the German drinking water case, where the interventionist and formalist regulatory style implicit in the directive was well in line with the traditional approach in Germany (Héritier et al. 1996). In the cases of access to information in Germany and drinking water in France, by contrast, domestic persistence emerged from the fact that European requirements clashed with core patterns of national administrative traditions which were strongly embedded institutionally. The institutional incompatibility of European and national arrangements was too great to allow for smooth regulatory adjustments. Instead, there is strong resistance to change in both countries.

In Germany the requirements of the Information Directive in favour of regulatory transparency and accountability did not correspond to state and legal traditions in which public access to documents and information is only considered legitimate if the individual requesting it can show the 'direct effect'

of the project or activity in question on his or her particular circumstances. This distinctive notion of the role of law and administration in this area has led to substantial implementation problems and, hence, to strong resistance to changing domestic arrangements in the light of European requirements (Winter 1996). Similarly, French implementation of the Drinking Water Directive was characterized by far-reaching resistance to change. Here the dominant regulatory practice provided regulatory authorities with considerable autonomy to define water quality standards on the basis of informal and consensual negotiations with water providers. This practice is institutionally entrenched in the strong integration of the so-called '*grands corps*' whereby administrative coordination relies less on hierarchical institutions than on the confidence vested by those at the top in the lower ranks (Montricher 1996). Against this background the formalist and legalist approach implicit in the European Directive implied a fundamental challenge to French regulatory traditions.

Only in three cases (EMAS in Germany and France, drinking water in Britain) could domestic adjustment be considered as a possibility from an institutional compatibility perspective since the changes required by European legislation posed no challenges to core patterns of national administrative traditions. In these circumstances the actual pattern of change or persistence cannot be inferred from a mere institutional compatibility perspective, but must also take account of the specific policy context at the national level.

The EMAS Regulation did not challenge institutional core patterns in either Germany or in France. Although the Regulation's emphasis on self-regulation and voluntary agreements clashed with the legalist and interventionist style of German environmental policy, they were nevertheless in line with the German tradition of corporatism (Benz & Goetz 1996). In France, too, the spirit of the Regulation was basically in line with the French practice of voluntary agreements on industrial emission reductions and the use of economic incentives notwithstanding the need to build up corresponding regulatory structures for administration of the system (Héritier et al. 1996). However, the responses of the two countries were different, with adjustment in Germany and resistance in France. Germany's smooth adaptation to European requirements can be attributed to the fact that the domestic actor constellation was characterized by broad support for the regulation from both industrial and environmental organizations, partly because the legislation accorded with national debates on deregulation and administrative reforms. The strong support from industry in particular resulted from the expectation that future authorization and inspection procedures might be 'slimmed down' for EMAS participants. In France, by contrast, there is considerable resistance

to changing existing regulatory practices as a consequence of the lack of support from industrial actors. Industry is concerned that information voluntarily provided within the context of EMAS might be used against it during authorization and inspection procedures (Knill & Lenschow 1998).

In the British case of drinking water, the regulatory changes from industrial self-regulation towards a more interventionist regime associated with the privatization of the water industry in 1989 had significantly reduced institutional incompatibilities between European and national arrangements. Although the reformed domestic regime was already congruent with the interventionist approach implied by the Directive, some adjustments were nevertheless necessary, in particular with regard to the formal and practical compliance with the legally binding standards prescribed by EU legislation. These remaining adjustments were facilitated by a favourable policy context. Privatization meant that the economic costs of compliance with European standards no longer interfered with the government's objective of reducing public spending as the costs for retrofitting existing plants had to be borne by private companies. Moreover, the regulatory regime set up in the context of privatization strengthened the voice and influence of environmental and consumer groups, thereby providing new institutional access opportunities which favoured compliance with European objectives (Maloney & Richardson 1995).

In summary, this brief review of research findings illustrates that the domestic impact of European policies that prescribe clear institutional models for domestic compliance can be understood on the basis of a two-step approach. As a first step we are able to evaluate the overall possibility of domestic adjustments based on the institutional compatibility of European and domestic arrangements. Only if we need to investigate whether possible adjustments actually occur do we take an additional explanatory step and consider the underlying constellation of actors and opportunity structures. As will be shown in the following sections, the absence of such direct pressures for institutional adaptation in other policy areas requires the application of different explanatory schemes in order to understand variances in domestic adjustment.

