

EU Environmental Policy and its Effect on U.S. Chemical Regulation

A study of the REACH package's reach

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Abstract

The purpose of this paper was to assess how the EU chemical regulation, REACH, affected the reform of the U.S. Toxic Substances Control Act. It borrows from theories of policy diffusion and of the EU as a regulatory power, which were used to theorize two causal mechanisms potentially leading to convergence between the European and American chemical regulations, tested using a method of process-tracing. The first is a theory based on competition and market power, explaining that firms exporting to the EU necessarily had to adapt to REACH, provoking rent-seeking at home. The second is based on learning, and argues that American lawmakers took lessons from the EU experience with REACH.

Both models were found to be faulty. The first undervalued the effect of a large domestic market, and overvalued the effect of submitting to foreign regulations. The second model made the faulty assumption that, under certain circumstances, learning from REACH would necessarily lead to doing as REACH. Furthermore, the TSCA reform ended up diverging from REACH in key areas. More nuanced models can give a better understanding of both how policy converges and of the EU's regulatory influence.

Key words: policy diffusion, policy convergence, policy transfer, regulatory influence, process-tracing, process tracing, REACH, TSCA, FLCS, chemicals, chemical regulations

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1 Introduction and purpose

1.1 Introduction

Throughout the course of the European Union, the so called “Green States”, member states of the EU whose goal it has been to bring their environmental regulations to the EU level, have acted to export their national goals to the EU. These regulations, though efficient at harmonizing regulations among member states, have been criticized for not considering its detrimental effect to European industries, placing them at a comparative disadvantage vis-à-vis their global competitors (Lenschow, 2015, p. 331-334). Indeed, environmental regulations are often controversial for this reason: what positive impact can it have on the environment if it knocks green companies out of business, or forces them to flee to pollution havens? Advocates, on the other hand, argue that stricter regulations trigger a ‘California Effect’, raising regulatory standards across the board.

The key to this study is the adoption of a significant package of laws and regulations, the Registration, Evaluation, Authorisation and Restriction of Chemicals, commonly known and hereafter referred to as ‘REACH’, adopted by the European Union (EU) in 2006. Of further importance is the Toxic Substances Control Act (TSCA), initially adopted by the United States (US) in 1976, and the stunning differences between the two pieces of legislation. The TSCA was reformed in 2016 through the Frank R. Lautenberg Chemical Safety for the 21st Century Act (FLCS), possibly through a process of policy diffusion.

Specifying how is difficult, since causal processes of policy diffusion remain disputed, indeed there are even those who argue that different mechanisms must be theorized for each sector. To fill this theoretical gap, two new mechanisms are theorized specifically for diffusion in the chemical sector, and then tried.

The first is a mechanism is based on Europe as a regulatory power through its significant market, forcing foreign firms to adapt to their rules. The suggestion is that the EU spread its regulatory preferences to the US through the strength of its market. The second is a mechanism based on the process of learning, and draws heavily from theories on rational policy learning. The suggestion is that REACH was an innovative success, and rational lawmakers took lessons from Europe to reform their own legislation.

In the following section, I will present the purpose and research question of this paper. The next chapter is dedicated to providing the reader with a background in chemical regulations and the chemical industry. The third chapter

presents previous research in the subfield and the theoretical framework used to theorize new mechanisms. It is followed by a chapter on methodology in which the mechanisms of diffusion are presented as two models. This is followed by a within-case analysis and an interpretation of its results. The conclusions are presented in the final chapter.

1.2 Purpose

There have been significant difficulties in establishing a global deal to be followed by the world's foremost polluters (Falkner et al, 2010). The European Union has been a significant actor and lead the way not only in international settings but also by showing the way forward with strict domestic environmental regulations. The challenges in solving environmental issues through multilateral agreements and international institutions (Falkner et al, 2010) encourages looking into different ways of reducing humanity's impact on the environment. The purpose of this paper is to explore the spread of regulatory policy once high environmental standards are put in place, as well as exploring how by trying two separate mechanisms. Though not specifically relating to climate issues per se, the spread of environmental policy in general is of principal interest to the field of environmental governance.

The area of policy diffusion has been studied extensively, and come to interesting conclusions on the effects of one country, state, or regional block, on other actors, looking specifically at countries' regulations or indicators thereof, such as changes in certain emissions or environmental indicators. This will be discussed further in point 3.1. And yet, the regulation of harmful chemicals, a potential danger to both the environment and human health, is not studied to a great extent within political science. My ambition is to apply much of the methodology and theory of previous researchers on the topic of harmful chemicals. This is particularly interesting as a decade has now passed since the EU passed REACH, its most ambitious package of laws on chemicals yet, and nearly a year has passed since the United States adopted the Frank R. Lautenberg Chemical Safety for the 21st Century Act, amending the Toxic Substances Control Act of 1976.

This now allows us to investigate the effect that REACH has had outside of the EU, by analyzing its effect on corporate and legislator behavior in the United States, and potentially leading to American chemical reform. As such, this case study may contribute not only to the subfield of policy diffusion, but also the debate on the extent of the EU's regulatory power.

1.3 Research Question

As research focuses on the more general phenomenon of policy diffusion, it could be advantageous to narrow this study down to a specific package of legislation, affecting one specific industry. It can thereby look at both the phenomenon of policy diffusion, by examining whether it occurred, but also gain greater insight into its functions by considering two different mechanisms of diffusion, in this case that of corporate self-regulation provoked by a dominant market's legislation, as opposed to learning from other legislators.

- *How did the European Union's adoption of the REACH package affect the reform of the American TSCA?*

The question is formulated in an open manner as to allow for the two different mechanisms to be tried, though it does not explicitly mention them for the sake of clarity.

2 Background

The purpose of this chapter is to introduce the reader to some concepts important to this thesis, as it treats a narrow and specific field, namely that of chemical regulations. Initially, a discussion on what regulation entails and how it is relevant to this study. Secondly, it will introduce the reader to REACH as a piece of legislation, and what its effects are on companies exporting to the EU market. Finally, it explains the Frank R. Lautenberg Chemical Safety for the 21st Century Act, and how it is relevant to this study. It is a complement to the theoretical framework as REACH is critical for the independent variables of both mechanisms, and the Frank Lautenberg Act is the dependent variable.

2.1 Regulations

The area of regulations is important for both the subjects of trade and environmental governance. In this section I explain why, and bring up some core parts of regulations that allow us to study it, giving us a focused approach from which we can treat both REACH and the TSCA.

The OECD (2012, p. 21) defines regulations as “the diverse set of instruments by which governments set requirements on enterprises”, including both laws themselves and the manner in which they are enforced. The role of traditional trade barriers has declined in recent decades as the WTO countries generally and the EU specifically have long acted to decrease traditional trade barriers such as tariffs and other measures to reduce or prevent imports. Of increasing importance has been access to markets despite heavy regulations, referred to as ‘regulatory trade barriers’ (Cooreman, 2017). In fact, this is also what REACH is, as it can prevent exporters from even accessing the EU market if a product is deemed harmful. Of course, regulatory trade barriers can carry significant costs, as is the case with REACH (Ackerman et al, 2006, p. 7), encouraging harmonization and also the study of these regulations.

