Multi-level Regulation of Agricultural Biotechnology: Determinants and Actor Strategies in Germany

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Ulrich Franz Friedrich Hartung

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Erstgutachterin: Prof. Dr. Jale Tosun,

Zweitgutachter: Prof. Dr. Reimut Zohlnhöfer

Ulrich Franz Friedrich Hartung
Institute of Political Science
Bergheimer Straße 58
69115 Heidelberg, Germany
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Acronyms

BASF	Badische Anilin- & Soda-Fabrik
BSE	Bovine Spongiform Encephalopathy
BUND	Bund für Umwelt und Naturschutz Deutschland
BVL	Bundesamt für Verbraucherschutz und Lebensmittelsicherheit
Bt	Bacillus thuringiensis
CA	Competent Authority
CDU	Christian Democratic Union
CJEU	Court of Justice of the European Union
CRISPR	Clustered Regularly Interspaced Short Palindromic Repeats
CSU	Christian Social Union
ECJ	European Court of Justice
ECB	European Corn Borer
EFSA	European Food Safety Authority
EU	European Union
EPP	European Peoples' Party
FDP	Free Democratic Party
fs/QCA	Fuzzy-Set Qualitative Comparative Analysis
GDP	Gross Domestic Product
GM	Genetically Modified
GMO	Genetically Modified Organism
MP	Member of Parliament
NABU	Naturschutzbund Deutschland
NGO	Non-Governmental Organization
NPBT	New Plant Breeding Technology
ODM	Oligo Directed Mutagenesis
RNAi	RNA interference
RTDS	Rapid Trait Development System
SPD	Social Democratic Party
UK	United Kingdom
US	United States of America
USDA	United States Department of Agriculture
ZFN	Zinc Finger Nuclease Technology
ZKBS	Zentrale Kommission für die Biologische Sicherheit

Chapter 1

1 Introduction

1.1 General Remarks

The last two decades have been characterised by two major developments regarding the regulation of agricultural biotechnology in the European Union (EU). First, regulations have proliferated in the member states' spheres because national governments made extensive use of important legal possibilities, which they re-obtained from the EU (see, e.g. Tosun 2014; Tosun and Hartung 2018; Schenkelaars and Wesseler 2016). Moreover, in certain member states, subnational units have increasingly become active and regulated the use of genetically modified organisms (GMOs) (Tosun and Hartung 2017; Seifert 2006c). These legislative activities plus the limited authorisation – only one genetically modified (GM) crop is currently approved for commercial cultivation – together resulted in the fact that GM crops have always remained insignificant in EU agricultural production (Herring and Paarlberg 2016: 407).

Second, so-called new plant breeding technologies (NPBTs) have been developed during the 2010s, which are increasingly used for breeding ever more promising commercial crops (see, e.g. Waltz 2018). These new techniques, most important, CRISPR/Cas have enormous potentials for addressing current and future challenges of agricultural production, most important among them, food security, and climate change (see, e.g. Carroll and Charo 2015). However, following the EU's decision to classify organisms produced by NPBTs as GMOs, biotechnology could remain negligible in EU agricultural production (CJEU 2018). Nevertheless, due to important scientific and industrial actors' pressures on EU institutions, the EU might loosen its GMO regulatory framework (European Commission 2018b). Therefore, the

conditions for EU farmers to cultivate NPBT-modified crops could be much easier, possibly boosting thereby farming based on agricultural biotechnology for the first time throughout the EU.

Against the background of these two developments, this thesis scrutinises the determinants of the multi-level regulation of agricultural biotechnology in the domestic sphere and investigates the strategies of key actors in this field, focusing specifically on Germany. In this country, state actors operating on different political levels direct legal possibilities to regulate GMOs. In addition, Germany provides sweeping insights for learning about the multi-level regulation of agricultural biotechnology because of several, and at first sight, contradictory facts.

First, Germany banned GMO cultivation on its territory; however, federal governments facilitate approvals of new GM products at supranational level. Secondly, citizens refuse to buy food containing GM ingredients; however, the German livestock production industry imports and processes millions of tons of GM feed, and most of the population consume resulting animal products. Finally, Germany represents a leading scientific and business location with a powerful biotechnology sector; however, all important corporations have relocated their plant biotechnology divisions to non-EU countries. Nevertheless, Germany-based Bayer AG has acquired Monsanto, thereby forming the most potent venture that markets biotechnology products to farmers around the world.

Agricultural biotechnology regulation in the EU represents an appealing research subject because it is characterised by high degrees of salience, politicisation, and controversy. In addition, the issue has a strong multi-level nature, wherefore regulatory activities on the various political levels require vertical coordination. Furthermore, agricultural biotechnology is a matter of risk regulation, which means that it is marked by intricate and contentious decision-making over the inclusion of science and politics in dealing with associated risks. Finally, the issue has important multi-sectoral implications because regulations not only affect actors operating along the agriculture/food production chain; rather, these measures also impact

actors in adjacent policy fields, most important, environment, consumer protection, research and development, and international trade (Shaffer and Pollack 2004: 6–13).

Due to these appealing features, GMO regulation in the EU has already attracted remarkable scientific attention. Most research concentrated on aspects related to the EU as the primary regulator of this field (see, e.g. Randour *et al.* 2014; Mühlböck and Tosun 2018; Drott *et al.* 2013; Geelhoed 2016; Burns 2012; Klika *et al.* 2013; Weimer 2015). Also some scholars analysed regulatory action on national levels in particular member states, including Germany, among others (see, e.g. Seifert 2009; Kuntz 2014; Katzek 2014; Barcena 2005). However, the regulation of agricultural biotechnology in domestic multi-level/federal systems that are characterised by interdependencies between various levels of governance have not yet been deciphered sufficiently (Tosun and Hartung 2018). In addition, research on how political parties – the central decision makers over regulations – deal with the specific topic exists (Bäck *et al.* 2015; Cooper 2009; Katzek 2014; Tosun 2014; Tosun and Hartung 2017; 2018; Tosun and Schaub 2017). Nevertheless, more detailed knowledge is needed about the strategic nature of their position-taking regarding the controversial issue. Finally, the role of private interests on the EU regulatory decision-making process on NPBTs, which has been enclosed by the European Court of Justice (ECJ) in 2018, and specifically the role of German authorities within this process – is yet to be investigated. To reduce these research gaps, and to expand the existing literature on the EU multi-level regulation of agricultural biotechnology, three core research questions guide this thesis.

> How and why have regional and local entities regulated this policy field? How have political parties on the two major levels of Germany's federal system positioned themselves on the GMO topic? Which role have private interests played in the EU regulatory decision-making processes on NPBTs?

To assess these questions, this book presents four original studies. The first study explores the determinants of GMO regulatory action at the local level, and the second study investigates the drivers of such action at the regional level. The third

study analyses the position-taking behaviour of German parties on agricultural biotechnology, examining if and why these collective actors strategically desist from positioning themselves on this specific policy issue. Finally, the fourth paper examines the lobbying activities of the biotech company Cibus, which aimed at promoting a deregulation NPBTs in the EU. This study analyses why this firm chose to lobby regulatory authorities in certain member states, focussing specifically on Germany.

The remainder of this introduction is structured as follows. Chapter 1.2 provides background information on the foundations, rules and implications of the EU regulatory framework on GMOs, which is fundamental both for the introduction of regulations at subnational levels and for the (strategic) activities of key actors in this policy field. Section 1.3 introduces the key concepts underlying this book. Section 1.4 presents an overview of the most important theoretical and methodical approaches. Section 1.5 outlines each of the four original studies and summarises their findings. Finally, Section 1.6 concludes with avenues for future research.

1.2 Background Information

The EU regulatory framework on GMOs was established in 1990, when the first member states had transferred their legal competences to the supranational level, with the objective of harmonising their miscellaneous national rules regarding the usage of GM crops for importation, cultivation, feed, processing, food, and scientific purposes. The legal basis of the framework is currently defined in Directive 2001/18/EC, which addresses the deliberate release of GMOs into the environment. This directive defines a GMO as 'an organism, with the exception of human beings, in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination' (Art. 2 (2)). This definition includes crops, animals, and microorganisms and originally dates to the set-up of the framework in 1990. The definition has not been revised even though the regulatory framework

has been altered several times. Moreover, NPBTs have been discovered and rapidly became the preferential tools in plant breeding, most importantly CRISPR.[1]

The GMO definition has since been applied whenever the breeding technique of genetic engineering (transgenesis) has been employed to modify living organisms. Ever since the legal decision was made by the European Court of Justice (ECJ) in 2018, the GMO definition has also applied to products resulting from new (genome editing) breeding techniques (CJEU 2018). In contrast, 'traditional' breeding techniques based on radiation or chemicals, such as mutagenesis, are considered as not resulting in organisms according to the GMO definition.

Table 1. Differing Regulatory Implications for Breeding Techniques that Produce Commercial Crops with Similar Traits

	Traditional breeding	**Genetic engineering**	**Genome editing**
Trait	Herbicide-tolerant crop variety	Herbicide-tolerant crop variety	Herbicide-tolerant crop variety
Event example	BASF maize or canola (Imidazolinone-tolerant)	Monsanto maize (Glyphosate-tolerant)	Cibus canola (Sulfonylurea- tolerant)
GMO legislation	No	Yes	Yes

Note: revised version based on Jones (2015a: 90); see also Jones (2015b: 229).

Table 1 illustrates the implications of the EU regulatory approach, which is mainly oriented around the process of modifying a living organism (process-based regulation). The consequences of this process-based regulatory approach are far-reaching: even though products resulting from the various breeding techniques –

[1] The term 'New Plant Breeding Technology' dates to a definition of the EU's 'New Techniques Working Group' (2011), which designated the following eight breeding techniques: Oligonucleotide Directed Mutagenesis; Zinc Finger Nuclease Technology (ZFN) comprising ZFN-1, ZFN-2 and ZFN-3; Cisgenesis and Intragenesis; Grafting Agro-infiltration; RNA-dependent DNA methylation; Reverse breeding and Synthetic genomics. The term has since been expanded and used in a broader sense, so that it includes newer genome-editing techniques such as CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats).

such as crops with herbicide tolerances (see Table 1) – are endowed with similar properties, they are regulated in fundamentally different ways. While crops that have been bred using 'traditional' methods are generally deregulated, organisms derived with the help of genetic engineering or new (genome editing) breeding techniques fall under the scope of the GMO legislation.

The main objective of the EU regulatory framework is the protection of human and animals' health and the environment from possible negative effects of GMOs. To this end, a complex regulatory system has been established, which includes a risk assessment and an approval system for GM products, prescribes detailed rules for their traceability and labelling, and governs the release of GM crops into the environment for commercial and scientific purposes.