### **Europeanization by changing domestic opportunity structures: The case of road haulage**

A second mechanism of Europeanization refers to changes in the domestic opportunity structures (i.e., the degree to which European policies contribute to a change in the distribution of power and resources between actor coalitions).

tions). In what follows, we illustrate the operation of this Europeanization mechanism with reference to road transport policy.

### *The Europeanization of road haulage*

Although the Treaty of Rome called for the establishment of a Common Transport Policy (CTP), the transport sector has only recently undergone profound change. Decisive steps in this direction came in the form of liberalization of international transport and the introduction of the right of non-resident transport hauliers to operate in foreign markets (cabotage) in 1993 (Kerwer & Teutsch 2001).<sup>7</sup> Since the famous *Cassis de Dijon* ruling by the European Court of Justice, mutual recognition has been established as a key mechanism for dealing with different regulatory regimes (Alter & Meunier-Aitsahalia 1994). In the case of road haulage, cabotage is the mechanism that removes the protection of national transport markets. Given its character as the functional equivalent of the principle of mutual recognition, the issue of cabotage turned out to be the toughest nut to crack in the process of European transport policy making. What could be observed was less a direct approach to harmonizing existing national regulatory regimes than an indirect strategy which emphasized the role of market forces in leveling out divergent legislation. The cabotage directive allowed for highly regulated domestic markets and for quantitative restrictions and price controls to co-exist alongside a deregulated international market. In the case of the CTP, the domestic impact of Europeanization therefore comes from the redistribution of powers and resources between domestic actors. In this context, the CTP had the same impact across all the Member States: the position of users of transport services was strengthened, while the supply side of the transport sector was put under pressure. In this way, European policies challenged existing equilibria at the national level but did not prescribe how the new equilibria must look.

### *Explaining change: The changing distribution of power and resources*

To account for the domestic impact of Europe requires a two-tiered analytical approach. In the first step we try to identify where European impact is more or less likely to trigger changes due to a domestic constellation characterized by a relatively equal distribution of power and a contested regulatory approach. Only here do we need a second step to account for the direction of domestic changes through a detailed analysis of the specific domestic context. In what follows, we illustrate this by summarizing how the development of the

CTP in Europe influenced policies in Britain, France, Germany and Italy (Héritier et al. 2001).

Our explanatory approach allows us as a first step to distinguish between Britain and Italy on the one hand, and France and Germany on the other. In the British and Italian cases, the policy arena was clearly dominated by groups of actors favouring the existing regulatory regime. As a consequence, European liberalization did not modify the domestic opportunity structures to such an extent that it posed a successful challenge to the dominant policy coalition. Britain had liberalized its transport markets as early as 1968 in a way that resembled what has since emerged as the European approach to international transport. At that time, the vast majority of domestic actors were in favour of a liberal approach and thus European liberalization did not involve significant changes in domestic opportunity structures (Knill 2001b).

In a mirror image to the British case, the domestic constellation in Italy was characterized by a dominance of actors opposing any liberalization of the transport sector. The European impact was not strong enough to alter the domestic opportunity structures to such an extent that they posed a successful challenge to the strong position of domestic hauliers and the many institutional vetoes with which they could block reform attempts. Neither was there significant change in the polarized patterns of interest intermediation through which the huge number of smaller hauliers' associations successfully pressurized public actors, whereas the more moderate, pro-liberal stance of the larger firms' associations went virtually unheard. As a consequence, European policies did not increase the capacity of public actors to formulate policy goals autonomously and implement them in the face of group opposition. Rather, the government and administration gave way to the aggressive policy of the smaller hauliers, which in turn led to a perpetuation of domestic market regulation to protect Italian hauliers from international competition (Kerwer 2001).

In contrast to the British and the Italian case, France and Germany were characterized by a relatively more even distribution of powers between interests in the domestic arena. Hence, the potential for European-induced changes was expected to be higher. As a result of the differences in the domestic constellations, however, the outcomes in each country were different.