It is of course also necessary to specify what is meant by ‘the chemical industry’. When referring to the chemical industry, we refer to chemicals and chemical products, excluding pharmaceuticals (a giant within the field of chemicals) as well as biocides and pesticides, not regulated by REACH. For the more technically minded, the EU code for this sector is D19T22, and the US code is sector 325 (from which you need to exclude pharmaceuticals/agrochemicals manually). Furthermore, some legislation may specifically look at what are indeed derivatives of chemical products, not entirely governed by REACH. These may be

such common goods as electronics or petroleum, and are not within the scope of this study, nor are they encompassed within the trade codes stated above. This is for practical reasons. According to the American Chemistry Council, 96% of all manufactured goods are “touched by chemistry” (ACC, 2016-1) and to consider them all would be far too time-consuming.

For chemical regulations, the key parts we look at are its system for information-gathering, on whom the burden of proof is put, which chemicals may be restricted and how. These issue areas are taken from a report comparing the TSCA to REACH (see Applegate, 2008).

2.2 REACH

Chemicals in Europe are broadly regulated by REACH, which entered into force in 2007 after approval by the EU (Lenschow, 2015, p. 333). It is the primary legislation for chemicals in the EU, though there are over 100 other pieces of legislation in some way regulating chemicals. REACH requires the private sector to generate data on the properties of various chemicals, including those already in use by industries. Harmful chemicals can then in various ways be restricted from the EU market, either immediately or within a set time-frame, in order to prevent economic damage. It also included the creation of a new agency, the ECHA, to monitor its implementation, while member states are charged with enforcing the rules (Vaughan, 2015, p. 16-17), and it authorizes regulatory action when there is a scientific uncertainty on the potential harm of a chemical, applying the ‘precautionary principle’ (Applegate, 2008, p. 747-748), a useful legal tool for a scientific field full of uncertainty.

It is important to note that it does not concern certain specific groups of chemicals such as biocides, pesticides, pharmaceuticals, or cosmetics (European Commission, 2016) and certain provisions of REACH, specifically concerning the classification, labelling and packaging of chemicals, were replaced by the Classification, Labeling, and Packaging (CLP) (European Chemicals Agency). We exclude the aforementioned groups of chemicals from this study, but do not take into account the changes of the CLP as they were originally a part of REACH, and its changes carry little importance to this study.

2.3 The TSCA and Frank Lautenberg Act

In the United States, chemicals have been regulated by the Toxic Substances Control Act (hereafter TSCA) from 1976. The TSCA has long been considered outdated, almost obsolete, due to – among other issues – the lack of power it gives to the Environmental Protection Agency to establish that a chemical is harmful and thereafter restrict it from the market (Applegate, 2008) Particularly

disappointing to environmentalists is that it did not heavily regulate chemicals already in use before 1976, as the TSCA's screening process was only to be done on new chemicals entering the market (Applegate, 2008, p. 730-32). For older chemicals, encompassing 99% of traded chemicals, even gathering of information is obstructed by procedural hurdles, and the EPA does not need to act when receiving a report that an existing chemical is harmful. Applegate sums it up thusly:

“In short, if TSCA's action-forcing is weak for new chemicals, it is virtually non-existent for existing ones.” (Applegate, 2008, p. 732)

Not surprisingly, the concept of the *precautionary principle* is not a part of the TSCA, as it had not yet been developed as a legal concept in 1976. The burden of proof was put on the regulator, effectively preventing efficient regulation (Applegate, 2008, p. 745).

The solution was therefore to reform the TSCA with the Frank R. Lautenberg Chemical Safety for the 21st Century Act (U.S. Congress-1), named after the deceased senator who had worked for years to reform the TSCA. The final part of the analysis will treat this reform in more detail, examining whether the reform can be considered to have converged from REACH by comparing the two laws.

3 Previous research and theory

3.1 Previous Research

The purpose of this chapter is to flesh out the existing research. The first part is dedicated to the research on policy diffusion, including environmental policy diffusion, and the differing theories briefly mentioned in the introduction. The second part looks at the discussion on the EU as a regulatory power. Finally, it will focus on some methods used and mechanisms suggested by researchers.

The research on policy diffusion originally stems from the ‘Diffusion of innovation’ literature (Rogers, 2003), presenting a theoretical framework from which we can understand how innovative ideas spread between actors. This was eventually applied to political science, grouped under the theory of ‘policy diffusion’, the study of the process by which the policy of one regulatory actor is adopted by another. A part of this subfield that somewhat sticks out is the focus on ‘policy convergence’ or ‘race to the bottom/trading up’, in that such studies do not focus on the process per se, but on the direction and possible endpoint of diffusion processes (Graham et al, 2012, p. 696).

This research on convergence has been focused on testing two diverging theories: the ‘Race to the Bottom’ theory, in which low-regulation economies become heavens for polluters, encouraging other nations to similarly lower their standards, and the ‘California effect’ theory, which claims the opposite: through trade, states are incited to raise their regulatory standards as other states do.

The research on the ‘Race to the Bottom’ initially comes from the United States, and is derived from the study of corporate law, in which firms could charter in any one US state and operate in all others, leading to states competing for who had the lowest chartering requirements, thereby gaining financial benefits from the chartering, which gave us the concept of the ‘Delaware effect’ (Vogel, Kagan, 2004, p. 4-5). And though the political imagery of the ‘Race to the Bottom’ has been significant, and a major argument against globalization, there is little evidence for it on a global scale. Indeed, repeated research shows that the intuitive ‘Race to the Bottom’ does not seem to take place (Vogel, 1995) (Damro, 2012) (Prakash, Potoski, 2017). For diffusion of environmental policy specifically, Porter notes that “no empirical evidence has been found that any OECD country has settled for suboptimal environmental standards in response to international competitiveness concerns” (1999, p. 138). Rather, environmental standards seem to be getting stricter.

Of course, this does not guarantee that ‘trading up’ necessarily happens, or that it will follow a market-based mechanism, hence the significant research on what causes it. Vogel initiated this discussion by showing that firms, when needing to comply with certain standards in a highly regulated, dominant market, enforce that standard in their operations across the world, whether local legislation requires it or not (Vogel, 1995). This effect has been tested many times (Vogel, 2012) (Young, 2015) (Prakash, Potoski, 2006) (Prakash, Kollman, 2003) and seems to indeed occur, with some going further and arguing that these firms then lobby states to impose stricter regulations on all firms, giving them a comparative advantage over their competitors (Bernauer, Caduff, 2006).

Others have postulated a different form of policy diffusion based on learning from other state’s experiences, in which states become “laboratories of democracy” (Graham et al, 2012, p. 691) and successful policies are then emulated. Policies need not diffuse from these political experiments, of course. This mechanism is dependent on several factors, such as the policy’s success, shared language between actors, the ambitions of lawmakers and the practical needs for implementation of the policy (Dolowitz, Marsh, 2000, p. 7).

Since the European Union is a key actor in this study, we also take into account the debate on the EU as a regulatory power. The view of the EU as a regulatory power stems from the ‘EU-as-a-power’ debate, in which the EU could be considered as either a civilian or military power, initially, famously referred to as a “normative power” by Manners (2001, p. 6-8). As it developed, it increasingly considered the EU to be a regulatory power, a consequence of its influential market, which is key to this study. Within the framework of this regulatory-power view, however, there are disagreements. The EU can initially be considered in two ways: as a supranational actor legislating its member states, or as a global regulatory power projecting its preferences abroad to states not explicitly governed by the EU, its agencies and member states (Eberlein, 2005). Similarly, there is a discussion on the manner in which the EU’s influence spreads (see Young, p. 1237, Knill, Holzinger, 2008).