Table 2 gives an overview of the main directives and regulations underlying the EU regulatory framework in 2019. We can gather from the table that, in the EU, the use of GMOs is rigorously regulated in all relevant regards, from the production to their retail. Nevertheless, we should bear in mind that the EU has revised the legislation several times during the last two decades. Generally, these amendments have made the framework even more restrictive and prohibitive than it was previously.

Besides the central pieces of legislation displayed, several more specific implementation rules, recommendations and guidelines makes up the EU regulatory framework (see, European Commission 2019b). As most of the rules underlying this framework are designed in a restrictive way, it has been widely considered the most restrictive of its kind worldwide for some years now (Burns 2012: 342; Raybould and Poppy 2012: 9; Seifert 2011: 22). However, the framework has been further revised, most importantly, through the introduction of Directive 2015/412 and Directive 2018/350. Directive 2015/412 in particular made the EU regulatory framework even more restrictive.

Table 2. The Foundations of the EU Regulatory Framework

Piece of legislation	Area of application
Directive 2001/18/EC	On the deliberate release of GMOs into the environment
Regulation (EC) 1829/2003	On GM food and GM feed
Directive (EU) 2015/412	Amending Directive 2001/18/EC as regards the possibility for the Member States to restrict or prohibit the cultivation of GMOs in their territory
Regulation (EC) 1830/2003	Concerning the traceability and labelling of GMOs and the traceability of food and feed products produced from GMOs
Directive 2009/41/EC	On contained use of GM micro-organisms.
Regulation (EC) 1946/2003	On transboundary movements of GMOs

Note: all pieces of legislation have been accessed under European Commission (2019b).

A significant consequence of the EU regulatory framework is that only one GM crop is currently authorised for commercial cultivation in the EU: MON810.[2] This GM maize initially received approval in 1998; however, due to a so-called 'de facto moratorium', farmers in the EU have only been allowed to plant MON810 since 2005 (see, e.g. Wesseler 2014: 190–194). MON810 has been developed and is marketed by Monsanto, which, due to its market practices and power, is the most criticised corporate actor in the global agricultural sector (see, e.g. Lamphere and East 2017; Singh 2010). Even though MON810 was the only GM crop to gain EU

[2] Monsanto scientists derived this GM crop when they fortified maize using a repellent resistant to the European Corn Borer (ECB), which is the EU-wide most prevalent maize pest. More precisely, the company's scientists used genetic engineering to transfer isolated protein genes formed by the soil bacterium Bacillus thuringiensis (Bt) into maize crops. This targeted modification has enabled MON810 crops to self-produce the Bt-toxin, which is lethal for the ECB. By way of example, Degenhardt *et al.* (2003) estimated the ECB-infested maize areas in Germany to make up 21 percent of the country's total maize cultivation area. Studies on Bt-maize found that adopting these crops can be beneficial for farmers as Bt-maize would combat pests, increase yields, and reduce unhealthy fungal toxins (see, e.g. Pellegrino *et al.* 2018).

authorisation for cultivation purposes, several GM products have received authorisation for food and feed use in line with Regulation 1829/2003 (for details on the events, see European Commission 2019a).

The three pieces of legislation, which provide the member states with the most far-reaching legal possibilities for regulating GMOs, are Directive 2001/18/EC, Directive 2015/412, and the EU's 'coexistence' policy. These pieces carry important implications for regulatory activity at the subnational levels of the member states as well. Moreover, since 2018, these pieces of legislation also apply to products that have been derived with the help of NPBTs.

Directive 2001/18/EC provides the member states with a 'safeguard clause' (Art. 23), which proved extremely important for national governments regulating GMO cultivation on their territories during the 2000s. The clause enabled the member states to impose national cultivation bans on GM crops that were approved on the EU level, providing they could present new scientific evidence of their negative effects on human or animal health or on the environment. Most member states made use of the legal option and banned MON810 and other (unauthorised) GM crops on their territories (for an overview, see Tosun 2014: 370). Because MON810 is the only GM crop authorised for commercial cultivation in the EU, the national cultivation bans on this maize variety effectively prohibit all commercial GMO cultivation in the respective countries today.

Directive 2015/412 extends beyond the 'safeguard clause' included in Directive 2001/18/EC as it allows the member states to impose national cultivation bans on certain GM crops for non-scientific reasons as well, such as socio-economic concerns. Moreover, the directive allows national – and in some countries, regional – governments to impose ex-ante cultivation bans on GM crops, i.e. prospective bans on GM crops that are still pending approval in the authorisation pipeline of the EU level and awaiting authorisation. Randour *et al.* (2014) argue that Directive 2015/412 marks a peak in the transfer of decision-making powers over GMOs from the supranational level back to the member states. Tosun and Hartung (2018) have shown

that most member states did indeed impose national cultivation bans in response to the directive, and that Germany banned every single GM crop pending EU approval before they were even authorised.

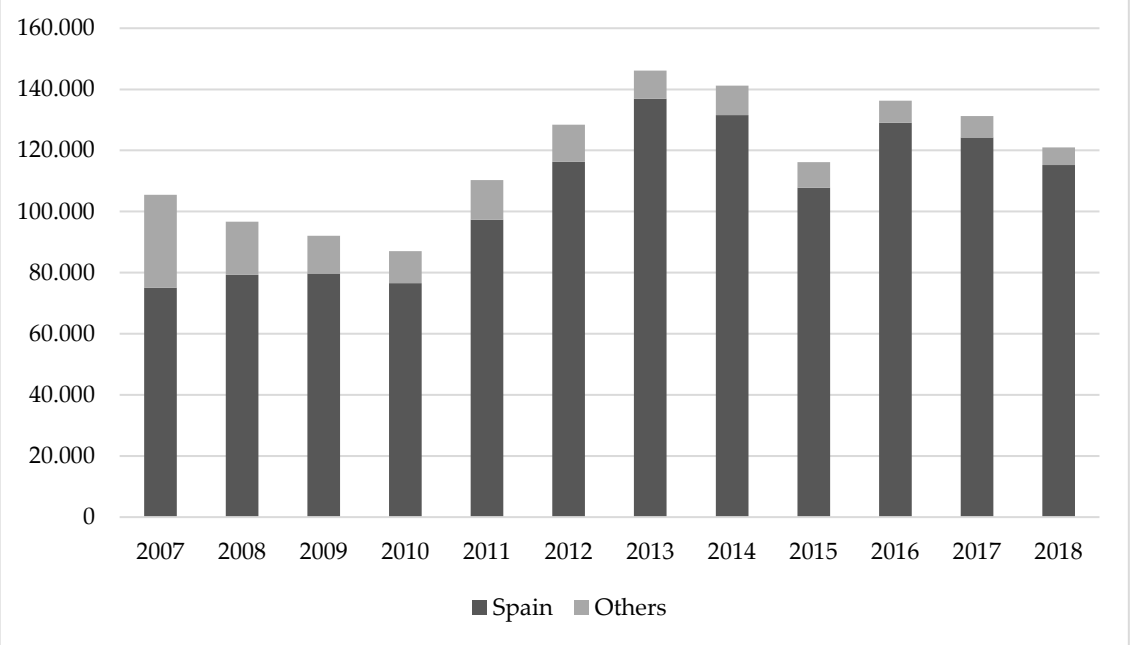
Finally, the EU demanded in 2003 that the member states adopt regulatory measures in order to govern the 'coexistence' of GM crops with conventional and organic ones. In response, many countries in which GM crops had been cultivated by farmers enacted rules governing coexistence. Except for Spain, the member states demanded such large minimum distances between the organic/conventional and GM farming practices that GM farmers were exacerbated or de facto prohibited from cultivating GM crops (see, e.g. Schenkelaars and Wesseler 2016: 7). For instance, the distance requirements prescribed in Germany – 150m for conventional maize and 300m for organic maize fields – are relatively restrictive and hinder GMO cultivation, particularly in regions with small-structured agriculture (Consmüller *et al.* 2011). However, the main reason why it would be economically too risky for German farmers to cultivate GM crops is that the liability regime makes it highly detrimental for farmers to cultivate these crops.

The EU multi-level regulatory framework has had notable consequences for products modified by genetic engineering (transgenesis) in the past. One of these concerns 'conventional' genetic engineering: besides there currently being only one GM crop authorised for commercial cultivation, the framework limits the degree to which this crop, MON810, can be cultivated. The share of MON810 of the total maize area (conventional and organic) cultivated in the EU has never been more than 1,6 % (USDA Foreign Agricultural Service 2017: 10). This number illustrates the minor importance of GM agriculture in the EU and stands in sharp contrast to the earlier attempts of the European Commission to establish this farming practice in addition to conventional and organic farming (see, e.g. Weimer 2014; Weimer and Pisani 2016).

Figure 1 shows the degrees to which farmers cultivated MON810 in the EU distinguishing between the major cultivating country, Spain, and all the other member

states, in which this maize variety has been cultivated for commercial purposes, in combination: Czech Republic, France, Germany, Poland, Portugal, Romania, and Slovakia. Among other things because of its very liberal regulatory framework, Spain is the only member state where GM crops have been grown to significant extents. In contrast, Germany (2009), France (2007) and Poland (2013) made use of the 'safeguard clause' and banned MON810. With the bans, the countries stopped farmers who were willing to cultivate this GM crop. Since Romania stopped MON810 cultivation in 2016, and the Czech Republic and Slovakia did so also in 2017, MON810 is cultivated currently only in Portugal and Spain (see, USDA Foreign Agricultural Service 2018).

Figure 1. Cultivation of MON810 in the European Union



Source: data taken from USDA Foreign Agricultural Service (2015a), USDA Foreign Agricultural Service (2017), and USDA Foreign Agricultural Service (2018).

The lack of GM crop approvals for commercial cultivation, in combination with the regulatory measures in place in most member states, has resulted in GMO cultivation remaining of minor importance in the EU. This low relevance becomes especially apparent when considering the extents of GMO cultivation in main adopting countries, most notably the United States (US), Brazil, Argentina, India, and

Canada. In these countries, several important crops – maize, soybean, canola, and sugar beet replete with herbicide tolerances, insecticide resistances or combinations of both – have become major factors in agricultural production in the last few decades (Brookes and Barfoot 2017: 20–22).