In Germany, the balance between coalitions favouring contradictory regulatory approaches shifted in favour of the liberal coalition, thus altering the former interventionist regulation into significantly more liberal approaches. The interventionist system of market regulation had long been contested, but actors who supported liberalization were unable successfully to challenge the vested interest position of the domestic hauliers. European policy was thus decisive in overcoming the *de facto* veto position of these actors, tipping the



scales in favour of the pro-liberalization coalition. The introduction of cabotage rendered both the restriction of market access and the tariff structure unsustainable (Teutsch 2001). Along with the deregulation of the road haulage markets in Germany went the abolition of institutions such as the price-setting committees in which road hauliers had dominated their market opponents, thus crucially affecting the strategic options for domestic actors.

In contrast to the German case, European policies in France shifted the balance in favour of a re-regulation coalition. Since the liberalization process in the late 1980s the French road haulage market has been much more market-oriented than it was in the 1970s. However, in the aftermath of domestic liberalization and the advent of liberalized European transport markets, actors in favour of re-regulation coalition progressively gained ground. Hauliers' associations increasingly coordinated their activities and trade unions emerged as a new and vigorous actor in the field, channeling the demand for protection of the national industry and their workforce. In this respect, reference to the European threat was a significant factor in contributing to a strengthening of the opposition to effect a shift in the balance in favour of re-regulation (Douillet & Lehmkuhl 2001).

These examples demonstrate different facets of how specific mechanisms can function in the domestic arena. The domestic impact of Europe is best understood by first, focusing on the changes in the distribution of power and resources and second, by investigating the way in which these changes are institutionally mediated. As our case studies have shown, however, to identify a particular mechanism of Europeanization is not to describe its actual effect. Rather, the range of policy outcomes stretches from hard core de-regulation in Britain to social re-regulation in France.

### **Europeanization by mobilizing for domestic support: European railways policies**

Notwithstanding the dominant role of 'market-making' and 'market-correcting' policies in Europe, there are other European activities that must be distinguished analytically. We suggest that these activities are basically designed to prepare the ground for more far-reaching policies of either positive or negative integration. This implies that a European influence can be found in policies that neither prescribe a concrete institutional model nor influence the relative distribution of power and resources between actors at the domestic level, but which are designed to increase support for domestic reforms that may facilitate future steps towards further integration. European railway policy is a good example of this Europeanization mechanism of 'framing' (i.e.,

a mechanism which focuses on changes in the expectations and beliefs of domestic actors).

### *The Europeanization of railways policies*

Despite widespread acknowledgement that European railways faced serious financial crisis, neither the efforts of individual Member States nor European reform proposals helped to improve the situation significantly. In particular, the Commission's attempts to legislate never got past the initial stage. On the one hand, the heterogeneity of the Member States rendered all coordination useless. In the larger Member States, in particular, railways were not seen as purely economic actors but as the providers of a public service with obligations that had to be maintained for political reasons. Hence, there was marked resistance to any Community attempt to intervene in domestic railway policy. On the other hand, the Commission only had limited legal and institutional powers to overcome the resistance of the Member States. The Commission thus abandoned its original idea of integrating national railways. Since the end of the 1980s it has shifted its policy emphasis to organizational and regulatory reforms. These include managerial autonomy for the railways by restricting state interference, contracts regulating the financial relationship between the state and the railways, the separation of infrastructure provision and network operation, and rules governing market access and operation.

In the policy-making process at the European level, however, even these less demanding Commission proposals have been watered down by the Council and the European Parliament (Kerwer & Teutsch 2001). Consequently, the resulting European legislation does not really constitute a serious challenge to the established railway policies of the Member States. Council Regulation 91/440<sup>8</sup> provides for far-reaching discretion over the process of implementation at the domestic level. The regulation only requires a change in the national accounting system rather than any organizational or institutional adjustments. Moreover, the provisions for third-party access are restricted to international joint ventures in freight transport rather than being granted to individual companies.

The Commission was well aware of the limited effect that the measures finally adopted would have. Yet there is good reason to assume that even the limited reform was still in accordance with the Commission's new strategy. Unlike its initial ambitious objective of reforming national railways by relying on a top-down approach, its new strategy was to alter the national policy-making context by increasing domestic support for its reform programme. As a Commission official pointed out, 'if the directive was to be a success, it was not so much a success with what it did directly, but what it did indirectly.