This debate is further a part of the academic discussion on the rise of the regulatory state in the last decades of the 20th century, in which significant variety is noted between countries such as the USA or the UK, and trading blocs such as the European Union (see Yeung, 2000) as well as the manner in which these regulatory states can project their preferences abroad, connecting us to theories of policy convergence/divergence once more (Keonig-Archibugi, 2010).

Furthermore, researchers have used varying methods of examining the actual output of policy change, i.e. indicators that regulatory policies have an effect outside of their borders. In environmental policy diffusion, one method has been measuring emissions regulated by specific policies or agreements and attempting to correlate changes in emissions with the institutionalization of these policies over time (see Prakash, Potoski, 2017). Others have studied the behavior of firms more closely, looking at how they lobby (see Dolowitz, Marsh, 2000, Bernauer,

Caduff, 2006) or self-regulate through voluntary environmental certifications (Prakash, Potoski, 2006).

3.2 Theoretical framework

There are difficulties in the study of policy diffusion which I hope to diminish by having a clear theoretical framework as the backbone of my study, established in this section. The various ideas on theory, methodology and mechanisms of policy diffusion are too varied to together constitute a basis for a single study, as shown in the previous section, wherefore I narrow the theoretical part of the study down. Even if a convergence is found, and causality is established, a study of convergence is not complete without a discrimination between differing mechanisms, also called “the twin challenge of interdependence” (Starke, 2013, p. 561).

The diffusion of policies can be expected to result in an increase of policy homogeneity among countries. So far, however, there is no clear picture of the extent of convergence. While there are some indicators, these “trends are neither universal nor uniform, variation occurs from issue-area to issue-area” (Holzinger, Knill, 2008, p. 555). This is also the case for the EU’s regulatory influence in general, supported by Young, arguing that “the EU’s regulatory influence varies systematically across different forms of regulatory interactions”, noting in particular the differences between regulatory areas in which the EU *can* exclude foreign firms from its markets and regulatory areas in which the EU *cannot* exclude foreign firms (2015, p. 1234). This is considered in this study, wherefore two separate processes are theorized below, satisfying both the twin-challenge criterion and the variance in regulatory interaction. The first mechanism is one of policy-convergence through competition, and the second is one of policy-convergence through learning.

3.2.1 Market power and competition

This view on policy convergence focuses heavily on trade, and argues that dominant markets, when enforcing strict regulations on products, may cause the states to ‘trade up’ once their companies have themselves increased their regulation to gain access to the regulated market (see Vogel, 1995). This mechanism also draws from the Market-power-Europe theory, one conceptualization out of many in the Europe-as-a-power debate. Chad Damro (2015, p. 1337) presented his theory not as an explanatory theory, excluding other possibilities, but rather as a framework from which the EU can be understood. This is particularly interesting for the purpose of this paper: to try two mechanisms which may operate parallelly. As such, confirming this mechanism

does not exclude the other. Furthermore, it provides a solid theoretical basis for the first part of the mechanism, i.e. that EU's regulatory influence depends on its market power.

It is in fact a reasoning similar to that behind the 'California effect' theory, and for a more concrete mechanism I draw from Bernauer and Caduff's (2004) work. They look specifically at the actors which can affect the voluntary regulation which may then lead to national regulation. The theory is that on one hand, NGO's and the populace pressure lawmakers and companies (and also affect each other interactively) and on the other hand, producers may be encouraged to pressure their governments to regulate at a level which they have already reached as form of rent-seeking (manipulating public policy to increase profits). For the state, these can be considered "protectionist benefits" given to the firms and "domestic economic benefits" to itself as it will profit the domestic economy if their own firms have a stronger position on the market (Bernauer, Caduff, 2004, p. 107-108).

In conclusion, the theoretical basis for this model is one of market-power leading to policy diffusion through private firms adapting to foreign regulations, and then lobbying for these same regulations at home. The concrete steps of the mechanism will be presented in chapter 4.

3.2.2 Lessons learned

This mechanism is somewhat closer to the root of policy diffusion, i.e. the work of Rogers on the 'diffusion of innovation' (2003). It considers policies as ideas which may be spread between states. My theoretical basis for this study is primarily the Dolowitz-Marsh model (2000, p. 8-10). It creates a framework from which we can study this mechanism basically focused on answering some key questions:

- Why transfer?
- Who is involved in the transfer?
- What is transferred?
- To what degree is it transferred?

Answering this series of questions pertaining to the convergence of policy allows for the construction of a theoretical model. For the first question, the assumption is that a policy is transferred when being considered successful. There is evidence from the field of American politics that policy diffusion is especially likely to happen when policies are successful (Volden, 2006), requiring a theoretical model on this form of policy convergence to include the considered success of the transferred policy.

As for the actors involved, we assume it is primarily the lawmakers, but also the various interest groups heavily affected by them such as environmental groups and industry lobbyists. We of course consider REACH the policy being transferred (i.e., an inference between its creation and the TSCA reform) and

leave the final question, “to what degree is it transferred”, to the final step of this study in which we compare REACH to the TSCA, before and after reform.

This is complemented by Knill and Holzinger’s ‘Transnational communication’ model, which we use by considering the lack of strong U.S. chemical regulations a domestic problem, and the American lawmakers as rational actors. Hence, we assume rational actors would solve this problem by drawing lessons from actors who have resolved a similar issue if they share the same goals as the original lawmakers (see Knill, Holzinger, 2008, p. 559).

To summarize, this mechanism is based on rational policy makers, and theorizes that they will learn from foreign legislation if said legislation is considered successful and the lawmakers share their goals. It will also be presented in more detail in chapter 4.

3.2.3 A note on terminology

As in every field, terminology varies depending on the author, the particular study or minor technicalities. This section is devoted to clearing up any confusion which may arise from this to make the reading of this paper and its sources easier.

Policy diffusion is the process by which the policy decisions by one state are influenced by the policy decisions of another (Graham et al, 2013, p. 765). Policy convergence is used when not studying the process per se, but rather its end point, i.e. the final policy, sometimes called ‘policy transfer’ or ‘policy export/import’ (Muller et al, 2014, p. 1101). This terminology is especially used in studies of a comparative nature (Graham, 2013, p. 679, fig 2). However, as some scholars study both the process and its end point, the two terms may be used interchangeably. For specific theories, terms may be used such as ‘Race to the top/bottom’, to denote that actors are strengthening or weakening their regulations in an interdependent manner. Vogel (1995) used the term ‘trading up’ referring to the process by which firms standardized their car production across the USA to comply with California’s strict requirements, which has also been called the ‘California effect’, with its polar opposite being the ‘Delaware effect’. Some literature, speaking of policy diffusion *from* the European Union to another actor speak of ‘Europeanization’, a somewhat confusing term also used for integration within the EU.

I use the term ‘policy diffusion’ to denote that one actor has been influenced by another when choosing to adopt a policy. I use the term ‘policy convergence’ to denote that the adopted policy is so similar to another policy that they are essentially the same in function. I coined the term ‘partial convergence’ for a policy of which large parts have converged, but others have been left out.

