

**E-Waste Governance beyond Borders -
Does the EU influence US Environmental Policy?**

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Abstract:

In 2002, the European Union enacted ambitious legislation on the design and end-of-life treatment of electronic products. This paper explores the external effects of these laws on the California. The EU Directives on the Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) and on Waste Electrical and Electronic Equipment (WEEE) influenced the introduction of similar regulation in other jurisdictions. This paper identifies the connections between EU and Californian e-waste legislation. It analyses the roles of interdependence and transatlantic learning and it outlines the systemic variables that shaped the diffusion of EU e-waste policy to California.

Keywords: E-waste, Policy Diffusion, Regulatory Leadership

1 Introduction

This paper analyses the influence of European Union (EU) waste electrical and electronic equipment (e-waste) policy on the United States (US) by focusing on California. This is part of a larger effort analysing a number of US States and the federal level to gain insights into the factors shaping policy diffusion from the EU to the US.

E-waste is a growing problem globally. Electrical and electronic equipment is the fastest growing waste stream in many industrialised countries including the EU and the US. In 2005, 8.3-9.1million tonnes of e-waste were generated in the EU and this figure is estimated to grow to 12.3 million tonnes by 2020. If e-waste is treated improperly or dumped in landfills, hazardous substances can leak into the environment. Workers that are exposed to these substances in inappropriate dismantling processes can suffer severe health problems. Hence, e-waste requires appropriate end-of-life treatment, consumers need to be aware of the fact that e-waste should not go into the regular household waste stream and sufficient recycling facilities have to be at their disposal. The problem of e-waste shipments to developing countries, where it is often treated without any health and environmental protection measures needs to be addressed. These problems are not solved yet. Currently, approximately 40% of all e-waste arising in the EU is not treated in compliance with the Union's e-waste law. A large part of this e-waste is either treated within the EU but without due environmental care or it is illegally shipped to developing countries where valuable materials are recovered without health and environmental protection measure or it is simply dumped.¹

To address the problems arising from the increasing generation of e-waste, the EU introduced two laws with pioneering character in 2002. The Directive on Waste Electrical and Electronic Equipment (WEEE)² makes producers of electrical and electronic equipment responsible for the end-of-life phase of their products whereas the Directive on the Restriction of the Use of Certain Hazardous Substances (RoHS)³ requires the elimination of certain hazardous substances from electrical and electronic products. Globally, there was no law that introduced an e-waste take back and recycling programme as far-reaching as WEEE. The requirements of the RoHS Directives were unprecedented. Hence, both Directives are pioneer policies that go beyond any previous legislative requirements globally.

Given this pioneering character, the WEEE and the RoHS Directives influenced and inspired policy activities in other jurisdictions. This paper explores this phenomenon. It analyses in which ways the EU Directives played a role in the policy-making of other jurisdictions and it investigates the influence that the laws had on the electronics industry. Section two introduces the WEEE and the RoHS Directives. Section three proposes an analytical framework for the diffusion of EU policy. Section four applies the analytical framework to the case of California.

This paper finds that the WEEE as well as the RoHS Directive influenced policy-making in California. Both EU laws inspired policy activities in California but a number of other domestic factors played an important role in favouring and shaping the diffusion process. In addition to the inspiration of Californian law-making, the RoHS Directive influenced private policy measures of electronics manufacturers. The introduction of the RoHS requirements led to a de facto global standard for electronics manufacturing.

¹ European Commission. 2008d, 5-6.

² Directive 2002/95/EC.

³ Directive 2002/96/EC.

2 The WEEE and the RoHS Directives

Both, the WEEE and the RoHS Directive stem from the same efforts of preventing hazardous substances from ending up in landfills where they could leak into the soil and groundwater and of preventing harm to human health caused by improper end-of-life treatment. They could be considered two sides of the same coin. The WEEE Directive aims at diverting e-waste from landfills to appropriate reuse, refurbishment and recycling facilities. By making producers responsible for the end-of-life treatment of their products, WEEE aims at encouraging product design for recyclability. The RoHS Directive complements these efforts by banning hazardous substances from the electronic products to prevent environmental and health damages at the end-of-life stage, especially since not all products are disposed of appropriately.⁴ Both Directives have cross-references and are often considered as a package.

The WEEE and RoHS Directives cover a broad range of electronic products split into ten categories, eight of which are currently subject to the RoHS Directive. The categories of covered equipment are large household appliances; small household appliances; IT and telecommunications equipment; consumer equipment; lighting equipment; electrical and electronic tools; toys, leisure and sports equipment; medical devices; monitoring and control instruments; and automatic dispensers. Products intended for military use are not in the scope of the Directives neither are monitoring and control instruments and medical devices in the current scope of the RoHS Directive. There are a number of exemptions such as large-scale stationary industrial tool and specific temporary exemptions from the RoHS Directive.

Both Directives are currently under review with the aim to increase the amount of e-waste that is collected and appropriately treated, to review the scope of restricted substances and to reduce the administrative burden associated with the Directives.⁵

2.1 The WEEE Directive

The WEEE Directive requires producers of electrical and electronic equipment to organise and finance the take back, treatment and recycling of their products. It sets recycling and recovery targets for EU Member States. Products must be labelled to inform consumers that electronics are banned from municipal waste and must be collected and handled separately. The Directive is part of a larger trend toward Extended Producer Responsibility, which has the aim of shifting to product design for recyclability and efficient resource uses. It aims at creating an incentive for producers to invest in research and development for more recyclable materials and in product designs that facilitate recycling.

As of August 2005, e-waste must be collected separately from the general municipal household waste across the EU. Producers of electrical and electronic equipment are required to establish designated collection sites where consumers can return their e-waste free of charge. Individual producers are responsible for the costs of collection, treatment, recovery and disposal of their products. The participation in collective schemes is possible to fulfil these responsibilities. For products put on the market before 13 August 2005, producers pay in proportion to their market shares. Annexes II and III to the WEEE Directive prescribe recycling standards and guidelines for recycling facilities. At authorised treatment plants items such as components containing mercury, polymers with brominated flame retardants and printed circuit boards have to be removed.

WEEE currently sets a minimum collection target of 4kg per annum per capita for e-waste from private households, which had to be achieved by December 2006. This does not reflect the actual generation of e-waste in the different EU Member States, which vary significantly. Therefore, the current legislative review process

⁴ European Commission. 2008c, 5, 9-10; European Commission. 2008d, 5.