NPBTs, most importantly CRISPR, have experienced a rapid development during the last decade. Because of their higher precision, lower costs and higher pace, these tools have major advantages over 'conventional' genetic engineering (transgenesis) and 'traditional' breeding techniques (see, e.g. Wolt *et al.* 2016). Plant scientists around the world therefore favour NPBTs, and together this results in a steadily increasing number of newly modified products reaching marketability (Waltz 2018). Nevertheless, products derived by NPBTs have not received approval in the EU yet. In addition, this status will continue in the near future because of the decision of the CJEU (2018), according to which these tools fall into the scope of the EU's GMO legislation.

As a result of this decision, the EU multi-level regulatory framework applies also to products derived with the help of NPBTs. Therefore, newly modified products must go through the same time-consuming, costly and uncertain authorisation processes at the EU level as 'conventional' GMOs. Moreover, they are subjected to the same regulatory requirements anchored at the EU level and the member states. The consequences of the application of existing GMO legislation to the new methods of plant breeding are significant: the agricultural use of resulting products has not only slowed down but been made extremely difficult. Also, EU consumers will remain sceptical towards newly modified food products as these fall into the stringent labelling obligations prescribed by Regulation 1829/2003.

Several non-EU countries have established more liberal regulatory approaches for governing NPBTs and their resulting products (Schuttelaar and Partner 2015). In these countries, regulatory frameworks are oriented around the final product, rather than around the process of plant modification (product-based regulation). As resulting products of new breeding techniques often cannot be distinguish from

traditionally bred ones, this approach allows businesses to exploit the potential of CRISPR and the other NPBTs. For instance, US authorities have approved several newly modified products for cultivation and retail without prescribing any regulatory or labelling obligations.[3]

Whether and to what degree newly modified crops will be used in EU agriculture essentially depends on whether the EU regulatory framework on GMOs will be liberalised. In many experts' eyes, this is quite possible. These assessments are based on the fact that the ECJ's decision has been broadly criticised as being against scientific knowledge and facts. Moreover, it has mobilised a coalition of scientific organisations and industry actors, who push for a revision of the EU regulatory framework. For instance, the Commission's Chief Scientific Advisors published a statement on the regulation of these techniques, wherein they recommend the European Commission to adopt a more permissive regulatory approach towards new breeding techniques including CRISPR (European Commission 2018b).

Whether the EU regulatory framework will be liberalised or not, the EU needs to adapt its legislation to the increasing spread of newly modified crops around the world. At the present state of scientific knowledge, it is impossible to distinguish whether crops imported into the EU have been modified by NPBTs or if they represent natural or 'traditionally' bred crop products. As newly modified crops, in contrast to GMOs, often cannot be detected, the EU zero-tolerance policy for GM ingredients that have not been authorised plunges the EU into a dilemma: either the EU tolerates the potential presence of newly modified products from non-EU countries that cultivate these crops, without considering them as GMOs, or the EU must stop

[3] The US regulatory approach towards NPBTs has largely crystallised in the past few years. For example, US retailers started to sell a so-called 'Arctic Apple' in 2017. This apple has been modified by RNA-interference (RNAi) to wither considerably slower than its conventional counterparts (Waltz 2016). Because of this new feature, the apple might please US consumers (Maxman 2017). Generally, since new breeding techniques can instil food products with desired traits, newly modified foods could find more public acceptance than former GM products, which had no significant benefits for consumers. Most such newly modified foods have not yet reached the US market, but more such crops than ever, including commercially important crops such as maize or soybeans, will be grown unregulated on fields in the US in the short term (Waltz 2018: 7; Wolt *et al.* 2016: 512).

all imports of respective crops from these countries, regardless of whether these imports contain admixtures of newly modified crops (Jones 2015c: 3).

1.3 Introducing the Key Concepts

The first concept underlying this thesis relates to 'regulation'. Levi-Faur (2010) stated that 'the term is employed for a myriad of discursive, theoretical, and analytical purposes that cry out for clarification and mapping'. Since this concept is both hard to define and highly contested politically, it is essential to specify what it means. To disaggregate this encompassing concept, this thesis conceives of regulation as being characterised by two main features. First, it corresponds with an instrumental understanding of the regulation of risks. Second, it relates to a state-centred conception of regulation (Black 2002: 16–19).

From the instrumental perspective, the primary function and objective of regulation is to reduce risks, such as social, ecological or economic ones, to a minimum. However, regulations do not necessarily aim to prohibit activities, such as research or economic ones, completely, i.e. bring their levels of risk down to zero. Rather, regulation represents a suitable means for balancing potentials and risks, thereby enabling private actors to capitalise economically on technological innovations while safeguarding society or the natural environment from negative effects (Weimer and Marin 2016). In accordance with this instrumental understanding of regulation, the present study conceives of regulation as a means of controlling and monitoring the area of agricultural biotechnology for specific purposes; these may range from minimising risks to the various ways of balancing associated benefits and risks.

The state-centred conception of regulation, which implies that state authorities have the ability to 'command and control', focuses on laws made by governmental authorities (Black 2002: 2). From this perspective, state authorities use legislation as a means of social and economic intervention in order to restrict or facilitate specific social, economic, research, or other activities in consistent and predictable ways

(Döhler and Wegrich 2010: 31). The state-centred conception implies that some forms of democratic processes preceded regulatory action, which is one major aspect that distinguishes this form of regulation from regulatory activities executed (jointly) by non-governmental actors. By adopting the state-centred concept of regulation, this book entirely shifts its focus away from alternative forms of regulation prevalent in global food and agricultural governance, such as self-regulation, co-regulation, management-based regulation, or other private systems of governance (see, e.g. Fuchs *et al.* 2011).

Conceptualising regulation in the dual way as functionalist and state-centred limits the number of empirical phenomena relevant to this work. In fact, it is essentially this limitation, which fundamentally structures the investigation of agricultural biotechnology in Germany by organising the various empirical phenomena and theoretical approaches into a manageable number.

The second key concept requiring specification is 'risk'. As indicated above, risk is closely associated with regulation because regulatory measures are widely considered to function as means of reducing potential risks, particularly those associated with the practical application of technology (see, e.g. Majone 2003; 2010; 2011; Black 2010). The well-established literature on risk essentially provides two predominant definitions of risk. According to the first one, 'risk is a situation or event where something of human value (including humans themselves) is at stake and where the outcome is uncertain'. The second definition conceives of risk as an 'uncertain consequence of an event or an activity with respect to something that humans value' (Aven and Renn 2009: 1). Both definitions emphasise an element of risk that strongly pertains to the (regulatory) controversies sparked by GMOs around the world, namely that uncertain consequences might arise from using technology, which then affects something of value to humans (Renn 1998: 51).

While several types of risks have been differentiated, 'certain' and 'uncertain' risks represent the most important ones for policy studies (Tosun 2017: 564). In contrast to certain risks, such as car accidents or seasonal flooding, uncertain risks

cannot be assessed statistically for calculating the probabilities of the occurrence of certain hazards (Renn *et al.* 2011: 234). Agricultural biotechnology, animal cloning, nanotechnology, chemicals, and hydraulic fracturing all belong to the category of 'uncertain risks' (van Asselt *et al.* 2013). The very notion of risks being uncertain has implications for the field of agricultural biotechnology, for it means that, even though scientific risk assessment has not found GM crops to have harmful effects, possible hazardous effects cannot be precluded completely (van Asselt and Vos 2008: 281). Despite the possibility of integrating scientific knowledge and expertise into regulatory decision-making processes on technologies that involve such risks, the ultimate regulatory decisions made on these issues are still done so under conditions of uncertainty (Florin 2014).

The two types of risks involve differing implications for policymakers, at least theoretically. While 'certain' risks are usually addressed with preventive policies, policymakers in the EU tend to adopt precautionary policies for the management of 'uncertain' risks (see, e.g. Tosun 2013a; 2013b) The legal basis for policymakers to cope with 'uncertain' risks refers to the 'precautionary principle' – a principle that enables them to take regulatory action on risky technologies, even when scientific evidence has suggested the technologies or their resulting products are safe (Di Salvo and Raymond 2010). As policymakers have increasingly invoked the precautionary principle for justifying restrictive policies on agricultural biotechnology and other policy domains, the principle became controversial by itself (see, e.g. Levidow *et al.* 2005: 261; Löfstedt 2014).

Regarding the concept of risk, this thesis further adopts the widely acknowledged assumption that risks represent the results of mental constructions, i.e. they are influenced by the perceptions and/or interpretations of human beings and not real, existing phenomena (see, e.g. Klinke and Renn 2010: 15). The term 'risk perception', which refers to the central aspect of mental construction, emerged from the observation that individuals tend to make subjective judgements on the dangerousness of risks and dates to Douglas and Wildavsky (1982). The notion that risks

are merely perceived (and not real, existing phenomena) has far-reaching implications for how individuals evaluate risk technologies such as agricultural biotechnology. This in turn can influence policymakers' regulatory decision-making on technological risks. For instance, the widespread anti-GMO sentiment in the EU, which has influenced regulatory activities on various political levels, resulted from the fact that EU citizens tend to believe that GMOs are harmful for their health and/or the natural environment (see, e.g. Durant and Legge 2005; Frewer *et al.* 2002; Gaskell *et al.* 2004).

The third essential theoretical concept that underlies this thesis and that requires specification refers to 'multi-level systems'. The multi-level perspective pertains to polities, in which political levels are neither organised strictly hierarchically nor governed autonomously. Rather, it pertains to policy-making in multi-layered systems that are characterised by high degrees of coordination between political levels (see, e.g. Benz 2009; Biela *et al.* 2013). Seifert (2006a: 11) stated that GMO policy-making in the EU 'entails all levels of political decision-making, from the interplay of international bodies and agreements to supranational, national and, […] regional polities.' Correspondingly, the multi-level perspective is essential for this thesis, which investigates the regulation of agricultural biotechnology in Germany, a country that has a federally structured system and that is embedded in the EU's multi-level polity (Benz 2009). Due to the high relevance of interplay between various political levels, including the local level, regarding the regulation of agricultural biotechnology in Germany, the multi-level perspective is fundamental for both the theoretical work as well as the empirical research underlying this thesis.