And that is to create a new thought process to be applied to the railways, to think again about what railways were supposed to be doing, and how they were supposed to be run.<sup>9</sup> The following examples show how this rather moderate approach of framing the beliefs and expectations of domestic actors actually contributed to more or less fundamental policy reforms in the Member States.

*Explaining change: Building support for domestic reform*

We have argued above that there are two sets of circumstances under which European policies relying on the framing mechanism might trigger corresponding regulatory changes at the national level. First, assuming that there is already a consensus for national reforms, EU policy can affect the outcome of these reforms by offering ideas for solving regulatory problems at Member State level. Second, EU policies might also affect the reform process by influencing the future expectations of the key actors who can potentially veto reform initiatives, thereby prompting a dominant coalition in favour of a reform to emerge. This scenario, however, assumes a relatively contested power constellation between opposing domestic advocacy coalitions; that is, the framing mechanism will hardly be sufficient to produce domestic regulatory reforms as long as the national context is characterized by the clear dominance of actor coalitions opposing EU regulatory objectives.

The first constellation of European influence can be observed in the 1996 reform of Dutch railways. The reform is based on the break-up of public and private functions and responsibilities, with all infrastructure-related tasks being assigned to a government-commissioned sector to reinforce their public character while the operation of transport services is horizontally separated into different private-sector businesses. European legislation provided a concept of reform on which the expectations of most actors at the national level could converge. In view of the profound financial problems of the railways, there was already a broad consensus among political, economic and societal actors in favour of a fundamental regulatory reform of the state-owned railways. Moreover, there was a basic consensus on the overall direction of the reforms, namely the introduction of market mechanisms in order to increase the competitive position of the railways in relation to other modes of transport. However, the actual operationalization of these broad objectives was still unclear and highly contested among different actors. Here, the advent of a Common European Railways Policy based on a separation of infrastructure from operations and on the introduction of market mechanisms provided a set of ideas offering a solution to domestic problems which found broad political support (Lehmkuhl 2001).

The fact that European framing might affect not only the outcomes but also the process of domestic reform can be observed particularly clearly in the German case where reference to European policy activities significantly altered the expectations and strategies of those who opposed reform and thus facilitated the emergence of a dominant coalition in favour of change. Whereas all previous attempts to reform the German railways had been substantially opposed either by the *Länder*, which did not want to accept regionalization, or by the railwaymen's union, which successfully mobilized the Social Democrats in Parliament, the new European legislation changed the situation decisively. The *Länder* started to recognize that the issue of regionalization as conceived in the European legislation might no longer need to be regarded as a distributive conflict between the *Länder* and the federal level. Rather, regionalization in conjunction with a liberalization of rail operations could also be interpreted as a chance to achieve more cost efficiency without sacrificing quality standards. Hence, the *Länder* switched their strategy from opposition to cooperation and used their strong strategic position in the institutional structure of the German political system to influence the content of the reform (Teutsch 2001).

Although the German trade unions had in the past proved capable of exerting a significant influence on personnel policy decisions and basic organizational issues within the rail industry, it could not prevent the economic decline of the railways. Given the failure of its traditional strategy, the unions saw the pro-rail stance underlying the European policies as a chance for a fundamental reorientation. This reorientation was based on two assumptions: (1) that the future of railwaymen's jobs could only be ensured if new avenues were explored; and (2) that changes in the legal status of the railways, together with their high degree of unionization, would in turn improve the railway unions' position in the domestic arena. The reorientation of both the *Länder* and the trade unions illustrate the way in which European legislation can impact on the national constellation. By altering the belief systems of actors, European legislation increased the potential for national reforms by reducing the relevance of institutional veto points in the national decision-making process.

Despite these examples of far-reaching domestic impacts of European framing, however, the success of European activities designed to alter domestic beliefs and expectations cannot be taken for granted. The example of railway policy provides us with instances where the impact of European policies was much more limited and not powerful enough to trigger and shape substantive regulatory changes at the national level. This scenario is illustrated by the French case where European framing was not sufficient to overcome the strong position of national actors in opposition to European reform objectives.