⁵ European Commission. 2008c; European Commission. 2008d.

of the Directive is likely to introduce an approach in which EU Member States with a high consumption of electronics would have more ambitious collection targets than Member States with lower consumption levels.⁶

2.2 The RoHS Directive

The RoHS Directive addresses six substances that pose major environmental and health problems during the disposal and recycling of e-waste. These substances might not pose a risk to consumers in the use phase of products but at the end-of-life stage they can cause major environmental and health damages if the e-waste is treated improperly. The Directive stipulates that the use of lead, cadmium, mercury, hexavalent chromium, and certain brominated flame retardants (PBBs, pentaBDE, octaBDE and decaBDE) must be phased out by 1 July 2006 except for some exemptions such as spare parts for products that were put on the market prior to that date. The restriction of the use of lead was the biggest challenge for electronics manufacturers because lead was a key component in the solder used for the assembly of most electronic products. The substitutes that are used to replace lead in solder have higher melting points, which required some changes in production methods and adjustments of the product design. The RoHS Directive triggered an industry-wide movement to finding new solutions to replace the banned substances.⁷ Yet, applications of the six hazardous substances are still allowed where no viable alternatives exist. In a so-called comitology procedure, a Technical Adaptation Committee composed of EU Member State Representatives can grant exemptions for narrowly defined applications for which the elimination of a substance is technically or scientifically impracticable or where the negative environmental, health and/or consumer safety impacts outweigh the benefits. Exemptions are temporary and subject to review at least every four years until a reliable and safe substitute is available.

In the current review of the Directive the broadening of the scope to measurement and control instruments and medical devices is a major point. The addition of other hazardous substances is discussed.⁸

3 Policy Diffusion

This paper explores whether the EU WEEE and RoHS Directives influence international regulatory developments in e-waste management and substance restrictions in electronics. It is argued that through policy diffusion processes, WEEE and RoHS have external effects on extra-EU policy and market activities.

Policy diffusion is here defined as a set of uncoordinated policy transfers from one political entity to another without explicit political pressure. These individual transfers can be disconnected or only loosely connected but they start from one source, a pioneer policy. In academic literature, the scope of the concept of policy diffusion varies. Some scholars include all means of influencing policy in other jurisdictions, including international law and coercion.⁹ Other scholars apply a more narrow definition of policy diffusion only including the mechanisms that are predominantly voluntary and uncoordinated thereby explicitly excluding collective decision-making or asymmetric power relations.¹⁰ The latter strand is followed in this article by using a narrow conceptualisation of policy diffusion defined as a set of uncoordinated policy transfers without explicit political pressure. A distinction is made between explicit coercive pressure and transfers triggered by the interdependence of two jurisdictions. Coercive pressure is defined as measures that have the primary and explicit aim of forcing a policy change in an external

⁶ European Commission 2008b.

⁷ Goosey 2004, 43.

⁸ European Parliament 2009.

⁹ See for example Dolowitz 2000. Yet, for example Shipan and Volden 2008 and Simmons, Dobbin and Garrett 2006 include coercion but exclude international harmonisation.

¹⁰ Joergens 2004, 252; Busch and Joergens 2007, 58-60.

jurisdiction. Tools such as financial incentives and trade sanctions are typical for this category of external influence. Policy transfers triggered by interdependence as opposed to coercion occur when policies are introduced to change domestic circumstances yet their introduction is accompanied by externalities that have effects on external jurisdictions. The policy measure was not introduced to change policy abroad but it can have this, intentional or unintentional, side effect. WEEE and RoHS fall into this category. Their primary aim is reforming EU domestic e-waste governance and as a secondary effect they have some externalities affecting other jurisdictions.

State and non-state actors play a role in policy diffusion processes. Some approaches in the public policy literature emphasise the importance of relatively autonomous state actors whereas some other approaches underline the role that societal actors play by stressing that state actors respond to societal pressure. This article is based on a combination of both, the mutual influence and importance of state and societal actors.¹¹ Policy-makers can learn about pioneer policy from abroad by actively searching for information or non-state actors can provide them with what they consider important information. Actors such as international organisations, NGOs and business serve as facilitators and disseminators of information about policy experiences originating in other jurisdictions. Both, state and non-state actors play a role in shaping the diffusion process and the diffused policy.¹²

This framework distinguishes two channels: diffusion triggered by the interdependence of jurisdictions and by learning. Amongst diffusion scholars, there is no harmonised terminology and clear consensus on what constitutes the channels of policy diffusion. For example, Simmons and Elkins¹³ differentiate two broad sets of forces: increasing adoptions changing the benefits of a policy and provision of information about the benefits of adopting a policy; whereas Busch and Joergens¹⁴ distinguish: (limited) rational learning, norm-based activities, competition and symbolic emulation. Considering the various conceptualisations, two diffusion channels are distinguished for the purpose of analysing the diffusion of the WEEE and RoHS Directives: interdependence and learning. These diffusion channels are not mutually exclusive. A combination of them can be relevant. The importance of a channel can vary in the different stages of the policy-making process. Interdependence could play a major role in the agenda-setting phase whereas learning could become more important as the process continues.

Systemic variables act as filter for pioneer policy. In most cases, the result of policy diffusion processes is not an exact copy. Variables inherent to the respective political entity determine whether diffusion takes place and shape the diffused policy measure. In the present analysis, these variables are grouped into politics, institutions and resources. The result of this filtering process can range from an exact copy to mere inspiration of a political debate. Dolowitz¹⁵ proposes a scale of different degrees of diffusion. Copying is the direct and complete transfer of a policy. Emulation refers to the diffusion of the idea behind a policy but not of all details. Combination depicts the situation in which policy-makers combine elements of different policies from abroad. Inspiration describes the case of a policy change inspired by another jurisdiction's policy but with only little similarities.¹⁶

The diffused policy can be a public or a private policy measure. Pioneer policy can diffuse without formal public policy responses. In some cases, private actors decide to apply pioneer policy requirements to their global operations, even outside the territory of the pioneer jurisdiction. Especially multinational

¹¹ Bennett and Howlett 1992.

¹² Tews and Busch 2002, 170; Kern, Joergens and Jaenicke 2001.

¹³ Simmons and Elkins 2004.

¹⁴ Busch and Joergens 2007, 72-4.

¹⁵ Dolowitz 2000, 25.

¹⁶ Tews and Busch 2002, 171.

companies can implement pioneer policy in their entire global supply chains based on considerations about economies of scale and learning. Applying the requirements of the market with the highest standards to their global operations can minimise transaction costs caused by maintaining different parallel production lines.¹⁷ When this takes place, policy-makers can decide that due to the private responses there is no need for public policy intervention.