The multi-level perspective has been frequently interlinked with the 'governance' perspective to the widely used concept of 'multi-level governance' (see, e.g. Chowdhury and Wessels 2012; Piattoni 2010; Benz *et al.* 2007). The term 'governance' refers to the interaction of vertical and horizontal interdependencies between state actors and non-governmental actors (Benz *et al.* 2007: 16). Besides governments operating at the various levels, many other actors within these levels thus influence

and function as policy-making actors. From the governance perspective, governance is not executed in a hierarchical manner from the political centre, nor do political entities deal with certain tasks or issues by themselves. Rather, government is based on the interaction of inter- and intragovernmental structures and processes (Benz *et al.* 2007: 15)

The term 'governance' implies a shift from hierarchical policymaking made by governments to more horizontal modes of negotiation or cooperation with private and other non-state actors for the implementation of binding rules (Chowdhury and Wessel 2012: 345). Accordingly, the term 'multi-level governance' has been used frequently in studies on agricultural biotechnology regulation in the EU context (see, e.g. Dobbs 2016; Lee 2010). However, since the state-centred concept of regulation underlies this thesis, the term 'multi-level governance' appears less suitable for accommodating the empirical phenomenon of interest. Rather, the term 'multi-level regulation' appears more appropriate in this regard because, from this perspective, state actors represent the key regulatory bodies – or 'risk managers' (Beisheim *et al.* 2012: 7). Nevertheless, it should be noted that some definitions of multi-level regulation include non-state actors as well (Chowdhury and Wessels 2012: 346).

Taking together these three core concepts, this thesis is based on a conceptual foundation that can be denominated as 'multi-level risk regulation'. This approach should be suitable to account for the various peculiarities of the empirical research field, and therefore offers a sound basis for investigating regulatory action on agricultural biotechnology in Germany.

1.4 Overview of Approaches

To investigate GMO regulation at German subnational levels and to analyse the strategies of two important actors in the area of agricultural biotechnology, namely political parties and private corporations, the individual studies employ and combine various theoretical and methodical approaches. Each of these approaches was

selected for their strengths in assessing their respective empirical research interests, though naturally, every approach comes with certain limitations.

1.4.1 Theoretical Approach

In theoretical terms, this thesis belongs to the field of (comparative) policy research, a research tradition that seeks to explain the emergence of policy outputs (Schneider and Janning 2006; Fischer *et al.* 2007; Knill and Tosun 2012; Wenzelburger and Zohlnhöfer 2015). In addition to analyzing the influence of certain factors on policy outputs, this thesis contributes to the current literature since it considers policymaking to be processual in nature – a notion which is of central importance to (comparative) policy research (see, e.g. Schneider and Janning 2006: 48–64; Jann and Wegrich 2014). Several phases of policy-making can be differentiated: from perceiving and defining a problem and setting an agenda, to the formulation of rivaling policy options and the decision made regarding these options, to the implementation of the final decision and its evaluation (Wenzelburger and Zohlnhöfer 2015: 16). Within each of these phases, institutional settings as well as actor constellations can vary, influencing the results of policy-making processes. This thesis examines the processual nature of policy-making, focusing on factors that seem particularly conducive to explaining regulative policy-making on agricultural biotechnology in Germany's multi-level system.

The first theoretical approach this thesis applies in this regard refers to the framework of 'comparative policy analysis' (see, e.g. Schmidt *et al.* 2007; Busch 2013; Zohlnhöfer 2009; Wenzelburger and Zohlnhöfer 2015). This framework provides a theoretical toolbox, which comprises of six well-established theoretical strands for explaining governmental policy-making: socioeconomic theory, party difference theory, power resources theory, institutional theory, international hypothesis, and theories of path dependence (Zohlnhöfer 2009: 157–164). Generally, these theoretical strands offer explanations of how policy decisions come about and to what extent polities, i.e. political institutions and structures, and politics, i.e. political

processes, influence policy outputs. Moreover, in two regards, the framework of comparative policy analysis is flexible and can be adjusted for the investigation of particular empirical research interests.

First, the most appropriate strands can be selected from the toolbox, depending on the respective policy area and the empirical phenomenon of interest. Second, the given determinants can be complemented by certain policy-specific determinants, which appear particularly influential in explaining policy-making in certain policy fields (Zohlnhöfer 2013: 377). The six determinants given by the comparative policy analysis framework will be used to varying extents, with some being more important than others in certain studies. Moreover, determinants from previous disciplinary GMO research are used, e.g. 'diffusion' between subnational entities (see, e.g. Tosun and Shikano 2016). Similarly, determinants from interdisciplinary GMO research are employed, e.g. 'tourism' from the literature on agroeconomics (see, e.g. Consmüller *et al.* 2010; 2011).

The state-centred conception of regulation makes the motivations and the behaviour of political parties to a central focus of this book, for in liberal democracies such as Germany, parties with governmental responsibilities usually represent the critical policymaking actors (Müller and Strøm 1999). Therefore, the 'party difference theory', which often seeks to explain governmental actions with the partisan composition of governments, is of major importance for this thesis (Zohlnhöfer 2009: 159–160). However, government parties' internal motivations, which fundamentally determine how policies will be designed, represent a black box for the comparative policy analysis framework, which is mainly accompanied with quantitative methods (Zohlnhöfer 2013). However, since investigating parties' underlying motivations for their behaviour in the agricultural biotechnology field represents one of the research interests of this thesis argues that political parties can generally be presumed as being motivated by three major aspirations: vote-seeking, policy-seeking, and office-seeking (Strøm 1990; Müller and Strøm 1999). This widely acknowledged conjecture is crucial for this piece as it not only allows for in-depth theorisation but

also the systematic assessment of how parties prefer to position themselves on controversial issues and what legislative actions they take on agricultural biotechnology. The second approach to party-internal motivations deems parties' behaviour to be influenced by their respective 'partisan ideologies' (Budge 1994). This theoretical concept provides a promising tool for the present thesis as ideologies largely determine whether parties consider certain policy issues salient.

This is of major importance, for it closely accompanies their policy-making when in government (Budge 2015). Moreover, in the course of ascribing parties certain ideological foundations, these actors have been assigned to different 'party families' (Budge 1994). This approach, which, inter alia distinguishes Christian Conservative from Social Democratic or Green party families, provides a helpful theoretical basis for theorising how certain parties might behave in terms of position-taking or regulatory action on agricultural biotechnology (see, Bäck *et al.* 2015; Tosun 2014). The party difference theory, as well as the approaches to parties' internal motivations, can be applied to parties operating on all political levels without many complications. Therefore, the approaches adopted appear appropriate for investigating GMO regulatory action in Germany's multi-level system as well as for the investigation how parties position themselves on the GMO issue.

Another analytical approach is used to investigate the lobbying activities performed by the private company Cibus, which pushed for the deregulation of NPBTs in the EU. To explain its actions, the thesis employs the concept of 'venue shopping' (Baumgartner and Jones 2009). The term 'venue shopping' was originally coined in relation to advocates who face obstacles in certain decision-settings, and therefore look out for alternative ones that they consider more promising for promoting their policy objectives (Baumgartner and Jones 2009: 36). However, besides the analytical focus on such shifts between certain decision-making arenas, this approach also sensitises for the factors which determine which venues advocates select and which they choose to reject – an empirical procedure denominated as 'venue choice' (Ley 2016; Ley and Weber 2015; Marshall and Bernhagen 2017; Huwyler *et al.* 2018). The

lens of the venue choice concept is thus well suited to analysing Cibus' lobbying behaviour, which required decentralised authorities in particular member states to voice opinions on whether NPBTs should be regulated in the same manner as genetic engineering (transgenesis) or whether they should be deregulated like 'traditional' breeding techniques.

1.4.2 Methodological Approach

The thesis investigates the regulation of agricultural biotechnology at German subnational levels. In addition, it analyses parties' position-taking behaviour as well as private companies' lobbying activities in this policy field. The respective studies address these empirical phenomena in different investigation periods. While one study has a short-term investigation period from 2010–2015, another study covers a long-term period of nearly three decades from 1990–2017. The periods were chosen according to the specific research interests of each study and have implications for the detailedness of their respective empirical analyses.

The thesis employs qualitative, quantitative, and mixed-methods techniques. The qualitative methods comprise 'qualitative content analysis' and 'process tracing'. Process tracing means that, based on the respective theoretical approach, possible causal processes between certain variables and mechanisms are identified (Starke 2015). Qualitative content analysis employs a rigorous qualitative procedure for analysing the contents of textual documents (Mayring 2000). For some studies one of these two approaches is used, whereas others benefit from the combination of both, since this enables certain theoretical assumptions to be checked on a case-by-case basis, thereby ensuring high degrees of reliability.

In addition, this thesis employs the mixed approach of 'fuzzy-set qualitative comparative analysis', a method that combines the strength of qualitative and quantitative research strategies (Schneider and Wagemann 2012). Finally, the thesis uses 'multi-dimensional-scaling technique', a quantitative method that is used in network analysis for assigning locations to nodes in multi-dimensional spaces, so that

nodes that are 'more similar' can be placed closer together (Hannemann and Riddle 2005). Generally, the studies benefit from the combination of different methodical approaches, as this allows for in-depth insights as well as higher degrees of generalisability.

This thesis has various dependent variables, which correspond to its differing empirical interests. The central dependent variable of the studies, which investigate regulatory action at the subnational levels in Germany, represent concrete regulatory policies. The latter refer to legal regulations that have been implemented by governmental authorities in order to restrict the application of GMOs. At the German local level, the dependent variable refers to local cultivation bans. These bans come into force when a specific legal clause has been included in local lease contracts. Afterwards, farmers are legally prohibited from growing GM crops on municipal land. The study on the regional level distinguishes between two dependent variables. The first refers to a composite index which, for each regional state, comprises of various regulations and GMO-related policies. The second identifies whether regional states have become official members of the European GMO-Free Regions Network – a transnational network of EU regions, which together mobilise against GMO farming in the EU. The third dependent variable measures whether German parties who operate at the regional and the national levels strategically forgo from positioning themselves on the contested GMO topic in their election manifestos. The final dependent variable refers to Cibus' venue choices. The company requested competent authorities in specific member states to voice their opinions on the regulation of NPBTs, hoping to exert positive bottom-up pressure on the European Commission to deregulate the new techniques.

The original data sets employed for the studies were compiled by collecting primary and secondary data from various sources. Many of these sources were accessed via the websites of the various actors of interest, including state actors and the numerous important non-state actors. In addition, various (scientific) online databases were used, which provided specific systematised empirical data on both

independent and dependent variables. Data that were important and could not be accessed electronically were obtained through other means; the most important of these were expert interviews and the study of existing scientific publications from various research disciplines.

1.5 Outline and Findings

The thesis consists of four independent studies, each contributing to the study of the regulation of agricultural biotechnology in the EU multi-level system and Germany specifically. Chapter 2 investigates regulatory activities at the local level focussing on German cities' and municipalities' reasons to forbid GMO cultivation on their land. Chapter 3 analyses whether the German federal states introduced hard GMO regulations and why, or if they used symbolic policy-making to maximise their electoral success. Chapter 4 examines whether German parties operating at the regional and the national level strategically forewent from positioning themselves on the widely unpopular GMO issue and why. Finally, Chapter 5 analyses the determinants underlying the venue choices made by the biotech company Cibus, which strived for the deregulation of NPBTs in the EU in order to sell its newly modified seeds to EU farmers. The following sections provide brief descriptions of the particular research interests and outlines of each of these chapters.