The decision by the French government in 1997 to create a new organization responsible for railway infrastructure might initially suggest that European policies influenced domestic railway policy making to a certain extent. However, the fact that the national railway still manages the infrastructure on behalf of this new organization (it remains a monopoly provider of all operational services) proves that this is not the case. If we look more closely, we can see an interesting interaction between different forces. On the one hand, the French administration is quite responsive to European policies that offer strategies for solving some of the railway's problems. On the other hand, European policy has not been strong enough to restrict potential opponents. Rather than 're-tuning' their opposition into cooperation, opponents of reform have been able to mobilize political resistance by highlighting the European dimension underlying domestic reform attempts. Given these opposing impacts, French railway reform may be characterized as a tightrope act between official opposition to European policy and the cautious introduction of domestic reform in line with European policy objectives (Douillet & Lehmkuhl 2001).

Summing up, we may say that European policies relying on the framing mechanism represent a logic of integration analytically distinct from the mechanisms of the first two cases. Rather than being directed at prescribing domestic reforms from above or affecting institutional opportunities and constraints on domestic actors, the provision of European support is designed to alter the cognitive input into existing opportunity structures. By serving as a focal point for domestic development, framing policies may either shape domestic reform outcomes by altering secondary aspects within the domestic belief system or they may influence the reform process by tipping the scale in favour of a dominant reform coalition emerging.

## **Conclusion**

Despite the growing number of studies of the domestic impact of European integration, the field of research remains relatively unexplored in political science. One particular problem for research in this area is the lack of a comprehensive explanatory framework to account for diverse patterns of domestic adaptation across policies and countries. In this article, we have set out an analytical framework to help develop this research area beyond its infancy. We have argued that the approach required to explain domestic adaptation patterns may vary according to the distinctive Europeanization mechanism underlying the European policy in question. In particular, in the area of regulatory policies we have distinguished between institutional compliance, changing opportunity structures and the framing of domestic expectations and

beliefs, each of which requires a distinctive approach to account for its respective domestic impact. This analytical distinction could serve as a promising starting point for further research activities aimed at investigating not only the conditions under which we can expect the dominance of distinctive mechanisms of Europeanization, but also potential interdependencies between them.

Dimitrova and Steunenberg (2000) have recently offered a rather promising starting point from which to approach the first issue. They argue that the presence of winning coalitions in several of the larger Member States constitutes a prerequisite for the adoption of institutionally demanding European policies (i.e., Europeanization by institutional compliance). If, by contrast, such coalitions are lacking, it will only be possible to adopt EU policies if a more differentiated and open approach is followed which leaves a great deal of flexibility for domestic implementation (Dimitrova & Steunenberg 2000: 203). Consequently, in such constellations, the mechanisms which produce Europeanization by affecting domestic opportunity structures or beliefs might be more relevant.

Referring to potential interdependencies between Europeanization mechanisms, we have already emphasized at the beginning that in the real world we are often confronted with hybrid constellations. Within a particular policy sector different mechanisms of Europeanization might be involved or the mechanisms that were once involved might change over time. Against this backdrop, it is of great theoretical and practical importance that we better understand the reinforcing or weakening effects of the varying mechanisms of Europeanization.

In this context, it can be expected that the mechanisms of Europeanization mutually reinforce each other in circumstances where European policies not only prescribe institutional models for domestic compliance, but also strengthen the strategic position of those domestic actor coalitions in favour of adjustment to European requirements (e.g., by altering the domestic opportunity structures and/or the beliefs and expectations of the opposing actors). Such attempts deliberately to combine different mechanisms in a mutually reinforcing manner can currently be observed in the environmental field where they are aimed at reducing widespread implementation deficits (Knill & Lenschow 2000).

It is also conceivable that different Europeanization mechanisms weaken each other. Thus, the absence of detailed prescriptions for the domestic compliance with institutional models is one particular characteristic that favours the domestic impact of European changes in domestic opportunity structures and beliefs. In other words, these Europeanization mechanisms do not only affect the domestic policies through their effects on the strategic and cognitive positions of domestic actors, but also because of the fact that they imply

no requirements about the outcome of national reforms. Complementing these policies with prescriptions for detailed institutional requirements might reduce their impact as stimuli to reform, because this will reduce the leeway national reformers have to alter regulatory arrangements in light of the particular social, political and economic context conditions at the national level.