Diffusion can be horizontal and vertical.¹⁸ For example, pioneer policy can be introduced at local level and diffuse through the different levels of governance up to the international level and become subject to an international agreement. Policy can also diffuse vertically, for example from one nation state to another.

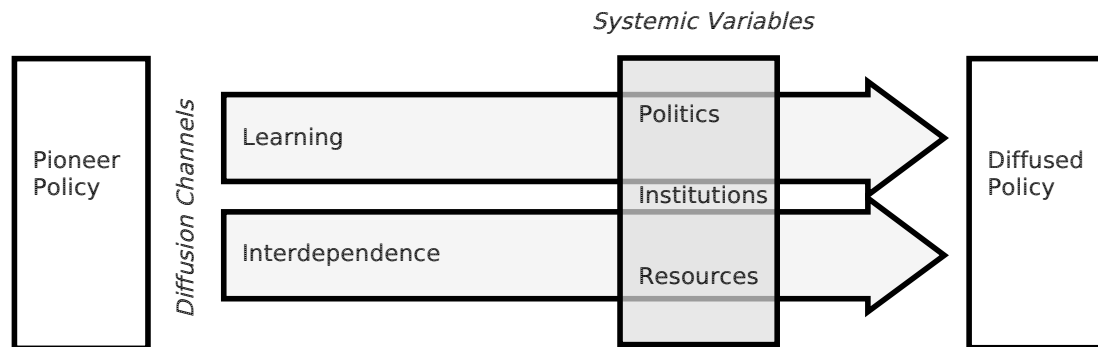


Figure 1: Policy Diffusion Process

3.1 Systemic Variables

In the diffusion process, pioneer policy is filtered through a set of systemic variables. These are variables specific to the entity to which the policy diffuses. For the purpose of this analysis, three groups of variables are identified: the politics, the institutions and the resources of the follower jurisdiction and its policy-relevant actors.

The politics of a jurisdiction influence the diffusion of policy. Politics is understood as the struggle and dynamics of policy beliefs. Actors involved in policy diffusion are assumed to have a set of policy beliefs that shape their perceptions and interpretation of pioneer policy. Scholars such as Hall¹⁹ and Sabatier²⁰ describe actors' belief systems as a threefold set of variables that are termed fundamental goals, policy position and instrumental position for the purpose of this analytical framework. Fundamental goals are deeply rooted in actors' belief systems and consist of normative and ontological axioms. They include beliefs such as the preference of individualist as opposed to socialist values as reflected in the political left-right spectrum. The second level consists of beliefs relating to actors' policy position. Unlike the fundamental goals, they are not system-wide but specific to certain policy fields or so-called subsystems. Policy position-related beliefs are normative and causal perceptions determining different priorities, for example placing more emphasis on economic development than environmental protection or on government interventions as opposed to market forces. Instrumental positions build the third level of beliefs. They concern specific policy settings such as certain thresholds or detailed specifications.²¹ Fundamental beliefs are very resistant to change. Policy and instrumental positions change more frequently in response to new situations and new information, the latter

¹⁷ Vogel and Kagan 2002, 6.

¹⁸ Daley and Garand 2005.

¹⁹ Hall 1993, 278-91.

²⁰ Sabatier 1988.

²¹ Sabatier 1998, 103-4.

changing more often than the former. Actors seek more information and understanding of a policy in order to find ways to achieve their fundamental goal. For this, they are willing to change instrumental and policy positions. Radical policy change only occurs seldom and is mostly the result of changes in majority constellations and the political leadership of a jurisdiction. Through new elections, the majority can shift to actors with different fundamental goals.²²

In the politics set of systemic variables, political will and entrepreneurship are important for understanding when and how policy diffusion takes place. Actors that take on an issue as one of their priorities and promote it in the political debate are important for a policy issue to gain enough traction and support to be placed high on the political agenda. They significantly increase the likelihood of diffusion taking place.²³

Policy diffusion depends on the compatibility with the dominant belief system in a given jurisdiction. In cases of absolute compatibility with the dominant beliefs, a pioneer policy is likely to diffuse and the likelihood of significant similarity between pioneer and diffused policy is high. If a pioneer policy is incompatible with the dominant fundamental goal in a jurisdiction, its diffusion is unlikely. Only minor elements that are compatible with dominant beliefs are likely to diffuse and the difference between pioneer and diffused policy is expected to be great. With changes in majorities and thereby in the dominant fundamental beliefs, the likelihood of policy diffusion can increase or decrease. In situations of stable majorities, pioneer policy can trigger the revision of policy and instrumental positions of actors.

Institutionalised rules and procedures determine the ways of policy-making that result in certain outcomes. They can be designed in a way that makes it easy or difficult to pass policy that is influenced by a pioneer policy. Existing policies can lead to path dependency precluding some incompatible policy options. Institutionalised procedures can be inclusive or exclusive leading to favourable access to the decision-making process for certain actors while making it more difficult for others. Rules and procedures can make it more difficult to introduce policy changes than preserving the status quo. Once institutions are established, actors rely on them and it becomes difficult to change them. Governments and policy-makers act within and adapt to existing institutional settings that impose constraints and provide opportunities for them to act upon their preferences and beliefs.²⁴ In cases of incremental policy change, as opposed to radical change, policy-makers base their action on existing policy and do not substantially depart from it. Therefore, the compatibility of the pioneer policy with existing policy and the fact whether or not rules and procedures make it easy or difficult determine whether and with which result policy diffuses.

Resources enable or impede actors to get involved in policy diffusion. Additionally, the general resources of a jurisdiction play a role determining whether the introduction of a diffused policy is feasible and considered desirable. Financial means, human resources and expertise can broaden or constrain actors' scope for action.²⁵ In cases of scarce resources, only the policy problems that are perceived as most important and urgent can be dealt with. Resources determine whether, how and to what degree actors engage in analysing pioneer policy. Limited resources can also be a reason to copy policy measure from abroad because own analysis would be too costly. Resources provide the scope for the kind of policy measures that are feasible. In times of financial and staff constraints, a diffused policy could be changed to match the available resources or a policy, which would otherwise have been likely to pass, could be rejected due to lacking resources.

²² Jenkins-Smith and Sabatier 1993, 5-6.

²³ Mintrom 1997.

²⁴ Scharpf 1997, 40-1.

²⁵ Scharpf 1997, 43.