4 Methodology

My initial plan for this study was to conduct an extensive, quantitative analysis of a ten-year period before and after the implementation of REACH, assessing whether or not self-regulation could have played a role. Unfortunately, there was a significant lack of data forcing me to look to other methodologies. The result is therefore an intensive within-case analysis, in which I develop a model for each mechanism and try them using the method of process tracing. In this chapter, I explain the method of process tracing and the two models I will be testing.

4.1 Process tracing

I have previously gone through a number of different theories and causal mechanisms in environmental policy diffusion, most of them quantitative. I believe a deficiency in this field is one of scope, in that it has not focused more narrowly on one sector. I also believe it is a mistake to rely solely on statistical methods and large- n studies, as the mechanisms of policy diffusion vary widely between industrial sectors (see Young, 2015, p. 1234) (Holzinger, Knill, 2008, p. 555), requiring new theoretical propositions which should be based on small- n , verifiable causal stories (George, Bennet, 2005, p. 205).

Process tracing is a primarily qualitative method by which a process, hypothesized from existing theory, is presented, and then tried (Teorell, Svensson, 2007, p. 247-248). The various links in the chain of events leading from our independent variable to our dependent variable can strengthen, weaken, prove, or disprove various hypothesis (Collier, 2011, p. 826). It has been suggested as a solution to the “Small n , many variables” problem, due to it not requiring a trying of the causal status of each intervening variable, or link of the chain (Teorell, Svensson, 2007, p. 249). Rather, these links are of a descriptive nature and used to support the theorized causal process, forming pieces of evidence within a narrative.

Process tracing can of course exist in different variants. This form of process-tracing is one aimed at theory-testing, most commonly used when both X (the independent variable) and Y (the dependent variable) are known (Beach, Pedersen, 2013 p. 56). A slight deviation from this method is that while I know Y happened (the TSCA was reformed) I’m not certain of the extent to which it was reformed and have made finding out the last step of the analysis. One reason for this was because I am also examining the extent of the EU’s regulatory influence.

In this way, I avoid choosing on the dependent variable, and potentially losing credibility.

As the developed theory generates predictions on the causal process, and the purpose of this study is to theorize two processes and then test them, we are able to not only test the theories but also further their development (see George, Bennet, 2005, p. 217). As such, both of my models may be proven wrong, but a contribution can still be made by correcting the models based on the empirical research. Furthermore, though I have theorized each mechanism with a monocausal start ($X \rightarrow Y$) (See Beach, Pedersen, 2013, p. 56), it may indeed be so that both models are accurate since they are not necessarily rivals, but can complement each other.

Finally, the results will be interpreted using a form of Bayesian logic, in which no evidence can fully either confirm or disconfirm a theory. Rather, we give weight to evidence not on the basis of its quantity, but on the likelihood the evidence be found if the theory were true (Beach, Pedersen, 2013, p. 83-85).

4.2 Models and hypothesis

Crucial to the method of process-tracing is that *all* intervening steps in a process must be hypothesized before the analysis, and then be accounted for in the analysis. It is not sufficient for a significant number of steps to be accounted for, and if this criterion is not met the suggested process must be amended, be it to a large or small extent (George, Bennet, 2005, p. 209). The mechanism being tested should have observable implications that will be true also for this analysis, and there should be no large logical gaps (Beach, Pedersen, 2013, p. 59). For each of the steps, I have prepared a hypothesis to be tested.

The process, and hypotheses, that will be tested is a product of the theoretical framework presented in section 3.2. It is important to note that it is therefore not entirely a test of the specific models presented by Bernauer and Caduff or Dolowitz and Marsh; they have been amended on a theoretical basis, and will now be tested on a within-case analysis to challenge them empirically.

The key to tracing a mechanism is to hypothesize a chain of events which should be true of the mechanism is correct (Teorell, Svensson, 2007, p. 248-249). Furthermore, the derived predictions should include expected evidence to confirm a hypothesis and suggestions on what could confirm an alternative hypothesis.

4.2.1 Model 1: Competition mechanism

This model contains an important theoretical deviation from the theories of Bernauer and Caduff which should be noted. Bernauer and Caduff specifically theorized foreign companies, i.e. EU companies in this case, as the actors which

pushed for stricter regulation in the home country, the U.S. in this case. This is based on the idea that foreign companies have already implemented stricter regulations, when home companies have not. This is a reasonable assumption when dealing with an industry in which foreign goods cannot be banned for their production methods. However, since REACH obliges American companies to adapt to their rules, it is reasonable to assume that American companies would lobby their own government to increase the regulation if they have already rendered their operations more environmentally friendly, as it would give them a comparative advantage over other American businesses or foreign non-EU exporters.

H1: The European market is a dominant market for U.S. chemical companies.

The mechanism requires the EU market to be dominant for the chemical industry. This is due to it being too difficult for a state (the EU in this case) to spread its legislation to another through regulatory influence if its own market is not dominant. A significant amount of U.S. companies exporting to Europe (which we assume leads to some form of establishment on the continent), a highly-regulated zone, would lead to an increased self-regulation in the United States, as well. High exports and indicators that firms and the U.S. government prioritized the EU market would be evidence in favor of this test.

H2: Domestic U.S. companies regulated far beyond what U.S. regulation required.

The type of rent-seeking behavior suggested in this mechanism is not one of lower regulations, but of strengthening, which only works if firms have self-regulated. We therefore look for indicators that American firms regulated far beyond what the TSCA demanded.

H3: U.S. Chemical industry lobbied for stricter regulations in the TSCA.

The final step before convergence would then be that the chemical industry actively worked to ensure the TSCA was reformed, demanding stricter regulation rather than working against them.

4.2.2 Model 2: Learning mechanism

This model depends, for obvious reasons, on REACH having been implemented well before the TSCA reform. Furthermore, it requires that REACH be considered a success and that the American lawmakers shared the goals of the EU lawmakers, otherwise a rational actor would not wish to learn from them. This could for instance be because it was not in the policy maker's best interest to heavily

regulate the chemical industry in the way that REACH did. Finally, it must be shown that the EU policy is indeed both politically and practically implementable in the US.

Bernauer and Caduff recommend using media, reports, conferences, statements, and similar material to establish the degree of learning, wherefore it constitutes the bulk of my material. I modernize their material by including Youtube videos of congressmen and other lawmakers. Please note that a key assumption here is that lawmakers are rational actors and will act in their best interest.

H4: Reach was considered a success in the U.S.

A foundation for this is the severe deficiencies of the TSCA discussed in chapter 2, which allows for REACH to be cited as a positive example. If it is believed that REACH improved public health and the environment, it is likely to be considered successful. Reports that REACH harmed innovation, was too costly, or harmed small and medium sized companies are potential examples of how it can be considered unsuccessful.

H5: U.S. policy makers share the same goals as EU policy makers.

The goal in this case is of course to impose sweeping reform, strongly regulating the chemical industry in the way that REACH did. This is by no means a given, and policy makers may even have had opposite intentions. Statements from politicians and other officials, rather than lobbyists and advocates, can provide valuable information on their objectives.

H6: A REACH-like policy was practically implementable in the U.S.

There may be some constraints to convergence which need to be considered. For instance, convergence may be hindered by a policy's complexity or harm to key industries. For it to be practically implementable, we would expect to see evidence of a strong political will for sweeping reform.

4.2.3 Degree of convergence

H8: The regulatory reform resulted in a full convergence.

H9: The regulatory reform resulted in a partial convergence.