1.5.1 The Regulation of Genetically Modified Organisms on a Local Level: Exploring the Determinants of Cultivation Bans

Authors: Ulrich Hartung | Simon Schaub

Other version published in *Sustainability* (2018)

In the first chapter, we investigate local units' regulatory activities on GMOs in Germany as, in this country, local entities have legal possibilities to impose local cultivation bans on GM crops. Which factors induced cities and municipalities to become active and prohibit GMO crops on their lands, adding thereby another regulatory

layer to the EU multi-level regulatory system? Previous research has investigated local conflicts sparked by the GMO topic so far; however, it has not been analysed why local units act as regulators in this policy field.

We used qualitative data from resolutions published by local councils and available online to produce insights regarding the drivers of regulatory action. In our eyes, this was the best suitable method of data collection because some cultivation bans dated back two decades. Many of the documents analysed provided data that informs us about the reasons for local units to impose such bans. We used a combination of qualitative and quantitative content analysis to produce various insights.

The study reveals that functional motivations to prevent negative socio-economic effects or impacts on the environment or human health are decisive for local units' decisions to ban GMO cultivation on their land. Furthermore, the results of the quantitative analysis unveil that municipalities often refer to both socio-economic reasons as well as to risks for the natural environment and human health for justifying their regulatory activities. Furthermore, the results indicate that local policy-makers impose popular cultivation bans to promote their own political success. Finally, horizontal diffusion of GMO cultivation bans between local entities, but also vertical diffusion from higher political levels to the local level can be observed. Overall, the results show that in most cases no single, but a variety of factors lead to regulatory activity. Moreover, it further emphasises the importance of analysing the interdependencies between agroecosystems and socio-economic systems in their full complexity.

1.5.2 Regulation vs Symbolic Policy-Making: Genetically Modified Organisms in the German States

Authors: Ulrich Hartung | Felix Hörisch

Other version published in *German Politics* (2018)

In the second chapter, we focus the regional level in Germany, as in this country, the federal states can enforce stricter GMO regulations than defined on a national level. We investigate whether and to what extent the 16 states stipulate concrete GMO regulations and whether symbolic policy-making is used for reasons of vote-maximization. The starting point for this chapter was the observation that only a few studies have dealt with regulatory action at the regional level, which was amazing to us because GMO regulation can have far-reaching implications at this level.

Therefore, the basic idea of this study is to provide a first comparative analysis that systematically investigates GMO regulation at the regional level. We collated the states' GMO-related policies using desktop research and expert interviews and constructed a composite index which, for each state, besides regulations, comprises of GMO-policies. We used this index as well as the membership in the GMO-free Regions Network as two separate outcomes to explore the conditions for both outcomes in a fuzzy set Qualitative Comparative Analysis (fs/QCA). We selected these conditions mainly based on previous research concerned with the political drivers for the adoption of GMO regulations and the underlying factors for the adoption or refusal of GM crops by farmers.

The study shows that the Green Party, as well as affiliated ministers, do not represent predominant conditions for whether or not a state adopts GMO-related policies or regulations. However, Green ministers were leading drivers for states' accessions to the GMO-free Network, thus signalling a GMO-adverse stance to the electorate. Moreover, we reveal differing regulatory action of CDU and CSU in the Western and Eastern states – an observation that we explain with the diverging interests of farmers. Furthermore, we find that SPD ministers regulated much like the

other parties, but presumably for alternate reasons such as coalition internal pressure. Finally, strong environmental interest groups were found to have positively conditioned symbolic policy-making, but with seemingly no effect on the adoption of concrete GMO regulations.

1.5.3 Why Parties take Neutral Positions on Policy Issues: Insights from the German Christian Democratic Union

Author: Ulrich Hartung

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The interest of the fourth chapter is whether political parties forego from position-taking on the unpopular GMO issue for strategic reasons, and if so, for which. Therefore, I focus specifically on the CDU's position-taking behaviour towards agricultural biotechnology at the national and the regional level. The jumping-off point of this study was the observation that the federal CDU has continuously positioned itself on the topic in its election manifestos since the 1990s, however, suddenly no longer did so in 2017. My interest was to investigate whether this represents a simple non-positioning, i.e. accidental in nature or whether it represents the result of the parties' strategic considerations; a position-taking behaviour denominated as 'neutral' position-taking in Chapter 4.

The objective of this study is to expand literature on policy positions in the respect that supposed non-positions could actually represent neutral stances, i.e. strategic responses made by parties to reconcile several conflicting political objectives simultaneously. This difference is extremely significant as simple non-positions are entirely unintentional, while neutral positions can inform us about the deeper, strategic motivations for why parties position themselves (no longer) on (controversial) policy issues.

Based on qualitative content analysis, I hand-coded the election manifestos published by German parties at the regional and federal levels prior to elections that

took place from 1990–2017. Those without any relevant statements regarding the issue of agricultural biotechnology were the most important, as these possibly include neutral policy stances. However, to distinguish neutral policy stances from simple non-positions I considered two key facets of contextual information: first, the programmatic development of the relevant parties on the GMO topic over extended time periods; second, (political) incentives that might have induced them to take neutral positions in certain situations. Due to the analytical depth needed for this investigation, the empirical focus lies on two cases, the federal CDU and the especially insightful case of the regional CDU branch of the state of Thuringia.

The results obtained by the study show that parties take neutral positions and do this for various reasons. The federal CDU took a neutral position in 2017 in order to reconcile its moderate GMO agenda with its objective of forming a coalition with the Greens and to respond to the increasingly diverging policy preferences of its regional branches. The Thuringian CDU took neutral positions from 1999–2009 in order to reconcile its pro-GMO agenda with its aspirations for forming coalitions with the SPD and to reduce electoral losses that might result from anti-GMO sentiment. In sum, the paper shows that neutral position-taking represents a real phenomenon of partisan activity. Hence, rather than ignoring supposed non-positions, scholars should consider the possibility that these may actually represent neutral stances.

1.5.4 Inside-Lobbying on the Regulation of New Plant Breeding Techniques in the European Union: Determinants of Venue Choices

Author: Ulrich Hartung

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The fifth chapter investigates the lobbying activities of Cibus, a US-based biotech company that advocated the deregulation of NPBTs within the EU and hoped

thereby to market its newly modified seeds to EU farmers. Agribiotech companies and the associations representing them are frequently presumed to pursue their interests by means of inside-lobbying tactics, that is, through personal contacts with politicians or high-ranking bureaucrats behind closed doors. However, so far, research has provided limited empirical insights into such activities. Drawing on the concept of venue-shopping, this study addresses this research lacunae by investigating the venue choices made by Cibus in the EU multi-level system; a polity structure that provides advocates numerous channels and venues to pursue their policy goals.

The results obtained by the study show that Cibus bypassed the EU level and that the firm strategically chose national competent authorities (CAs) for its lobbying because their institutional 'closedness' reduced the risk of the debate over the deregulation of NPBTs becoming public. However, the CA's specific competences and their influence on EU decision-making were of likewise importance. The firm lobbied CAs, which were embedded in national contexts favorable to agribiotech, based in Finland, Germany, Ireland, Sweden, Spain, and the United Kingdom (UK).

Two factors appear to have influenced Cibus' choices for these countries: high-level political support for agribiotech and high relevance of biotech sectors. In contrast, public support for GMOs turned out scarcely influential, and virtually no association could be observed for the agricultural application of biotechnology in the past and the weakness of domestic anti-GMO lobby groups. Finally, the in-depth study on Germany affirms that 'closedness' was important for Cibus' choices and it reveals that technical information served as venue-internal factor that influenced the firm's choices.

1.6 Avenues for Future Research

Agricultural biotechnology regulation in the EU has received extensive scientific attention since the 1990s. Nonetheless, several research gaps still exist, especially regarding the domestic levels of the EU multi-level regulatory system as well as

regarding NPBT regulation generally. This thesis examines Germany in order to reduce four specific research lacunae in this area of study. Although the corresponding studies contribute to the existing literature, some space remains for future research into the regulation of agricultural biotechnology in the EU multi-level system.

The first avenue for future research refers to studies investigating GMO regulatory action at national levels in those member states, which have not yet been investigated in this regard. Research on Austria, France, Germany, Spain or the UK provides detailed information on the determinants of regulatory action at national levels (see, e.g. Seifert 2009; Kuntz 2014; Katzek 2014; Barcena 2005). However, these studies have shown that GMO regulatory action in national spheres is highly country-specific, meaning few generalised conclusions can be drawn. Both the design of national regulatory frameworks as well as their underlying determinants vary considerably between the countries.

For instance, farmers' opposition explains the enactment of the national ban on the GM crop MON810 in France whereas in Austria the same regulatory outcome resulted from the pressure of a broad political consensus together with an anti-GMO public (Seifert 2009). Hence, future studies could explore the determinants of regulatory action in member states, which have not yet received scientific attention to check the robustness of previous findings and contribute to more generalisable results.

The pro-GMO countries of Finland and the Netherlands would represent promising member states in this regard. Moreover, national GMO policy-making could be analysed in Greece or Italy, which both fall into the group of anti-GMO countries. Finally, Belgium, Bulgaria, Ireland or Lithuania could be investigated because agricultural biotechnology is contested in these countries, both socially and politically (see, e.g. Lucht 2015: 4265). For instance, one could analyse which actors succeed in influencing national GMO policy-making and why. Further studies could also improve our understanding of political parties' behaviour regarding the topic of

GMOs. How do competing parties position themselves on this disputed issue? What is their regulatory action when in (coalition) government(s)? To address such research questions, the party families concept provides an excellent tool as it can be used for theorisation as well as for producing comparable empirical results across various countries (Budge 1994).

A second avenue for future research could be to investigate how and why regional entities decide to regulate GMOs, while other units resign from doing so. Promising member states for such research inquiries represent countries in which regional entities enjoy high levels of authority (Hooghe *et al.* 2016). Accordingly, regional entities in Belgium, Italy, Spain or the UK could provide interesting insights into agricultural biotechnology regulation. However, whether regions actually possess such regulatory possibilities must be explored individually for each country (Seifert 2006b: 426). Literature has shown that both comparative analysis as well as case studies have revealed impressive insights into regional units' (regulatory) activities regarding agricultural biotechnology (see, e.g. Tosun and Shikano 2016; Tosun and Hartung 2017). Accordingly, Scotland, Wales or Northern Ireland, for instance, could be selected for further investigation, be it case studies or systematic-comparative analysis. In response to Directive 2015/412, these regions, among others, filed opt-out requests via the UK national government to ban GMO cultivation in their territories (Tosun and Hartung 2018).