Politics	Compatibility with the belief system of a majority of relevant stakeholders; Pioneer policy can lead to a revision of policy positions and instrumental positions changing the likelihood of the introduction of policy similar to the pioneer policy
Institutions	Compatibility with existing policies, rules and procedures
Resources	Feasibility of introducing a policy with the available financial means, human resources and expertise

Figure 2: The Systemic Variables

3.2 Learning

One of the two channels through which policy diffuses is learning. It takes place when actors become aware of a policy example from abroad and draw lessons from it for their own jurisdiction. Policy-makers can actively search for information or information can be brought to their attention by other stakeholders. On the basis of their beliefs, actors perceive a certain situation, a regulation or the lack thereof as a problem and as a result engage in learning.²⁶ New information from abroad can be utilised to achieve some of their fundamental beliefs. Learning from others' experiences reduces costs and uncertainties about the success of a policy. It is more efficient and easier to justify in the political debate to assess and take over experiences that others have already made than to invent and design a completely new solution, which has never been tested in practice before.²⁷ The mere existence of an ambitious policy in another jurisdiction can provide a powerful argument demonstrating that such measures are feasible. Advocates of a similar measure can point to the pioneer policy to demonstrate feasibility and to refute some criticism.

Actors analyse and use information to attain their fundamental beliefs. They revise their policy and instrumental position but the fundamental goal persists and filters the pioneer policy.²⁸ From this follows that actors are selective in the information that they take into account. In most cases, they engage in bounded learning, which acknowledges the limits of actors' analytical capabilities and their selectiveness. Actors take "analytical short cuts and cognitive heuristics to process information".²⁹ Often they do not engage in deep analytical learning. Learning also includes that actors are aware of the existence of a pioneer policy and they learn that it is feasible to implement such measure. This is a rather instrumental type of learning. In all cases, deep analytical and shallow instrumental learning, fundamental beliefs act as a filter that preclude and distort the manner in which policy experiences from abroad are analysed and policy decisions are taken. Policy positions and instrumental positions might be revised.

Generally, diffusion through the learning channel leads to changes in policy and instrumental positions. In rare cases, there might already be full compatibility. Changes of the dominant fundamental goal generally occur through changes in a country's leadership and majority constellation or they could be brought about by changes in the general economic or environmental situation. Diffusion is not likely to trigger this effect. Learning is rather instrumental to achieving and furthering the fundamental goals.³⁰

²⁶ Simmons and Elkins 2004, 174-5.

²⁷ Tews and Busch 2002, 180; Dolowitz 2000, 13.

²⁸ Sabatier 1988, 149; Hall 1993.

²⁹ Meseguer 2006, 36.

³⁰ Sabatier 1993: 17-20, 30-3.

3.3 Interdependence

The second diffusion channel is interdependence. Pioneer policy can have externalities affecting jurisdictions that are in an interdependent relationship with the pioneer. It can alter for example the economic or environmental situation in another jurisdiction.³¹ As a response to these changes, actors can revise their policy and instrumental positions. This can lead to an increased support for or a decreased opposition to certain policy measures. Additionally, significant externality-incited changes in the economic, environmental or social situation can lead to shifts in the public opinion and stakeholder positions resulting in a stronger support for the existing government or for the opposition.

Pioneer policy can alter the costs and benefits of introducing similar measures in other jurisdictions. For example, if the pioneer policy covers a significant amount of multi-national businesses, the compliance costs for business with similar measures in the follower jurisdiction can be lowered considerably, which could mean that there is less resistance for these policy measures. Additionally, pioneer policy can improve the environmental and health benefits of a policy. Given the global nature of many environmental pollution problems, by following the pioneer's example with similar policy, the follower can achieve a much higher environmental and public health result than if it would have acted on its own. This is a consequence of the accumulative effect of pioneer and follower policy. Hence, pioneer policy can change the policy-making conditions in other jurisdictions so that they are more compatible with the policy beliefs of relevant actors in the follower jurisdiction, hence reducing resistance. The costs of introducing a certain policy can be lowered and its benefits can be increased. This can generate the acceptance of actors whose policy beliefs would otherwise not have been compatible with the diffused policy.

Pioneer policy can have externalities that have a direct impact on actors in other jurisdictions, particularly on business actors that are exporting products and services to the pioneer jurisdiction. This assumption holds true in cases in which the pioneer market is attractive enough to incite producers to comply with the regulatory requirements rather than withdrawing from the market. As part of their fundamental goals, actors in the potential follower jurisdiction could attribute a high value to economic competitiveness. In the attempt of ensuring domestic industry's competitiveness and preparedness for compliance with the pioneer policy, actors, especially business and policy-makers, can change their attitudes towards introducing similar policy initiatives; hence, revising policy positions and instrumental positions in the light of their fundamental goals. The issue can rise in actors' priority lists and opposition to certain policy measures and settings can decline significantly. The interest of business actors can change. They can revise their beliefs related to policies and policy settings and consequently support or be less opposed to ambitious standards similar to the pioneer policy domestically in an attempt to try to gain competitive advantages. By enshrining the higher standards into regulatory requirements, a level playing field with other domestic producers would be created. Companies that comply at an early stage with the high standards would then have a competitive advantage because they would already be well prepared for compliance and could sell their knowledge and technologies to others.³² Hence, pioneer policy can change conditions in other jurisdictions that lead to the revision of state and non-state actors' beliefs with regard to the desirability of certain policy measures.

The enactment of a pioneer policy can trigger regulatory competition. The assumption is that in liberalised markets goods, capital and people move freely and choose the jurisdiction with the most beneficial regulation. Therefore, interdependent jurisdictions compete with each other to attract and retain capital and international business. If one jurisdiction introduces a policy that makes it

³¹ Elkins and Simmons 2005, 39-42.

³² Vogel 1997, 561-3; Porter and van der Linde 1995

more attractive than another, policy-makers of the other jurisdiction might react strategically and consider responding with similar policy.³³ This is often associated with a race to the bottom, which means that regulatory requirements converge on a lowest common denominator level. Yet, in environmental policy, empirical tests often do not find support for this hypothesis. A number of other factors could be responsible for both, a race to the top and a race to the bottom.³⁴

Learning	Pioneer policy is used to revise policy positions and instrumental positions and to make stronger arguments in favour or against similar policy measures – everything in the light of and to further actors' fundamental goals
Interdependence	Pioneer policy alters the economic, environmental or social situation in other jurisdictions making similar policy more compatible with actors' fundamental goals and leading to revisions of policy positions and instrumental positions

Figure 3: The Diffusion Channels

4 California

So far, 23 individual States of the United States of America enacted laws introducing different systems of e-waste collection and recycling. The first of these laws was introduced by California in 2003, less than one year after the introduction of the WEEE and the RoHS Directives in the EU. The scope of the US State laws varies but in all cases it is narrower than the EU Directives' scope. Except for California, all States apply the concept of Producer Responsibility but the implementation of this concept in concrete measures differs significantly.³⁵ California is the only State that introduced a restriction of certain hazardous substance in specified electronic devices.