This test is the last step for both models, as they cannot be interpreted without assessing the end-point, i.e. the degree of convergence. The hypotheses are related to chapter 2 of this study, and two of them are presented since they are easily differentiated. To establish the degree of convergence between the two laws, we must compare them in similar key points, namely on:

- information-gathering,
- on whom the burden of proof is put,
- which chemicals may be restricted and how.

If all points have converged it will be considered convergence, otherwise it will be considered partial convergence.

5 Analysis

5.1 Model 1: Competition

5.1.1 Dominant market

This point can be considered as the “enabling condition”, as Bernauer and Caduff (2004, p. 121) call it, for the rest of the process. Operationalizing a “dominant” market is difficult, as the requirements for a dominant market are unclear, and not explicitly treated in political theory. We can do, however, is to examine the importance of the EU market for American firms.

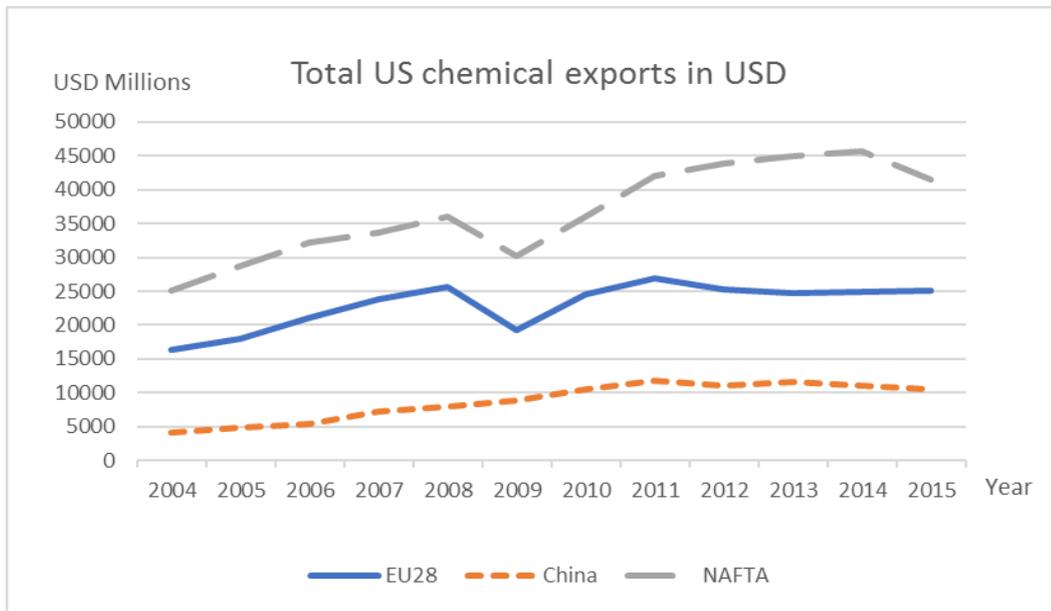
There is evidence that the EU market was of great importance to American chemical exports. In 2006, Ackerman et al estimated the chemical exports of American firms to the EU at \$14 billion per year, and “directly and indirectly responsible for 54 000 jobs” (2006, p. 2). Furthermore, both the American government (under president Bush) and the chemical industry (primarily through its branch organization the American Chemistry Council (ACC)) engaged in heavy lobbying with both EU officials, foreign countries, and European member-states. This lobbying eventually culminated in a joint statement by the Missions to the European Union of several countries, led by the U.S., heavily criticizing REACH (Ackerman et al, 2006, p. 3-4). And yet, only 6% of total chemical exports went to the EU in 2006, which seems relatively low compared to the significant effort of both government and lobbyists. One reason it was still considered an important market is because of the high number of jobs depending on these exports.

Another explanation is the increasing growth of chemical exports to the EU noted at the time, having increased by \$3.5 billion in value in only two years, leading to 15 000 new jobs (Ackerman et al, 2006, p. 6). Data from the Department of Commerce shows that this trend continued, with chemical exports

increasing until 2015 by nearly \$9 billion¹, making it a significant market for exporters.

To further explore the importance of the EU for the American chemical industry, I have gathered data showing US exports to the world's three largest chemical markets, namely the North American Free Trade Area (NAFTA), the EU28 and China (CEFIC). Domestic American sales are counted as exports to NAFTA. The results are presented graphically below to allow for a visual comparison, as it is the relative difference between markets which interests us. See table 3 and 4 in the annex for further data.

Figure 1 – Total Chemical Exports in USD²



Data from the US Chamber of Commerce shown in figure 1 does show that the EU market was important, indeed far more important for American exporters than the Chinese market, but it is dwarfed by the size of NAFTA. One can question if this suffices to consider the EU market dominant for chemical goods, considering other export destinations. However, all exports to the EU must abide by the rules of REACH, allowing for the possibility that firms increased their regulations across the board, which could potentially lead to a visible self-regulation in the next step.

¹ Under NAICS classification, sector 235 (excluding pharmaceuticals), see annex for whole table.

² US Chamber of Commerce, International Trade Administration.

5.1.2 Overcompliance with regulations

This leads us to the next step of the model, analyzing whether US chemical firms regulated beyond what local legislation required. Overcompliance with regulation is difficult to operationalize. Drawing a page from the book of Prakash and Potoski, who measured self-regulation through ISO 14001 standards (Prakash, Potoski, 2006, p. 351), a solution may arise. Explaining ISO 14001 is of course in order. The International Organization for Standardization (ISO), based in Geneva, is the primary global issuer of certifications for the private sector, with ISO 14001 being their environmental certificate. A certification primarily guarantees that a firm has fully complied with local regulations as well as the codes of practice of relevant branch organizations (Whitelaw, 2004, p. 12. For instance, the American Chemistry Council requires that its members acquire a Responsible Care certification (ACC, Responsible Care). The ISO also requires that a firm continuously takes steps to improve its environmental conduct, keep an appropriate environmental policy to minimize their impact on the environment and are regularly subjected to audits (Whitelaw, 2004, p. 36-42).

| Table 1: ISO 14001 adoptions in the US and globally³ | | | | | | | |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Year | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| US Chem ISO | 121 | 126 | 141 | 160 | 428 | 405 | 338 |
| % Change | 0% | 4% | 12% | 13% | 168% | -5% | -17% |
| Global Chem ISO | 9503 | 9584 | 9860 | 7940 | 11 554 | 11 890 | 11 978 |
| % Change | 0% | 1% | 3% | -19% | 46% | 3% | 1% |
| US ISO 14001 | 5225 | 4407 | 4957 | 5699 | 6071 | 5617 | 6067 |
| % Change | 0% | -16% | 12% | 15% | 7% | -7% | 8% |
| Global ISO14001 | 222 974 | 239 880 | 243 393 | 260 852 | 273 861 | 296 736 | 319 496 |
| % Change | 0% | 8% | 1% | 7% | 5% | 8% | 8% |

³ ISO Survey, 2009-2015.

Assuming that highly regulated firms will seek to market their green production through certifications, chemical firms should have a comparatively high rate of regulation. Furthermore, it is also common for green producers to demand that their chemical suppliers be ISO 14001 certified, as producers often have an indirect responsibility for their suppliers, e.g. as the auto-industry does to chemical companies in the U.S. (ICIS). Though Prakash and Potoski used data on ISO 14001 adoptions per country, I instead opted to gather such data for chemical producers in the US as well as chemical producers globally. A limitation of this operationalization is that this data was not collected prior to 2009, preventing a comparison before and after REACH. However, a greater adoption rate of ISO 14001 in the US would indicate that firms were indeed self-regulating.