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## Notes

1. For a systematic account on varying concepts of Europeanization, see Radaelli (2000).
2. Dimitrova and Steunenberg (2000) develop a similar argument to investigate the impact of European policy making on national policy convergence from a multilevel governance perspective. In contrast to this study, they analyze not only the impact of European policies on national opportunity structures, but also how European policy formulation is affected by existing strategic constellations as the domestic level.
3. Policies of negative integration might vary a great deal in the extent to which they additionally prescribe institutional models for domestic compliance. While this positive impact is rather limited for the most part of these policies, it is much more pronounced, for instance, in European policies for liberalizing the energy or telecommunications sector (Eising 1998; Schmidt 1997).
4. Directive Relating to the Quality of Water Intended for Human Consumption (80/779/EEC).
5. Directive on the Freedom of Access to Information on the Environment (90/313/EEC).
6. Regulation (EEC) No. 1836/93.
7. Council Directive 93/3118 laying down the conditions under which non-resident carriers may operate national haulage services within a Member State.
8. Council Directive 91/440/EEC of 29 July 1991 on the development of the Community's railways (OJ No. L/237).
9. Commission official quoted in Kerwer and Teutsch (2001).

## References

- Alter, K.J. & Meunier-Aitsahalia, S. (1994). Judicial politics in the European community: European integration and the pathbreaking Cassis de Dijon decision. *Comparative Political Studies* 26: 535–561.
- Benz, A. & Goetz, K.H. (eds) (1996). *A new German public sector? Reform, adaptation and stability*. Aldershot: Dartmouth.

- Börzel, T.A. (1999). The domestic impact of Europe: Institutional adaptation in Germany and Spain. PhD thesis, European University Institute, Florence.
- Caporaso, J., Cowles, M.G. & Risse, T. (eds) (2001). *Europeanization and domestic change*. Ithaca, NY: Cornell University Press.
- Checkel, J.T. (1998). Social construction, institutional analysis and the study of European integration. Paper presented at the Workshop on Institutional Analysis of European Integration of the European Consortium for Political Research, Warwick, March 23–28.
- Cowles, M.G. & Risse, T. (2001). Europeanization and domestic change: Conclusions. in J. Caporaso, M.G. Cowles & T. Risse (eds.), *Europeanization and domestic change*. Ithaca, NY: Cornell University Press.
- Dimitrova, A. & Steunenberg, B. (2000). The search for convergence of national policies in the European Union: An impossible quest? *European Union Politics* 1(2): 201–226.
- Douillet, A.-C. & Lehmkuhl, D. (2001). Strengthening opposition and pushing reform: Europe's differential impact on French transport reform. in A. Héritier et al., *Differential Europe: New opportunities and restrictions for member-state policies*. Lanham, MD: Rowman & Littlefield.
- Duina, F. (1997). Explaining legal implementation in the European Union. *International Journal of the Sociology of Law* 25: 155–179.
- Eichener, V. (1996). Die Rückwirkungen der europäischen Integration auf nationale Politikmuster. in M. Jachtenfuchs & B. Kohler-Koch (eds.), *Europäische Integration*. Opladen: Leske & Budrich, pp. 249–280.
- Eising, R. (1998). Liberalisierung und Europäisierung. Die Regulative Reform der Elektrizitätsversorgung in Großbritannien, der Europäischen Gemeinschaft und der Bundesrepublik Deutschland. PhD Thesis, University of Mannheim.
- Eising, R. (1999). Reshuffling Power: The liberalisation of the EU electricity markets and its impact on the German governance regime. in B. Kohler-Koch & R. Eising (eds.), *The transformation of governance in the European Union*. London: Routledge, pp. 208–227.
- Héritier, A. & Knill, C. (2001). Differential responses to European policies: A comparison. in A. Héritier et al., *Differential Europe: New opportunities and restrictions for member-state policies*. Lanham: Rowman & Littlefield, pp. 257–294.
- Héritier, A., Knill, C. & Mingers, S. (1996). *Ringing the changes in Europe: Regulatory competition and the transformation of the state*. Berlin: De Gruyter.
- Héritier, A. et al. (2001). *Differential Europe: New opportunities and restrictions for member-state policies*. Lanham, MD: Rowman & Littlefield.
- Ingram, H. & Schneider, A. (1990). Improving implementation through framing smarter statutes. *Journal of Public Policy* 10: 67–88.
- Kerwer, D. (2001). Going through the motions: The modest impact of Europe on Italian transport policy. in A. Héritier et al., *Differential Europe: New opportunities and restrictions for member-state policies*. Lanham, MD: Rowman & Littlefield, pp. 173–216.
- Kerwer, D. & Teutsch, M. (2001). The dynamics of the EC's Common Transport Policy. in A. Héritier et al., *Differential Europe: New opportunities and restrictions for member-state policies*. Lanham, MD: Rowman & Littlefield, pp. 23–56.
- Kitschelt, H. (1986). Political opportunity structures and political protest: Anti-nuclear movements in four countries. *British Journal of Political Science* 16(1): 57–85.