The timing of these e-waste initiatives indicates that there could be a link between the EU and the US State level e-waste laws since in the years after the introduction of the WEEE and the RoHS Directives an avalanche of e-waste laws started in the US. The first one was adopted in 2003, followed by one additional law in 2004, 2005 and 2006 respectively. In 2007, five States introduced e-waste legislation and in 2008 ten more followed. Two States enacted laws in 2009 and in 2010 another three. The US State laws have both similarities with and differences to the EU Directives and they also vary amongst themselves significantly.³⁶ Therefore, a deeper analysis is necessary to establish whether there is a link between EU and US State legislation and to examine the nature of this link. A qualitative approach mainly based on semi-structured expert interviews and policy document analysis is deemed most promising to conduct such an analysis. The following section presents the results of the case study of California, which is informed by a total of 20 interviews and a review of stakeholder letters and policy documents from the legislature and the government.

4.1 Californian E-Waste Policy

The Californian E-Waste Recycling Act³⁷ (SB 50) was signed into law in 2004. It makes minor alterations to a law that was passed in 2003 (SB 20). The Act establishes a program for the take back and recycling of video display devices and it restricts their content of lead, cadmium, mercury and hexavalent chromium. The scope of the Californian E-Waste Recycling Act is much smaller than the WEEE and the RoHS Directives' scope. It only covers video display

³³ Simmons and Elkins 2004, 172-3.

³⁴ Holzinger and Knill 2004, 27-8, Drezner 2001

³⁵ Electronics TakeBack Coalition 2010.

³⁶ Electronics TakeBack Coalition 2009.

³⁷ Stats 2004, ch. 863 (SB 50).

devices with a screen greater than four inches measured diagonally. The Californian Department of Toxic Substances Control (DTSC) established that the following nine categories of devices are covered by the Act: cathode ray tube (CRT) containing devices, CRTs, computer monitors containing CRTs, laptop computers with liquid crystal display (LCD), LCD containing desktop monitors, televisions containing CRTs, televisions containing liquid LCD screens, plasma televisions, and portable DVD players with LCD screens.

The E-Waste Recycling Act has two main objectives. It establishes a collection and recycling system financed by an advance consumer fee and it prohibits the sale of devices containing the four heavy metals restricted by the EU RoHS Directive. Starting 1 January 2005, Californian consumers are charged a fee at the time of purchase of devices covered by the law. These fees are deposited into a special account from which qualified e-waste collectors and recyclers are paid to cover their costs of managing e-waste. The E-Waste Recycling Act contains a direct reference to the EU RoHS Directive. Section 1(b) prohibits an electronic device covered by the E-Waste Recycling Act from being sold or offered for sale if it is prohibited from being sold or offered for sale in the EU, as stipulated in the RoHS Directive as adopted on 27 January 2003 and amended by the European Commission in the comitology procedure. This only applies to the four heavy metals not to the brominated flame retardants. Hence, The EU RoHS requirements apply to anyone who sells or offers for sale a device within the scope of the Californian law. Devices covered by the Californian Act that are not subject to the RoHS Directive have no substance restriction obligations.

Subsequent to the introduction of the 2004 E-Waste Recycling Act, there were some unsuccessful attempts to broaden the scope of the Californian substance restriction provisions to all products covered by the EU RoHS Directive. Some proposed bills were put on hold in the Appropriations Committee and were not tabled for a vote in the legislature. The proposed bill AB 48 (Saldaña) of 2007 passed both the Californian Assembly and the Senate but was vetoed by Governor Schwarzenegger with the justification that it is not entirely compatible with the EU RoHS Directive, which would "result in unintended and potentially more harmful consequences".³⁸

4.2 Systemic Variables

A set of politics-related variables influenced the inception of the Californian E-Waste Recycling Act in the form that it was adopted and the timing of its adoption. The introduction of the Act was motivated by a set of strong domestic pressures. First, the DTSC officially recognised that end-of-life electronics are toxic waste and can't be disposed of in landfills. Second, NGO campaigns about Californian e-waste being treated inappropriately in Third World countries led to public pressure to address the issue. Third, a federal initiative on e-waste failed. Fourth, California has traditionally been at the forefront of dealing with environmental problems.

The official recognition by the Californian Department of Toxic Substances Control that e-waste is classified hazardous and therefore can't be landfilled placed enormous pressure on policy-makers to find a solution. In California, waste generators are responsible for determining whether their waste is hazardous.³⁹ To obtain clarity about e-waste, a group of local governments sent a letter to DTSC in 2002 enquiring whether end-of-life electronics qualified as hazardous waste. California applies a more stringent definition of hazardous waste than set out by the federal Resource Conservation and Recovery Act (RCRA) rules. It does not recognise all federal hazardous waste exclusions, which makes its waste determination rules stricter than the federal ones. In 1984, US Congress adopted the Hazardous and Solid Waste Amendment to RCRA, which phased out the landfill disposal of hazardous waste. Californian local governments had identified

³⁸ Governor Schwarzenegger, Veto Message AB 48, 13 October 2007.

³⁹ Cal. Code Regs, tit. 22, Section 66262.11.

the problem of potential environmental damage caused by leaching waste electronics. They were concerned about the general practice at the time of disposing of e-waste in landfills. DTSC responded to this letter in March 2002 stating that end-of-life electronics are hazardous waste. Since according to Californian law only specifically certified recyclers are allowed to treat hazardous waste, this letter implied that e-waste was banned from landfills and recyclers needed a special permit to collect and treat e-waste. Consequently, local governments were suddenly faced with a large amount of e-waste for which there was no appropriate collection and treatment infrastructure. Therefore, there was a general recognition amongst policy-makers and stakeholders that a solution to this problem was urgently needed. Especially local government exerted pressure on the State legislature.