Besides anti-GMO regions, regions in which farmers cultivate(d) GM crops to remarkable extents could be particularly interesting because in these regions, policymakers should face pressures from both pro-GMO and anti-GMO groups. Which factors impede policymakers from restricting farmers to cultivate GM crops in these regions? Have pro-GMO actors succeeded over anti-GMO actors in influencing political decision-making? Although GMO cultivation is limited in the EU, suitable cases exist for such investigations, such as the Spanish regions of Aragon or Catalonia (see, Binimelis 2008; Binimelis *et al.* 2009).

The third possible avenue for future research refers to political entities that operate on the local level in the member states and have regulatory options for shaping the use of GMOs in their spheres. For instance, investigating the effects of the partisan affiliation of mayors or the composition of local councils on the establishment of regulations could prove enlightening.

Moreover, as with the regional level, promising research might not only focus on local entities in which GMO farming has sparked conflicts and/or regulations have been implemented, but also investigate local units in which farmers could cultivate GM crops (Friedrich 2017). In those local entities especially, policymakers – like their regional counterparts – should be confronted with the diverging interests of at least two groups with diverging interests. Studies thus far have dealt with the conflicts that have been sparked by field trials and commercial GMO cultivation at the German local level. Therefore, future research should examine the other member states, which have attracted less attention in this regard: Czech Republic, Poland, Portugal, Romania, and Spain. Generally, the local level provides fruitful ground for both case studies and comparative analyses. The latter could investigate horizontal effects between local units as, usually, the higher number of cases given at this level makes such an investigation possible.

Because of the multi-level system of regulating GMOs in the EU, often interplays or interdependencies between various levels of governance influence regulatory decisions. The studies presented in this thesis take these effects into account. Nevertheless, future research could further examine specific aspects of interaction, coordination, and interdependence between the various actors as well as the political processes at the various political levels. For instance, the homo-/heterogeneity of parties' position-taking on agricultural biotechnology could be explored in more detail. Do their positions differ horizontally between local and regional entities, and vertically between the local, regional, and national levels? How can the diverging positions of parties on particular political levels be explained? Furthermore, one could analyse, for instance, how regional units (in second chambers) participate in

regulatory decision-making processes regarding the implementation of national provisions or EU directives (Tosun and Hartung 2018).

The fifth possible avenue for future research refers more generally to NPBTs. These new tools might further increase the relevance of research in the field of agricultural biotechnology as they have the potential to become more significant in EU farming than genetic engineering (transgenesis) has been heretofore. However, liberalisation of the current EU regulatory framework is an essential precondition therefor. In this regard, learning more about how central actors, such as relevant EU institutions and the individual member states, position themselves on such a loosening could prove enlightening. Which regulatory approach is favoured/rejected by whom and why? Which strategies use actors in pushing for a preservation/amendment of the regulatory status quo? Can coalition-building be observed? To investigate these or similar research questions, the GMO research conducted in the last three decades provides numerous promising starting points for future studies.

Moreover, should EU institutions leave the regulatory decision on NPBTs to the individual countries, research that focusses on selected member states could prove promising. How do political parties and major interest groups position themselves on these tools? Can coalition-building be observed? Which lobbying strategies are employed for advocating certain regulatory approaches? Is there a public discourse about CRISPR and other NPBTs or is it a pure expert issue? Considering the member states' stances on agricultural biotechnology diverge fundamentally, it appears likely that they would implement different national regulatory frameworks for governing NPBTs and products thereof. The resulting regulatory fragmentation would have far-reaching implications for EU-internal trade relations as well as for the trade of agriculture products between single member states and non-EU countries.

Finally, researchers in this field should be aware of the increasing relevance of modified animals for livestock production. Until now, genetic engineering (transgenesis) has been scarcely applied to animals for food production purposes (Vàzquez-Salat *et al.* 2012). Worldwide, only one single GM animal has received

authorisation for human consumption: 'AquAdvantage' – a salmon with accelerated growth features, which was approved by the United States (2015) and Canada (2016). In the EU, no GM animals have been authorised so far; however, animals modified using NPBTs are expected to spread rapidly around the world; commercially interesting examples include especially muscular beagles and virus-resistant pigs (Laible *et al.* 2015). This potential spread could become pressing for the EU in its role as an international trade partner, as these animals – similarly to most genome edited crops – often do not contain foreign DNA, meaning they cannot be distinguished from their conventional counterparts (Travis 2015).

Chapter 2

2 The Regulation of Genetically Modified Organisms on a Local Level: Exploring the Determinants of Cultivation Bans

2.1 Introduction

Farmers started planting the first GM crops for commercial purposes in the mid-1990s. Since then, the cultivation of these crops has sparked controversies in almost every adopting country worldwide (Brookes and Barfoot 2017). In the EU, much criticism centred on the agri-industrial farming practices that are often associated with GM crop cultivation, which, among others, is said to contest and endanger 'traditional' food production systems (see, e.g. Levidow and Boschert 2008; Zilberman *et al.* 2018). The deprecatory views on biotechnology in agricultural production led to regulatory activity on all levels of governance: in order to defuse the conflicts between the two contending agri-food systems, policymakers introduced more and more regulations, which were partially detrimental to farming based on GMOs (see, e.g. Potrykus 2013; Tosun 2014; Dobbs 2016).

Research has concentrated on GMO regulatory activities on supranational, national, and regional levels, as well as on the interdependencies between these levels (see, e.g. Levidow and Boschert 2008; Tosun 2014; Bodiguel *et al.* 2010; Hartung and Hörisch 2018; Hristova 2013; Katzek 2014; Seifert 2006c; Tosun and Hartung 2018). This study complements previous research by investigating regulatory action on a level of GMO governance that has been scarcely analysed in this regard yet: the local level.

This study is not the first one investigating local implications of the use of biotechnology in agriculture. This has been done by several studies from various

disciplinary perspectives, including political science, sociology, and economics (see, e.g. Friedrich 2017; Wagner 2007; Hoppichler and Schermer 2007; Nischwitz *et al.* 2005; Schermer and Hoppichler 2004). Friedrich (2017), for instance, examined local conflicts that were sparked by the GMO issue in several municipalities in Germany. Her study provides detailed information on the actors involved, the various conflict actions and the (political) conflict settlement attempts. However, despite such insights, it remains to be analysed whether municipalities introduce hard GMO regulations, and if so, why they do it. To address this research lacuna, the research question guiding this study is as follows: How can GMO regulatory activity on the local level be explained?

Basically, whether a municipality adopts a GMO regulation can be influenced by a multitude of factors. Despite the explorative nature of this study, three theoretical arguments are proposed to explain such action. First, we argue that municipalities regulate due to functional motivations of safeguarding certain valuable goods such as the environment. Second, we argue that political aspirations of local policymakers seeking credit for positive policy outputs lead to regulatory action. Third, we argue that municipalities anchor regulations in reaction to similar policy measures adopted beforehand by other units.

Germany was selected for this study, as in this EU member state municipalities possess legal means to prohibit GMO cultivation in their regions. More precisely, German municipalities can commit themselves to forbid farmers to plant GM crops on their leased agricultural land (self-regulation). To accomplish this, a city or commune must include a specific clause in its lease contracts for agricultural land, which then explicitly prohibits cultivating GM crops on the commune's land. To include this clause, a municipality must enact a corresponding resolution in its local council, the main legislative body of a commune representing its local citizens. The GMO cultivation ban does not need renewal and it can only be abolished by a new resolution (GMO-free Regions in Germany 2019b).

The study reveals that various factors drive GMO regulatory activity on the local level. First, municipalities regulate due to functional motivations stemming from socio-economic concerns or perceived risks for the environment or human health. Second, they regulate due to political aspirations of local policymakers, who use popular GMO regulations symbolically to increase their political success. Third, municipalities take regulatory action because of horizontal diffusion between municipalities based on learning as well as due to vertical diffusion from higher political levels based on hierarchic coordination. Finally, the analysis of combinations of reasons for regulating GMO farming reveals, among others, that municipalities not only mention socio-economic concerns and risks for the environment or human health most frequently, but that they also do so prevalently in combination.

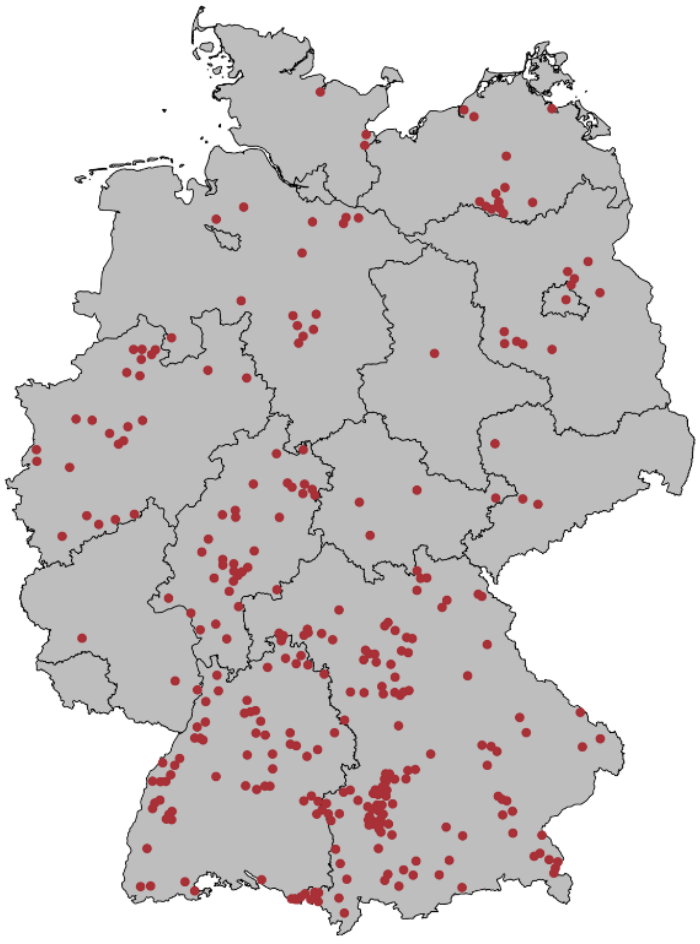
The remainder of this study is structured as follows. It first describes the development of the regulatory context of local GMO cultivation bans in Germany, thereby putting emphasis on regulatory activity on the EU level and the German national level. The theoretical section then focuses on three explanations for why municipalities regulate GMOs: functional motivations, political aspirations of local policymakers and policy diffusion. The subsequent section provides details on the methodology and data generation before the exploratory findings are presented and discussed in two steps. First, single frequencies of municipalities' statements are discussed and second, interdependencies between the reasons are investigated. The study ends with a summary of the main findings and some concluding remarks.