The data gathered from the ISO (Table 1) shows that American chemical companies were indeed self-regulating, and doing so at a faster rate than the rest of the world. Particularly notable is the dramatic rise of certifications issued in 2013, reaching a more or less steady level of 400 firms. Though we see greater regulation on a global scale as well, it is less impressive. One might argue that this is because the US is simply more likely to adopt environmental certifications, wherefore the table also includes data on US and global ISO 14001 certifications across industries. Here we see that US firms are not more likely to regulate than the rest of the world, indicating that the American chemical sector specifically self-regulated beyond what their governments required.

5.1.3 Corporate lobbying for stricter regulations

Operating under the assumption that this lobbying would occur through the American Chemistry Council, we do find evidence that they were not inclined to support heavier regulation. When California, a generally highly-regulated state, moved to ban the chemical bisphenol-A in children's products, the ACC spent millions of dollars lobbying against the banning of bisphenol-A, allegedly worried that even more chemicals may be restricted in the future (New York Times, 2011). Indeed, there seems to be little evidence to assert corporate rent-seeking as an intervening variable ultimately causing the adoption of the TSCA. Rather, much points to the opposite: the chemical industry, through the ACC, worked to weaken chemical regulations rather than strengthen them (New York Times, 2016-1), and had previously been heavily opposed to the various reforms put before congress (Heyen, 2013).

This, however, does not mean that the chemical industry was against any reform bill being passed. The New York Times reported that Senator Tom Udall, crucial in the writing and passing of the reform, worked closely with the ACC when producing the bill, indicating that the industry was willing to compromise. However, this led to criticism that the senator gave in to the chemical industry by weakening certain provisions. Not surprisingly, Cal Dooley, president of the ACC (and who has been referred to as the "top lobbyist" of the chemical industry) has

had much praise for the reform bill calling the signing of the FLCS “nothing short of extraordinary” (ACC, 2017).

Indeed, the ACC wanted some kind of reform. In his remarks at GlobalChem in 2014, Mr. Dooley called for a TSCA amendment that would enable the law “to work in modern times” (ACC, 2014, p. 3), referring to the precursor to the FLCS, the Chemical Safety Improvement Act (CSIA) (which never passed). In the same speech, he warned against basing U.S. regulation on REACH, criticizing it for being too costly and argued for “a science based approach to chemicals management” (ACC, 2014, p. 5), a criticism likely aimed at the precautionary principle⁴. Of note here is that the CSIA of 2013 placed the burden of proof on the EPA, and not the producers.

As the FLCS was being introduced to congress, the New York Times reported that the chemical industry wanted congress to act, partially due to the negative press of harmful chemicals in childrens’ goods and public concerns of an unregulated industry (New York Times, 2015). Moreover, various US states had recently started heavily restricting harmful chemicals from their markets. In total, 28 states had passed or were passing legislation to ban harmful chemicals, a process which could be undermined by an TSCA overhaul (Hogue, 2011, p. 36.38) (Trasande, 2016). This casts significant doubt on the wishes of the ACC, as lobbying may have been done to further their public image and prevent European-style regulations.

The ACC had provided American policy makers with an outline of key points when reforming the TSCA as far back as in 2009. In it, several important concessions are made, prioritizing the health of children and consolidating the role of firms in providing the EPA with information on chemicals. However, it also highlighted the importance of making decisions on a scientific basis (ACC, 2009, p. 2-3), potentially swaying policy makers away from a precautionary principle, and away from putting the burden of proof on firms.

5.2 Model 2: Learning

In this model, I examine whether there is evidence that American policy makers and pressure groups clearly learnt from the creation and of REACH when amending the TSCA, by considering the opinions on REACH, the goals of policy makers and whether a policy like REACH could be implemented in the US.

5.2.1 REACH considered a success

⁴ My own interpretation of the speech.

Was REACH considered a success, and by whom? Environmental advocates did not necessarily have the same opinion as industry representatives, media or academics, whose opinions on REACH will be studied in this section. It may seem strange to exclude politicians from this analysis, as they are the primary policy makers. But though they will speak freely on their own nation's regulations, they are unlikely to openly argue for or against foreign legislation. The reasonable assumption made is therefore that divides observed among academics, environmental advocates and industry representatives will be reflected in the view of politicians.

Even a decade after REACH was adopted, industry still struggled know exactly what regulators were after, and sometimes did not see patterns in the decision-making of regulators (Chemical Watch, 2016-1). Speaking ahead of a GlobalChem meeting in 2015, Professor John Graham dismissed the idea of adopting regulations too similar to REACH in the United States, primarily due to it being “far too complex and burdensome”, but praised two other components of the EU law: the first was that it puts the scientific burden of risk assessment on the industry, and compels companies to collaborate on risk assessment (ACC, 2015). As stated in section 5.1.3, the ACC was against basing US regulation on REACH, a sentiment shared by the National Electrical Manufacturer's Association who urged congress not to adopt a REACH-like bill (NEMA, 2007).

Others saw REACH, in its entirety, in a more positive light. The Environmental Defense Fund published a report comparing the regulations of Substances of Very High Concern (SVHC) in Europe to the U.S., where such a term did not even legally exist (EDF, 2009), praising REACH for its efficiency in identifying and restricting such chemicals. The Centre for International Environmental Law argued for a REACH-like legislation gave firms greater access to information about harmful chemicals and increased innovation (Tuncak, 2014, p. 9) and lead to the substitution of harmful chemicals with safer alternatives (Tuncak, 2014, p. 8). Andy Ingrejas, director of Safer Chemicals, Healthy Families, went as far as to say that American firms would be “hamstrung” on the global market if congress did not strengthen regulations (CIEL, 2013).

The wide range of opinions makes assessing whether REACH was considered a success difficult. In fact, much seemed to depend on the interpretation of a 2012 report by the European Commission (Eur-Lex, 2012), presenting the results of a survey sent out to chemical firms. Industry representatives interpreted it as evidence of the consequences of over-regulation, while advocates interpreted it as spurring innovation.

What does this tell us about REACH and how it was viewed? Different interest groups had different priorities. Advocates used REACH as an example of efficient restriction of harmful chemicals. Lobbyists primarily argued it was too much of a burden on firms, particularly small and medium sized companies, and hindered innovation. It is likely that lawmakers agreed with both arguments, and learnt not only from the positive aspects of REACH but also its downsides.

5.2.2 Goals of policy makers

There is some difficulty in establishing precisely what policy makers were after, due to many discussions between lawmakers, lobbyists and advocates not being made public during the negotiations. A wide net is therefore cast, searching for public statements by both the legislative and executive branch where they can be found.

Speaking on the house floor, representative Diane DeGette urged the house to pass the bill, primarily focusing on the restriction of chemicals from consumer goods, with a specific focus on the protection of children (RepDeGette, 2015).

Speaking to the House of Representatives, congressman John Shimkus argued for the need of a “sweeping legislation” and expressed the need for reform allowing the TSCA to “examine all chemical manufacturing and uses” and giving the EPA greater tools to assess the potential harm of chemicals (RepShimkus, 2016).