At the same time, NGOs in particular the Basel Action Network, the Silicon Valley Toxics Coalition and Greenpeace produced and published documentaries and reports that demonstrated that e-waste originating in California was disposed of in China with tremendous environmental and human health impacts.⁴⁰ This story made the front page of major Californian newspapers such as the LA Times⁴¹ and raised significant public awareness and concern about the issue. Public pressure to address the e-waste problem mounted.

A gap of federal rules on the issue led to the belief in California that the State needed its own legislation. In April 2001, the National Electronics Product Stewardship Initiative was launched on the initiative of the US Environmental Protection Agency. Federal, State and local governments, electronics manufacturers, retailers, recyclers, and environmental groups gathered in regular meetings to develop a federal solution to the growing e-waste problem. Yet, negotiations progressed very slowly and a number of controversies could not be resolved. Especially, the financing of e-waste collection and treatment stayed an unresolved issue. After about three years, the process faded away and never led to any federal initiative. This failure of federal attempts to address the e-waste problem led to the recognition in California that the State should introduce its own rules filling the wide open governance gap.

Additionally, California has historically been a leader on environmental protection within the US and globally.⁴² Many Californian policy-makers perceive their State as a leader in environmental policy and strive to maintain this image. The belief system of many Californian policy-makers and stakeholders is favourable for progressive environmental policy. The Democratic Party holds the majority in both Houses of the legislature but also Republican policy-makers and the Republican governor demonstrate a belief system that is relatively receptive to some environmental policy. The existence of EU pioneer policy that went beyond Californian policies therefore fell on fruitful grounds. Many advocates of the E-Waste Recycling Act and also of later initiatives pointed to the EU's pioneership spurring the desire of Californians not to lag behind but rather to be part of the avant-garde.⁴³

The combination of strong public and local government pressure, a federal governance gap and environmental policy-minded policy-makers were the main triggers for the proposal of Californian e-waste legislation SB 1523 in February 2002. Yet, the Democratic governor at the time, Gray Davis, vetoed this proposal because he considered it "not the most efficient or cost effective approach". He stated that he was "willing to sign legislation that challenges industry to assume greater responsibility for the recycling and disposal of electronic waste" referring

⁴⁰ See for example: Basel Action Network and Silicon Valley Toxics Coalition, *Exporting Harm The High-Tech Trashing of Asia*, 25 February 2002.

⁴¹ Los Angeles Times, 19 June 2002, 23 August 2002.

⁴² Carlson 2008.

⁴³ This is a consistent result of numerous interviews with Californian policy-makers, legislature staff and stakeholders.

the issue back to the legislature and the agency.⁴⁴ SB 1523 would have introduced an advance recovery fee and a system very similar to the act that passed one year later. Yet, this system was not compatible with the belief system of that point in time of the environmentally progressive governor. He wished for a more progressive law.

In response to this, a new proposal for the E-Waste Recycling Act was presented by Senator Byron Sher in December 2002. This second proposal embraced the governor's requests for more producer responsibility. It was a hybrid policy that put the responsibility on manufacturers to set up their own program but also gave them the option to pay a fee to the State, who would handle the e-waste on the respective manufacturer's behalf.⁴⁵

Industry was not unified on the issue and there was a split between different groups of companies. Some advocated that the responsibility to set up collection and recycling programmes should be placed on the manufacturers. Some others were in favour of a fee, giving the state the responsibility to handle the collection and recycling of e-waste. The Information Technology (IT) and TV manufacturers did not form a coalition and also within the IT sector, there were diverging positions. The diverging positions between the TV and IT companies are explained by the fact that the markets for TVs and IT products are very different. IT products are smaller than TVs and have a shorter life span of about 8 to 9 years as opposed to 17 to 18 years for the larger and heavier TVs. IT products such as notebooks can be recycled relatively easily and contain metals that have some value. TVs do not contain such valuable metals. The IT market is dominated by a small group of large multinational players. The TV market is composed of a large number of smaller companies, none of which has a significantly large market share. IT manufacturers remain relatively stable in the market. The TV market is known for a regular turnover. New TV manufacturers enter and other ones leave the market. These fundamental differences in the markets for TVs and IT products explain the difference in these companies' policy positions and instrumental positions in the Californian e-waste policy-making process. Yet, also within the IT sector there were differences in positions and their willingness to support either an advance recovery fee or a producer responsibility model. The strongest advocate of a producer responsibility model was Hewlett-Packard (HP). The company did not change its position throughout the process. This can be explained by its long-standing strategic partnership with a recycling facility in Roseville, California, which provided HP with the recycling experience that it could have utilised. This internal split within industry and the advocacy efforts by NGOs led to a long phase of debate and negotiations throughout the entire 2003 legislative session.

Towards the end of this legislative session still no compromise had been found. The IT sector was not unified in their position and the TV sector was prepared to agree to an advance recovery fee system. The pressure from various sources such as the state agency and local governments to come to a solution mounted. Faced with the undesired possibility of no legislation, pragmatic NGOs gave their support to a law introducing a fee. Hence, revising the policy and instrumental positions in the light of their fundamental goal of environmental protection. This led to the adoption of the Californian E-Waste Recycling Act in its current form. This Act is very similar to the act that governor Davis vetoed the previous session. Yet, in the end of 2003, he was faced with a political crisis that eventually led to his recall. This situation led to a revision of his policy position and his signing of the bill. This could be explained by an effort to gain public support and positive publicity and therefore his willingness to revise parts of his belief system.

Whereas the part of the E-Waste Recycling Act that introduced a system for the collection and recycling of e-waste was controversially debated, negotiated and

⁴⁴ Governor Davis, Veto Message SB 1523, 30 September 2002.

⁴⁵ Senate Bill 20 as introduced by Senator Byron Sher on 2 December 2002.

significantly altered throughout the decision-making process, the provisions about the restrictions of hazardous substances in electronic products covered by the Act was not much talked about. It passed through the decision-making process without much attention and controversy. The reason for this was that most manufacturers are multinational companies and expected to comply with the EU RoHS Directive and the Californian Act proposed full alignment with RoHS provisions. There was much more at stake for industry actors with regard to the e-waste collection and recycling system. The externalities of the RoHS Directive explain the smooth passage of the substance restriction provision. There were no or little additional compliance costs and efforts for most companies. Hence, the RoHS Directive influenced the revision of companies' belief system toward no resistance against the substance restriction provision in the Californian E-Waste Recycling Act.