2.2 The Regulatory Context

Regulation of GMO cultivation in Germany is characterised by a complex multi-level governance structure with some regulatory flexibility on the subnational levels. Authorization of GMOs for cultivation is located at the EU level, originally covered by Council Directive 90/220/EEC and by Directive 2001/18/EC. A national safeguard clause that is included in both directives has enabled EU member states to ban cultivation of GMOs on their territory, even after their authorization. These

bans had to be based on new findings on risks for human health or the environment. Only since 2015, member states may also enact cultivation bans on socio-economic or other grounds (see, e.g. Tosun and Hartung 2018; Salvi 2016). In Germany, the main competencies for regulating GMO cultivation are located at the federal level. Most importantly, the federal government enacted restrictive rules for governing the co-existence between conventional, organic, and GMO farming in 2005 (Consmüller *et al.* 2009).

Figure 2. Municipalities with Cultivation Bans across Germany.



Source: own figure based on data provided by GMO-free Regions in Germany (2019).

In addition, it may impose nationwide cultivation bans, such as the ban on the GM maize MON810 in 2009, which de facto prohibited GMO farming in Germany as a result (Cooper 2009). Despite the prohibitive regulatory framework in place at the national level, German states have used legal possibilities and imposed

additional cultivation bans for GM crops on their land by including specific clauses in lease contracts (see, Chapter 3). Municipalities or communes are political jurisdictions located at the lowest administrative level and range from small villages to large cities. Concerning GMO cultivation, municipalities can prohibit the cultivation of GM crops on their leased land as well. German municipalities introduced GMO cultivation bans over a period of 16 years, from 1999 to 2014. A list of all municipalities can be found in Table A1 in the appendix. The distribution of these municipalities across Germany is illustrated in Figure 2.

In the following, this section situates the development of municipalities' regulatory activity in its overall regulatory context. When considering this context, the development of regulatory practice on the local level can be divided into four phases. The first phase refers to the years of the EU 'moratorium' from 1999 to 2004. The second phase comprises the years of strictly regulated GMO cultivation in Germany from 2005 to 2008. The third phase relates to the period after the national cultivation ban on MON810 from 2009 to 2014. Finally, the fourth phase is about the years after Germany made use of a new legal opportunity, and, by way of precaution, banned all GM crops pending approval on EU level. This phase covers the years from 2015 to 2017. To make this clear, this section only situates the regulatory activity of German municipalities within the development of the overall regulatory context. It does not attempt to analyse the possible causal effects of changes in the regulatory context on the adoption of local GMO cultivation bans. Whether a municipality takes such action can be influenced by several factors, which will be analysed and discussed in Section 5.

2.2.1 Phase 1: The 'moratorium' years, 1999–2004

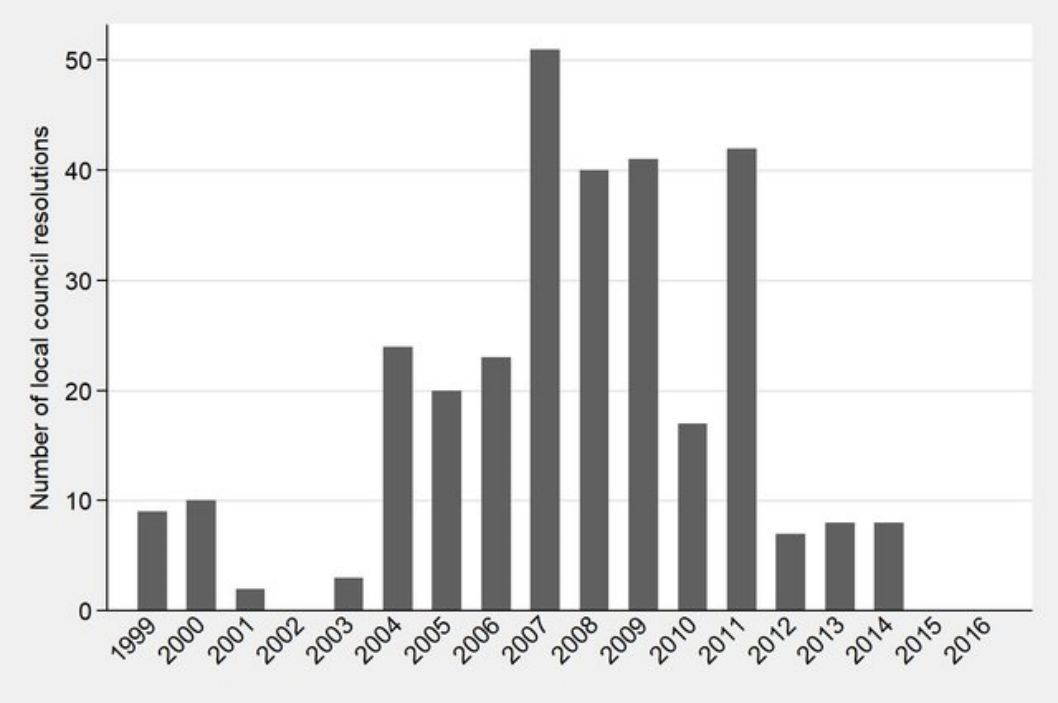
The initial set-up of the EU regulatory framework on GMOs dates to 1990 when the European Council adopted Directive 90/220/EEC on the deliberate release of GMOs into the environment, and Directive 90/219/EEC on the contained use of GM micro-organisms. Based on this newly established framework, the EU, from 1995 to 1996, authorised several GM crops both for food use and commercial cultivation. This

'wave of authorisations' together with a 'public outcry' induced several national governments to oppose further approvals (Tosun 2014: 364). Due to a blocking minority of only five anti-GMO member states, the Council of Environment Ministers stopped all GMO approvals for commercial purposes in June 1999. This so-called de facto 'moratorium' on all new approvals of GM crops for commercial cultivation lasted for five years until 2004 (see, e.g. Lieberman and Gray 2006).

Figure 3 shows that only a few communes took regulatory action during the 'moratorium' years from 1999 to 2004. On the one hand, it is remarkable that the municipalities adopted these measures. That is to say, not a single GM crop had been cultivated for commercial purposes in Germany by 2004. Until this year, universities, other public research institutions, and companies conducted several scientific field trials, the number of these plots, however, decreased significantly since 2005 (Federal Office of Consumer Protection and Food Safety 2019). Although public and private plant research holds a long tradition in Germany, GM crops have not been planted for scientific purposes in the country since 2013. One major reason for this is that vandals, informed on the exact locations by a public GMO location register (see, phase 2 below), frequently destroyed the costly field trials (Kuntz 2012). Moreover, the communes, in principle, did not have to fear the possible cultivations of new GM crops on their land, as the required authorisations on the EU level were blocked by the 'moratorium' at that time.

On the other hand, the communes may have been sceptical about – or did not want to wait for – the European or the national legislator to establish regulations that prevent farmers from growing GM crops in a municipality after a possible end of the 'moratorium'. The few communes might have imposed cultivation bans instead of waiting for regulations on higher political levels. Remarkably, during the 'moratorium' years, the number of cultivation bans reached its peak in 2004. This could be due to the looming end of the 'moratorium', which local policymakers might have expected to result in possible approvals of new GM crops.

Figure 3. Number of Local Council Resolutions, 1999–2017.



Source: Based on data taken from GMO-free Regions in Germany (2019b).

Turning back to the regulatory context in more detail, two particularly relevant processes took place during the turbulent 'moratorium' years. First, several member states provisionally banned the cultivation of specific GM crops in their territories that had been authorised for commercial cultivation in the EU (Tosun 2014: 370). To achieve this, they made use of a 'safeguard clause' that was included in Article 16 of Directive 90/220/EEC. According to this clause, the member states were obliged to justify national cultivation bans with new scientific evidence about risks for the environment or human health that have not yet been considered in the prior risk assessment led by the European Food Safety Authority (EFSA). The German government also made use of this legal option and imposed a cultivation ban on an EU authorised GM crop. In January 2000, Germany banned Bt176 maize (Syngenta), because of rather dubious new safety concerns (Boschert and Gill 2005: 291). The European Commission approved this biotech crop in 1997. However, it has never been cultivated by farmers in Germany.

In a second important process during the 'moratorium' years, the European Commission replaced Directive 90/220/EEC with Directive 2001/18/EC, with the

latter prescribing much stricter rules for the EU approval process of GM products and the cultivation of GM crops (Hristova 2013: 115–117). The directive obligated the member states to adopt national 'co-existence' measures, which should guarantee farmers the freedom to choose between the different agriculture production types, conventional, organic, and GMO farming. Moreover, Regulation 1830/2003 supposed consumers to have the 'freedom of choice' between products resulting from the different farming practices. Practically, safeguarding 'co-existence' represents a highly complex task as it must secure segregation between the different agriculture production channels along the entire food production supply chain: from the seed supplier to farmers, wholesale dealers, processors, and retailers.

The EU provided guidance to the member states in establishing appropriate rules for 'co-existence' management. The European Commission published 'recommendations' for the development of national 'co-existence' measures first in 2003, and additional ones in 2010, which, however, had no obligatory character (European Commission 2003; 2010a). Nevertheless, the European Commission stipulated a specific approach to 'co-existence' management. This must be performed at farm-level and be based on a crop-by-crop approach; the European Commission has been criticized for these 'soft power' recommendations as being 'top-down and authoritative' (Weimer 2014: 29). Moreover, the 'European Coexistence Bureau' provides the member states with several crop-specific guidelines to support the countries in establishing appropriate 'co-existence' measures (Joint Research Centre 2019).