- Knill, C. (2001a). *The Europeanization of national administrations: Patterns of institutional change and persistence*. Cambridge: Cambridge University Press.
- Knill, C. (2001b). Reforming transport policy in the United Kingdom: Concurrence with Europe but separate developments. in A. Héritier et al., *Differential Europe: New opportunities and restrictions for member-state policies*. Lanham, MD: Rowman & Littlefield, pp. 57–98.
- Knill, C. & Lenschow, A. (1998). Coping with Europe: The impact of British and German administrations on the implementation of EU environmental policy. *Journal of European Public Policy* 5(4): 595–614.
- Knill, C. & Lenschow, A. (eds) (2000). *Implementing EU environmental policy: New directions and old problems*. Manchester: Manchester University Press.
- Kohler-Koch, B. (1999). The evolution and transformation of European governance. in B. Kohler-Koch & R. Eising (eds.), *The transformation of governance in the European Union*. London: Routledge, pp. 14–35.
- Lavenex, S. (1999). The Europeanization of refugee policy: Between human rights and internal security. PhD thesis, European University Institute, Florence.
- Lehmkuhl, D. (1999). *The importance of small differences: The impact of European integration on road haulage associations in Germany and the Netherlands*. The Hague: Thela Thesis.
- Lehmkuhl, D. (2001). From regulation to stimulation: The reform of Dutch transport policy. in A. Héritier et al., *Differential Europe: New opportunities and restrictions for member-state policies*. Lanham, MD: Rowman & Littlefield, pp. 217–256.
- Maloney, W.A. & Richardson, J. (1995). *Managing policy change in Britain: The politics of water*. Edinburgh: Edinburgh University Press.
- Montricher, N. de. (1996). France: In search of relevant changes. in J.P. Olson & B.G. Peters (eds.), *Lessons from experience: Experimental learning and administrative reform in eight European democracies*. Oslo: Scandinavian University Press, pp. 423–277.
- Olsen, J.P. (1995). Europeanization and the nation-state dynamics. Oslo: Arena Working Paper 9/95.
- Radaelli, C. (2000). Whither Europeanization? Concept stretching and substantive change. *European Integration Online Papers* 4(8): <http://eiop.or.at/eiop/texte/2000-008a.htm>
- Sabatier, P.A. (1998). The advocacy coalition framework: Revisions and relevance for Europe. *Journal of European Public Policy* 5: 98–130.
- Scharpf, F.W. (1994). Community and autonomy: Multi-level policy-making in the European Union. *Journal of European Public Policy* 1: 219–242.
- Scharpf, F.W. (1999). *Governing in Europe: Effective and democratic*. Oxford: Oxford University Press.
- Schmidt, S.K. (1997). Die wettbewerbliche Handlungsfähigkeit der Europäischen Kommission in staatsnahen Sektoren. PhD Thesis, University of Hamburg.
- Schneider, V. (2001). Europeanization and the redimensionalization of the public sector: Telecommunications in Germany, France and Italy. in J. Caporaso et al. (eds.), *Europeanization and domestic change*. Ithaca, NY: Cornell University Press.
- Taylor, P. (1983). *The limits of European integration*. London: Croom Helm.
- Teutsch, M. (2001). Regulatory reforms in the German transport sector: How to overcome multiple veto points. in A. Héritier et al., *Differential Europe: New opportunities and restrictions for member-state policies*. Lanham, MD: Rowman & Littlefield, pp. 133–172.

Winter, G. (1996). Freedom of environmental information. in G. Winter (ed.), *European environmental law: A comparative perspective*. Aldershot: London, pp. 81–94.

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