The institutionalised structure of the decision-making process also had an influence on the enactment of the Californian E-Waste Recycling Act. The legislative cycle in California ends in the beginning of every September. Pending bills cannot be transferred to the following session and have to be reintroduced. Given the urgency of the problem caused by the immediate stop of landfilling of e-waste without an existing alternative infrastructure resulted in mounting pressure to come to an agreement on a bill. Therefore, a compromise was found between predominantly TV manufacturers who were in favour of a fee, pragmatic NGOs and policy-makers. Some electronics manufacturers and some NGOs did not agree with this compromise but given the time pressure, their voices were not taken into account. These procedural specifics of Californian decision-making are part of the explanation of the form of the E-Waste Recycling Act.

Resources were an important consideration in designing Californian e-waste policy. The financial viability of the E-Waste Recycling Act played a role in deciding between the various options and determining which one was considered. The adopted fee system is designed so that the system generates enough resources to pay for its costs. In the veto message that rejected the first e-waste Act, the governor referred to the high human resources requirement in times of downsizing of the bureaucracy as a major concern⁴⁶, which demonstrates that resources played a decisive role.

The politics around the substance restriction bills that were proposed in later legislative sessions, such as the 2007 AB 48 Toxic Electronics Phase Out Bill, were different. There was less situational or public pressure and the issue was very controversial. Environmental NGOs and business actors had opposing positions on the issue. Although the externalities of the RoHS Directive led to a revision of companies' policy and instrumental positions of the substance provision in the Californian E-Waste Recycling Act, they did not revise their positions with regard to the entire scope of all electronic products that would have been covered by AB 48. The worry that the Californian law would not provide for full alignment with the EU Directive and consequently introduce different requirements was too prevalent. This is explained by the dynamic character of granting exemptions to the EU RoHS Directive. Finding a consensus between the different advocacy groups was a difficult barrier that was not surmounted. Although there were significant efforts to accommodate stakeholder concerns, a sufficiently large consensus could not be found.

The Democratic majority in both houses of the legislature was favourable for passing the legislation since it was compatible with the general belief system of Democratic politicians in California. Yet, the Republican governor has a belief system that is more focused on business and economy. This does not prevent him from supporting environmental policy as such but he appears selective in his decisions. The veto of AB 48 was also motivated by his earlier statement that he wished a comprehensive approach to dealing with chemicals restrictions. When

⁴⁶ Governor Davis, Veto Message SB 1523, 30 September 2002.

signing the Californian law on a phthalate ban in children's products, he stated that he does "not believe that addressing this type of concern in the legislature on a chemical by chemical, product by product basis"⁴⁷ Driven by his belief that a comprehensive and science-based approach was needed that provides more certainty for business, he did not signed the chemical and product-specific AB 48.⁴⁸

The structure of the Californian decision-making process also had a strong influence on proposals to extend the substance restriction provisions in California. The veto power of the governor that brings bills adopted by both Houses of the legislature to an end, determined the fate of AB 48 (Saldaña). Even though the Senate and the Assembly adopted AB 48 (Saldaña) in 2007, the governor vetoed the bill on the grounds that it would introduce requirements that differ the EU RoHS Directive and that it could have unintended and costly consequences.

The other bills that were proposed to extend the scope of the substance restriction requirement were held in the Appropriations Committee on the ground that they would not generate revenues while causing expenditures for the State for enforcement measures of the bills.

4.3 Learning

The EU WEEE and RoHS Directives provided an example for e-waste-related policy in California. Policy-makers and stakeholders learned from their examples and used references to the two Directives in their advocacy efforts. Learning from the EU Directives played a significant role in two ways. First, Californian actors were aware of the basics requirements and functioning of the EU Directives and a few actors analysed the Directives in depth. Both groups drew lessons from the EU experience. Second, actors were aware of the existence of the EU Directives and used the mere existence of the laws as an argument for the feasibility of introducing e-waste recycling systems and substance restrictions in California. Their learning remained at a very abstract level. Hence, learning took place in a range from in-depth, profound learning to shallow, bounded learning. Both played an influential role.⁴⁹

The most important influence of the WEEE and the RoHS Directives on e-waste-related policies in California was their mere existence, which taught Californian actors that this type of laws was technically and economically possible and politically feasible. Especially NGOs and policy-makers pointed to the EU arguing that it demonstrates the viability of similar Californian legislation. According to many actors this was a very powerful and influential argument taking some wind out of the sails of opponents of the proposed policy.

Profound learning took place amongst a small group of actors. In the archived folder of the Assembly Committee on Natural Resources on the SB 20 / SB 50 bills, there are copies of the text of the WEEE and the RoHS Directives and a detailed comparison table of the proposed Californian bill, the EU Directives and some other stakeholder proposals. This indicates that the responsible staff members working on the bill had profound knowledge of the EU laws and drew lessons from them. In his veto message of the first e-waste bill, Governor Davis stated: "The European Union is working on a program to assure that manufacturers maintain responsibility for the safe recycling of the products they produce. I am encouraged by the product stewardship approach and believe this model, tailored to fit California's recycling and disposal infrastructure is worth pursuing."⁵⁰ This shows that he and his staff had profound knowledge of the WEEE Directive and learned from it. NGOs such as the Silicon Valley Toxics Coalition had close

⁴⁷ Governor Schwarzenegger, Signing Message AB 1108, 14 October 2007.

⁴⁸ Interview with a member of staff in the Governor's office.

⁴⁹ This is the summarised result of interviews with various types of stakeholders.

⁵⁰ Governor Davis, Veto Message SB 1523, 30 September 2002.

contacts with EU counterparts.⁵¹ Multinational companies communicated internally between their EU and Californian offices. Interviews corroborate that a few members of staff in the legislature and in NGOs and industry had in-depth knowledge of the EU laws and the majority of all other actors was aware of them and had basic knowledge to varying degrees.

4.4 Interdependence

The interdependence channel plays a big role for the diffusion of RoHS-related requirements but no significant role for the diffusion of WEEE-related requirements. The RoHS Directive has stronger externalities than the WEEE Directive. The RoHS Directive directly regulates the design of electrical and electronic equipment whereas the WEEE Directive is more focused on setting up a collection and recycling system in the EU. Nevertheless, the WEEE Directive contains elements that aim at changing the design of products by making producers responsible for the end-of-life stage but this link is less pronounced.