It is important to note that lawmakers did have considerable disagreements. Most notable are the objections of Senator Barbara Boxer and Senator Ed Markey, believing that the bill did not go far enough and would prevent states from regulating further than the EPA. Senator Markey did eventually co-sponsor the bill, after he, among other amendments, somewhat relaxed the rules preventing states from restricting chemicals from their internal markets, gave greater funding to the EPA and clarified the process allowing the EPA to restrict both new and old chemicals (EDF, 2015-1) (Tom Udall, 2015-1) (EPA, 2015-1).

It may seem counter-intuitive to, in one part of the analysis, explain how the US government was strongly against REACH and organized an international coalition against it, and then examine what the goals of the executive branch was, as it seems well-established. Two points need to be made here. Firstly, the lobbying against REACH before it was implemented was done by the executive branch alone, and not the legislative branch. Secondly, 2009 saw the inauguration of a new American president, and therefore a new administration. The actions of President Bush are therefore not relevant to our time-frame.

Shortly before signing the FLCS, then president Obama held a speech in which he lamented the poor system for gathering of information imposed by the TSCA in 1976.

“But the law placed demands on the EPA that were so tough [...] that it became impossible to actually see if those chemicals were harming anybody.”⁵

Moreover, he specifically brought up the differentiation between chemicals in use and novel chemicals, highlighting that out of the original 62 000 chemicals on the market in 1976, only five had been banned (Obama White House, 2016), and few had ever been reviewed. In fact, President Obama had made reforming the

⁵ The Obama White House, 2016. *President Obama signs the Frank R. Lautenberg Chemical Safety Act for the 21st Century.*

TSCA one of his top priorities when he first entered the White House (Denison, 2017, p. 4).

5.2.3 Practically implementable

Prior to passing the Frank Lautenberg Act, observers noted that passing any sort of bill regulating the chemical industry was near-impossible, and had failed many times since the TSCA was adopted in 1976. To make matters more complicated, the FLCS was to be passed at a time when the generally regulation-averse republican party controlled the congress (Washington Post, 2015).

Of special interest here is that the FLCS was a “bi-partisan, bi-cameral bill” (RepShimkus, 2016) and was introduced to both the House and the Senate by republican legislators. For years, Senator Frank Lautenberg failed to get any republicans to work on the bill with him. Now, they presented the reform while the greatest opposition came from democrats who worried that the bill was too soft on industry polluters (The Atlantic, 2016), with the strongest resistance coming from senator Boxer, then then Chair of the Senate Environment and Public Works Committee (Culleen, 2015, p. 3).

Indeed, one of the main issues of passing a TSCA reform was not only republican aversion to regulation or industry pressure, but also the need for many legislators to “fix everything at once” (Cullen, 2015, p. 4). As most democrats eventually agreed on compromise after negotiating significant amendments to the bill, pushing it to the left (The Atlantic, 2016), the typical partisan issues were out of the way. In short, industry, environmentalists, and politicians all wanted a reform of the TSCA, recognizing that such a bill might not be perfect but nonetheless accepting it.

5.3 Degree of convergence

This brings us to the final portion of the analysis, namely that in which we examine the degree of convergence. As previously stated, we are looking at information-gathering, on whom the burden of proof is put, which chemicals may be restricted and how. Instead of legal documents, the sources used are second hand reports by jurists and the EPA.

The TSCA did not provide the EPA with any significant tools to gather data on the safety of chemicals, as evidenced by the significant data-gap lamented by both regulators and industries, which contributed to the design of REACH (Applegate, 2008, p. 735). Gathering information is at the heart of REACH, and manufacturers and importers are required to submit reports on the properties of used chemicals to the ECHA, and both consumers and industrial customers (Vaughan, 2015, p. 131-132). All chemicals require registration whose level of detail varies depending on the tonnage of the imported article, and REACH

requires the European Chemicals Agency to then make this information publicly available (Vaughan, 2015, p. 133-135). In contrast, the new TSCA focuses on ensuring information-gathering is not too burdensome for the industry and on protecting the data of industries, though chemical firms are now subjected to the Chemical Data Reporting rule (EPA, Chemical Data Reporting).

In an unsure situation, REACH allows the ECHA to use the precautionary principle, and restrict a chemical from the market in the face of scientific uncertainty. The burden of proof is thereafter put on the manufacturer or importer (Applegate, 2008, p. 746-747). Under the old TSCA, the burden of proof was put on the regulator (Applegate, 2008, p. 745) and the EPA was put in a catch-22 as it had to “have information sufficient to document potential risk [...] to require a company to test” (Denison, 2017, p. 3), effectively hindering such test. And though the burden of proof remains on the regulator, such a catch-22 has been removed and now allows the EPA to properly restrict chemicals from the market (EDF). As REACH can denote some chemicals Substances of Very High Concern (Vaughan, 2015, p. 166-167), the new TSCA allows for the identification of Persistent, Bioaccumulative and Toxic Chemicals, facilitating quicker restriction from the market (EDF). All in all, the amendments allow for significantly better information gathering and permits restriction of harmful chemicals, but is considerably softer on the chemical industry than REACH.

Table 2

| | REACH | TSCA pre-reform | TSCA post-reform |
|------------------------------|--------------------------------------|---|--|
| Information Gathering | On industry, Efficient Tool | No Efficient Tool, Data-gap | On industry, Not burdensome For industries |
| Burden of Proof | Precautionary Principle, On Industry | No Precautionary Principle, On Regulator | No precautionary Principle, On regulator |
| Restriction of Old Chemicals | Restriction of Old Chemicals, SVHC's | Virtually no Restriction of Old chemicals | Restriction of Old chemicals, PBT's |

6 Results

6.1 Model 1: Market power and competition

Model 1: Hypotheses

Hypothesis 1: *The European Market is a Dominant Market for US Chemical Companies.*

Hypothesis 2: *Domestic US Companies regulated beyond what US regulation required.*

Hypothesis 3: *US Chemical industry lobbied for stricter regulations in the TSCA.*

The first step passed the empirical challenge despite the somewhat unclear definition of a dominant market. There is evidence that the U.S. government cared greatly about their exports there, as evidenced from their protests of REACH. One rival possibility is that the U.S., along with the other countries that protested the law, was worried it would set a dangerous precedent, spreading the stricter regulations to other key markets. However, the high amount of U.S. jobs relying on the EU market and the fact that it was the second largest chemical market suggests it can indeed be considered dominant.

The results of the second hypothesis were surprisingly conclusive. It found that the U.S. chemical industry regulated more than other American industries, but also to a greater extent than the chemical sectors of other countries. There are limitations to the ISO data as it is compiled from a survey, with issues common to all surveys such as non-respondents. However, such a limitation would not explain the difference between U.S. firms and foreign ones, or non-chemical firms from the U.S. The sharp increase in certifications starting in 2013 also supports the hypothesis.

The third hypothesis is difficult to confirm. Lobbyists certainly wanted new regulations, but were keen on those not being based on REACH. However, the model does not require that rent-seeking necessarily wishes to copy all parts of a foreign law, only that regulations are heightened for all, which the evidence does point to, though it is weak and says little about the sort of regulations lobbyists wanted.

6.2 Model 2: Lessons learned

Model 2: Hypotheses

Hypothesis 1: *REACH was considered a success in the U.S.*

Hypothesis 2: *U.S. policy makers shared the same goals as EU policy makers.*

Hypothesis 3: *A REACH-like policy was practically implementable in the US. .*

REACH was not always considered positively. It is likely lawmakers shared the sentiments of critics, and therefore acted to reform the TSCA more carefully, avoiding heavy burdens on industries. Yet, environmental activists evidently viewed REACH as a model regulation. I therefore deem the results inconclusive.

The results of my analysis showed indeed that U.S. policy makers shared the goals of the lawmakers who wrote REACH, i.e. introducing sweeping reform allowing for the restriction of some chemicals. I further believe this was strengthened by the wide range of materials used and the consideration of politicians from both parties and chambers, as well as the consideration of the executive branch.

Virtually all relevant actors wished for reform *and* were open to compromise. Special circumstances allowed the democrats and republicans to agree on a bill, but that is very different from agreeing on a REACH-like bill. Indeed, the bi-partisan nature of the bill, and the difficulties in adopting similar bills in the past, is evidence against this hypothesis.

6.3 Degree of convergence

Interestingly, the degree of convergence matches the analysis conducted for both models quite well, as the comparative deficiencies of post-reform TSCA can be derived from both the lobbying of industries and the general attitudes towards REACH. In short, the TSCA has been amended to resemble REACH in the way it differentiates between chemicals and requires gathering of information from manufacturers. The more burdensome provisions of REACH have been avoided, however, to the advantage of the chemical industry.

7 Conclusion

7.1 Conclusion

Both models require correction. I conclude that the theoretical basis for the first model was not nuanced enough. A future model should consider the importance of the domestic market, as opposed to simply considering the export market, as compatibility with the regulations of one market does not mean an industry is ready to take on the increased costs of domestic regulations. The concept of a ‘dominant market’ is perhaps too wide, as important export destinations seem to lead to partial convergence in this case rather than full convergence. Moreover, it did not sufficiently consider the various reasons for industry to lobby for policy convergence, as lobbying could be done to limit the effect of the reform or even, as in this case, hinder the efforts of states to regulate even further.

The second model is lacking in that it too quickly assumed learning from REACH would imply doing as REACH. Indeed, the empirical analysis shows that while Americans did learn from REACH, they specifically identified some parts of the legislation which were considered burdensome. The step I used depended on the policy being considered successful, but operationalizing success proved to be complicated, and the results difficult to interpret.

The final step to both models, the degree of convergence, proved to be crucial to understand the role of REACH in the adoption of the FLCS. When considering the adopted bill a weaker version of REACH, the narrative told through the models does fit, but would explicitly be models explaining *partial convergence*. It is also in this way the EU’s regulatory influence should be considered. While there definitely was learning from across the pond, and EU regulations likely did lead to lobbyists being more open to domestic regulations, the EU’s influence remains limited.

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8.1 Annex

Table 3: US chemical exports in USD, 2004-2009

| Exports to the European Union | | | | | | |
|-------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Item | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| Total | 16880706438 | 17948697274 | 21125451126 | 23780972766 | 25547952597 | 19306894461 |
| 3251 | 9446,804016 | 10488819646 | 12740332224 | 14051936897 | 15381354073 | 11411869218 |
| 3252 | 3580372472 | 3849278462 | 4375204874 | 5313338542 | 5323610488 | 3656569464 |
| 3256 | 1584683899 | 1796534364 | 2030105756 | 2309033507 | 2501236610 | 2241655479 |
| 3259 | 1428567479 | 1504597863 | 1627379927 | 1712849181 | 1948180760 | 1670473400 |
| 3255 | 287073141 | 309466939 | 352428345 | 393814639 | 393570666 | 326326900 |
| Exports to China | | | | | | |
| Total | 4150,30913 | 4826,929341 | 5385,668566 | 7202,977972 | 7933,069853 | 8819,907964 |
| 3251 | 1955974843 | 2004535506 | 2022681608 | 2914967648 | 3120237624 | 3431333020 |
| 3252 | 1632119788 | 2131674433 | 2548469178 | 3290191013 | 3523431386 | 4022855251 |
| 3256 | 180307244 | 223149948 | 306321961 | 386009184 | 472998098 | 424399233 |
| 3255 | 77979148 | 116335358 | 147432610 | 164944271 | 157387824 | 161427307 |
| 3259 | 303928107 | 351234096 | 360763209 | 446865856 | 659014921 | 779893153 |
| Exports to NAFTA | | | | | | |
| Item | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| Total | 25157,40488 | 28772,84587 | 32140,97782 | 33688,17028 | 35956,13297 | 30206,38564 |
| 3251 | 9570798942 | 10984018673 | 12221117757 | 13466160190 | 14511303130 | 11980133489 |
| 3252 | 8724720423 | 10488198169 | 11666980941 | 11692566800 | 12376766951 | 9649282737 |
| 3256 | 2955564803 | 3194875413 | 3700402565 | 3895515510 | 4413472828 | 4376588915 |
| 3255 | 1493176724 | 1692456687 | 1850513064 | 1965332602 | 1943650642 | 1808519071 |
| 3259 | 2413143988 | 2413296932 | 2701963492 | 2668595182 | 2710939414 | 2391861425 |

Table 4: U.S. Chemical exports in USD 2010-2015

| Exports to the European Union | | | | | | |
|-------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Item | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Total | 24537958468 | 26925942407 | 25252673539 | 24716332456 | 24925014693 | 25037059287 |
| 3251 | 14888940584 | 16506971033 | 15324430456 | 14416110471 | 14137816404 | 14554886557 |
| 3252 | 4839195649 | 5656521933 | 5275507800 | 5425829588 | 5595252610 | 5287650934 |
| 3256 | 2583994020 | 2609380657 | 2660848879 | 2810406014 | 3169113010 | 3170230687 |
| 3259 | 1836908872 | 1763879393 | 1607062271 | 1673008077 | 1616117339 | 1562572452 |
| 3255 | 388919343 | 389189391 | 384824133 | 390978306 | 406715330 | 461718657 |
| Exports to China | | | | | | |
| Total | 10587,45308 | 11730,2491 | 11087,09277 | 11690,73002 | 11152,39313 | 10590,41496 |
| 3251 | 4182787125 | 4626467018 | 4693348689 | 5095565977 | 4472194377 | 4538142127 |
| 3252 | 4332373334 | 4548324091 | 4313918317 | 4286396417 | 4322263614 | 3757835414 |
| 3256 | 531668861 | 636224475 | 619611459 | 812100903 | 887645455 | 897452632 |
| 3255 | 236669865 | 255923307 | 274174473 | 279019468 | 290465898 | 272272506 |
| 3259 | 1303953894 | 1663310206 | 1186039828 | 1217647256 | 1179823785 | 1124712281 |
| Exports to NAFTA | | | | | | |
| Item | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Total | 36095,73317 | 41937,39687 | 43826,1082 | 44963,62586 | 45705,32064 | 41533,55375 |
| 3251 | 14099910640 | 17486730199 | 18182529492 | 18564320965 | 18355549840 | 15839326076 |
| 3252 | 12399892044 | 14217887673 | 14702580377 | 15054282909 | 15807786913 | 14497228734 |
| 3256 | 4709514363 | 4995608139 | 5410504458 | 5721887391 | 5823844875 | 5753511200 |
| 3255 | 2193071559 | 2404641972 | 2691468146 | 2753807536 | 2861876323 | 2856582224 |
| 3259 | 2693344563 | 2832528891 | 2839025731 | 2869327057 | 2856262684 | 2586905511 |