The RoHS Directive had tremendous externalities on global electronics manufacturing. The electronics industry is highly globalised. The often very complex products are manufactured in facilities throughout the world. Components are produced by various suppliers that are then shipped to other countries for further processing and assembly. In this globalised supply chain, maintaining two or more separate product lines is often undesirable and difficult. Therefore, most manufacturers of products covered by the RoHS Directive apply these requirements globally. The RoHS Directive has set a de facto standard for global material policy within the electronics industry.⁵² According to a major electronic components distributor, approximately 15% of its total sales still contain some of the six RoHS substances. In North America approximately 18% of all sales and in the EU about 10% of all sales contain a RoHS substance. Yet, the market segments that order these parts are manufacturers that produce military and aerospace equipment, medical devices and telecom equipment, which are either outside of the scope or subject to an exemption of the RoHS Directive.⁵³ The higher number for the US could mean that a larger number of products not covered by RoHS are produced but maybe also that some manufacturers only produce for the domestic market and chose not to comply with the RoHS requirements. Yet, this appears to be a very small market share.

This global compliance effort explains that industry advocates did not majorly oppose the substance restrictions in the Californian E-Waste Recycling Act. They revised their policy position and instrumental position as a consequence of externalities of the RoHS Directive. Yet, the later proposed AB 48 presented a different situation. The externalities of the RoHS Directive that changed global manufacturing practices had the consequence that industry was concerned about potential incompatibilities of the Californian Act with the RoHS standard. The RoHS Directive introduced flexible mechanisms through which temporary exemptions can be granted. Additionally, some definitions were controversial and clarified in guidance documents, which have no official legal value. These technical details and fluid mechanisms could have resulted in diverging requirements in the incident of a Californian substance restriction Act. Governor Schwarzenegger's veto message voiced concern about potential incompatibilities with RoHS requirements. The fact of a global RoHS standard also gave industry an argument that specific Californian legislation extending the scope of current requirements to a larger scope of products is not necessary because de facto products are already compliant. Hence, the externalities of the RoHS Directive are so strong that they led to business' and some policy-makers' policy positions to be shaped in a way that they did not favour a Californian law.

⁵¹ Interview with Silicon Valley Toxics Coalition representatives, 5 February 2010.

⁵² Goosey 2004, 43.

⁵³ Interview with an environmental compliance manager of a major electronic components distributor, 11 February 2010

For the WEEE Directive the interdependence channel is much weaker than for the RoHS Directive. WEEE applies to all actors that sell electronics on the EU market including manufacturers, re-sellers under “own brand” and importers. Distributors of products that were manufactured outside the EU are also covered by the Directive. Yet, these obligations are not as strongly linked to the product design as the RoHS requirements. Therefore, actors that are based outside the EU and sell products into the EU do not have a strong incentive to apply the same requirements to their operations outside the EU. This could result in additional costs and efforts whereas the global application of RoHS requirements bring economies of scale.

5 Conclusion

This paper demonstrated that the EU WEEE and RoHS Directives influenced e-waste policy in California. Domestic variables explain the shape and emergence of the Californian E-Waste Recycling Act of 2003 but the EU WEEE and RoHS Directives inspired a large part of the political debate. Many experts agree that without the existence of the EU laws Californian e-waste policy would not have been possible in its current form. The two EU Directives provided proof that such laws were feasible, proposed a role model and had externalities on product manufacturing.

Policy diffusion takes place across various levels of governance. The presented case study shows how focusing the analysis on nation states only could miss major external effects of EU policy. In the case of the US, this appears an important aspect since the systemic variables for e-waste policy at the federal level have been not favourable for diffusion of the WEEE and RoHS Directives. An empirical study of only national policy in extra-EU jurisdictions would omit the significant developments that took place at the sub-national level. This paper therefore strives to make a contribution to the understanding of vertical diffusion and underlines its importance.

Californian policy-makers and stakeholders learned from the EU experience but only very few of them had expert knowledge of details of the EU Directives. The majority of actors was aware of the basic requirements and functioning of the WEEE and the RoHS Directives. The existence and the possibility to refer to the EU laws played a major role and learning took place in the form of acknowledging the feasibility of e-waste and substance restriction policy. This was cited by a large number of interviewees as a significant factor enabling the introduction of the Californian E-Waste Recycling Act.

The interdependence of EU and Californian (and global) markets for electronic products led to the application of the RoHS requirements to global manufacturing of covered products. These externalities of the RoHS Directive influenced actors' positions in California. In the case of the Californian E-Waste Recycling Act, it led to the revision of business' policy positions so that they did not oppose the introduction of the substance restriction requirement. The focus of the debate was on the take back and recycling requirements. Yet, in the case of AB 48 it led to the policy position that opposed the introduction of far-reaching substance restrictions mainly motivated by concerns about incompatibilities and diverging requirements for the Californian market.

The paper shows that systemic variables play a decisive role in filtering pioneer policy. In the case of Californian e-waste policy, a number of domestic developments created a perfect storm leading to State level legislation on the Californian E-Waste Recycling Act. The EU WEEE and RoHS Directives played an important role in the policy debate but they were not the main trigger that led to the decision to introduce legislative proposals. The EU Directives provided a model for the design of the different options for e-waste legislation. Yet, the system enacted does not have much in common with the WEEE Directive but very much in common with the RoHS Directive, namely a direct reference. The most

significant role of the WEEE Directive was its mere existence building a reference point for various stakeholders to demonstrate to the feasibility of an e-waste law. The existence of the WEEE Directive and the fact that they complied with it in the EU, made it difficult for the multinational electronics companies to argue against any type of e-waste legislation with the reason that it was not feasible.

This paper makes a contribution to understanding that policy diffusion does not necessarily result in public policy. Private policy responses to EU policy could equally be the result of policy diffusion. In the case of the RoHS Directive, systemic variables in California were not favourable enough to lead to a law that mirrored the RoHS Directive. Yet, due to the interdependence of both jurisdictions and the global nature of the electronics sector, a vast majority of companies introduced the RoHS requirements to their global operations. This private policy response is a major external effect of the EU Directive.

The interdependence channel is less strong for the diffusion of the WEEE Directive and did not play a significant role. RoHS directly prescribes elements of product design whereas WEEE makes producers responsible for the collection and treatment of their products, which indirectly aims at influencing product design. There is some debate amongst scholars and practitioners as to whether or not the WEEE requirements effectively incite product design changes. Given the different characteristics of the WEEE and RoHS Directives, their external effects are different. In general, one could conclude that the interdependence channel is more relevant for product-related policy whereas the learning channel is important for a broader range of types of policy.

California has often been a pioneer in environmental policy in the US. Most other US States have different systemic variables and different e-waste policies. Therefore, the analysis of the diffusion and non-diffusion of the EU WEEE and RoHS Directives to other US States would provide additional interesting insights into the conditions and causes for policy diffusion.

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