2.2.2 Phase 2: The years of strictly regulated GMO cultivation, 2005–2008

In 2005, Germany implemented legally binding rules for safeguarding 'co-existence' into its national law. In the same year, farmers were allowed to cultivate GM crops on the country's territory for the first time. From 2005 to 2008, they cultivated MON810 (Monsanto), which is an insect-resistant GM maize, on increasing, but overall relatively small areas (Federal Office of Consumer Protection and Food Safety 2019). MON810 received EU approval for commercial cultivation already in 1998 and is currently the only biotech crop that is authorised for this purpose in the

EU. The 'co-existence' regulations under which farmers cultivated this biotech crop in Germany for four years were extremely strict. The three most important rules are considered here, briefly: isolation distances requirements for GM crops to conventional and organic fields, the public GMO location register, and the ex-post liability rules (German Genetic Engineering Act 2019). It should be noted that these rules are complemented in German law by 'best practice' measures for GMO cultivation and detailed provisions for technical segregation (Best practice regulation 2008), as well as by Regulation 1830/2003 on the implementation of the EU regulation on labelling and application of GMOs.

First, German law demands minimum isolation distances for GM maize. It requires 150 m to adjacent conventional maize fields and 300 m to organic maize fields. These rules are much stricter than the seed industry advocated for, which, based on field trials on pollen drift, suggested the German government to implement 20 m distances from GM maize fields to conventional and organic maize fields (Venus *et al.* 2013: 3). With its isolation distance requirements, Germany holds a midfield position among the 16 member states that have implemented such requirements. Most member states demand such large minimum distances that GM farmers are exacerbated or even de facto prohibited from cultivating GM crops. Only in Spain, the main producer of GM crops in the EU, minimum distances (20 m for GM maize) are required, thus governing, but not severely hampering, the cultivation of GM crops (Schenkelaars and Wesseler 2016: 7).

Second, the GMO location register, in its publicly accessible part, provides information on field locations and the types of GM crops planted. In this register, farmers, as well as plant scientists, are legally obliged to disclose the exact sites where they cultivate GM crops. The register functioned as a significant barrier for both actor groups to carry out their work because the via Internet freely accessible register allows for anti-GMO activists to easily ascertain where GM crops are planted. As a result, activists occupied or destroyed many of the few GMO plantings causing pecuniary losses of both farmers and scientists (Schier 2007). The federal state

Saxony-Anhalt objected the GMO location register at the German Supreme Court in 2005, which decided five years later that this rule was in line with the German Constitution (Katzek 2014: 180).

Third, the German liability rules address the EU's requirement to enforce ex-post measures that determine who must cover the costs of possible economic damages that are caused by GM agriculture on fields where the two other farming practices are applied. According to these rules, GM farmers are strictly liable for damages caused, for instance, by the 'contamination' of non-GM crops due to pollen wafting from their GM fields. The maximum liability of GM farmers amounting to € 85 million is extraordinarily high. It is remarkable that even if GM farmers have met all requirements and adjacent properties are polluted accidentally, they are not exempt from possible liability claims of conventional or organic farmers. Moreover, if GM fields are possible sources of damage, the respective GM farmers are jointly liable (Consmüller *et al.* 2009: 49). Particularly, this liability regime made it an existential risk for farmers to cultivate GM crops in Germany (Katzek 2014: 178).

Altogether, the German 'co-existence' regulations comprise strict ex-ante regulations and strict ex-post liability rules. Thus, the regulatory framework on GMOs in place in Germany is more prohibitive when compared to most other member states (see, e.g. Bodiguel *et al.* 2010; Consmüller *et al.* 2009). Together, the three policy instruments were intended to guarantee 'peaceful co-existence' in Germany. However, these rules de facto 'postponed' the conflicts over GMO cultivation from the supranational and the national level to the local level. The 'co-existence rules' allowed farmers to cultivate GM crops for commercial purposes for the first time in Germany. Subsequently, some farmers started cultivating the GM crops despite the very strict regulation in place (Federal Office of Consumer Protection and Food Safety 2019).

Small-scale and organic farmers, however, perceived the incipient GMO cultivation as a threat. Together with environmental NGOs, they advocated against the idea of 'co-existence' in principle and demanded very strict 'co-existence' measures

at the least. These actors considered 'co-existence' not primarily as an economic issue, but an ethical, environmental, and socio-economic one (Boschert and Gill 2005: 289–90). On the other hand, the German farmer union and the agribiotech industry attacked the 'co-existence' provisions in Germany for the unduly high barriers to GMO cultivation. Thereby, the rules 'intensified domestic conflicts between advocates of [the] contending agri-paradigms' (Levidow and Boschert 2008: 183).

Turning now back to Figure 3, we can see that multiple communes introduced cultivation bans in the period of strictly regulated GMO cultivation from 2005 to 2008. The peak of the annual growth rate is in 2007 with 54 new local council resolutions. One plausible way of interpreting this high number of cultivation bans is that intensified domestic conflicts, along with the new possibility of farmers to grow GM crops on their agricultural land, motivated local policymakers to introduce these bans. Moreover, these actors could have perceived the existing 'co-existence' regulations as being insufficient and therefore seized cultivation bans additionally.

2.2.3 Phase 3: The years after the national cultivation ban on MON810, 2009–2014

On the grounds of the 'safeguard clause' included in Directive 2001/18/EC, the German government imposed a cultivation ban on MON810 in 2009. Thereby, the legislator stopped farmers after a period of four years from further cultivating this biotech crop. Similar as in the case of Bt176, the MON810-ban is considered as being based on scientifically questionable reasons and as being, in fact, motivated by the political considerations of the German government (Wickson and Wynne 2012). Several leading German and European authorities—the Federal Office for Risk Assessment, the Julius Kühn Institute, the Robert Koch Institute, the Federal Agency for Agriculture and Forestry (since 2008), the Central Commission for Biosafety, and EFSA—had considered MON810 to be safe (Ober 2012: 275). Since the ban, the 'co-existence' rules are, in fact, rather theoretical, as no other GM maize varieties—and in general no other GM crop—is authorised for commercial cultivation in the EU.

Figure 3 shows a mixed picture for the years after the national cultivation ban on MON810. At first glance, it may surprise that the regulatory activity varies considerably between 2009, 2010, and 2011, and the subsequent years. While considering that the MON810-ban de facto prohibits commercial GMO cultivation in Germany, the relatively high number of local cultivation bans taken by the communes in 2009 seems astonishing. However, this number might be explained by the fact that corresponding council resolutions had been initiated and prepared before the federal government imposed the ban in April 2009. The strikingly low number of cultivation bans in 2010 may be interpreted as a reaction of local policymakers, who, due to the national ban, might not have seen any more need to regulate. While many municipalities adopted local cultivation bans in the period of 'co-existence' regulations from 2005 to 2008, only the national MON810-ban in 2009 appears as having satisfied the regulatory needs of the communes, as indicated by the low number in 2010.

In addition, Figure 3 indicates that significantly more communes established cultivation bans only one year later in 2011. A probable explanation for this increase is that GM potato EH92-527-1, better known as 'Amflora' (BASF), gained authorisation for commercial cultivation in 2010. After a marathon authorization procedure of 13 years, the modified starch potato was the third—and to date last—GM crop that received approval for commercial cultivation. What might have motivated the communes to impose cultivation bans in 2011 was not only the fact that this GM crop gained approval. Rather, farmers immediately started planting 'Amflora' already in the approval year, but on overall very limited areas (a total of 17 hectares, and only for two years from 2010 to 2011) (Federal Office of Consumer Protection and Food Safety 2019). The reason for the short period of cultivation was that BASF suspended the marketing of 'Amflora' in the EU when it shifted its plant biotechnology division to the United States in 2012 (Salz 2012). In addition, after a lawsuit by Hungary, the General Court of the European Union, overturned the approval of 'Amflora' in 2013 because of procedural errors that were made by the

European Commission in the approval process (Paskalev 2012: 195–9). Besides BASF, other leading agri-biotech companies – Bayer (in 2004) and KWS (in 2015) relocated their plant biotechnology divisions from Germany to the United States (US) (USDA Foreign Agricultural Service 2016).

In the years from 2012 to 2014, only a few communes took regulatory action to impose local cultivation bans (Figure *3*). This limited number of local cultivation bans can be interpreted as the result of the fact that local policymakers did not have to fear that farmers could possibly cultivate biotech crops on their agricultural land due to the MON810-ban and to terminating the cultivation of 'Amflora'. Only very few communes might have feared potential new authorisations of new GM crops for commercial purposes, and therefore implemented cultivation bans.

2.2.4 Phase 4: The years after the national ex-ante bans on GM crops, 2015–2017

When inspecting Figure 3 again, we can see that not a single commune imposed a cultivation ban during the three-year period from 2015 to 2017. This development might be related to Directive 2015/412. This directive was adopted in March 2015 and it gives the member states the possibility to institute restrictions or bans during the approval process for a given GM product (ex-ante), and to restrict or prohibit the cultivation of specific GM crops in the aftermath of granting an authorisation on the EU level (ex-post). Germany used the ex-ante option and demanded restrictions of geographical scopes of all GM crops pending approval in the authorisation pipeline at EU level. It was not the only country doing so: 16 other member states and four regions made varying use of this new legal possibility (Tosun and Hartung 2018: 810). The German government reasoned the exclusion of its territory from the future authorisations of six GM maize varieties (Syngenta withdrew two varieties) with the incompatibility of GM maize with 'usual agriculture land use in Germany. It would have negative effects on the cultivation of conventional and organic maize' (Federal Ministry of Food and Agriculture 2015: 2).

With increasing numbers of municipalities having implemented cultivation bans, the potential number of future cultivation bans automatically decreased. It seems,

however, plausible to interpret the regulatory inaction of German communes from 2015 to 2017 as a result of the regulatory proceedings that took place at the EU level. As a reminder: in Germany, more than 11.000 communes exist, which, in principle, could adopt GMO cultivation bans. However, after the national ex-ante bans on all the GM crops pending approval, the communes might not have viewed it necessary to regulate GMOs themselves anymore. These ex-ante bans might have signaled to local policymakers that farmers, at least in the medium term, would not be given the possibility to grow GM crops in their territories.

2.3 Theoretical Considerations

What motivates municipalities to become active and pass GMO cultivation bans? Research indicated that multiple factors can explain policy-making at the local level including actor-specific factors, such as the party-affiliation of mayors or structural factors, like, for instance, the size of a commune (see, e.g. Wehling and Kost 2010; Holtkamp 2008). Theorizing all the possible factors would contradict the exploratory logic of this study as well as overstretch this piece of research. Therefore, this study focuses on three arguments why municipalities might be motivated to ban the cultivation of GM crops in their territories: functional motivations, political aspirations of local policymakers, and policy diffusion.

Due to the high level of risk that is often attributed to GMOs (Herrick 2005), several possible functional motivations exist, which might induce local policymakers to advocate cultivation bans. At their core, these motivations are shaped by normative, cultural, religious, and other beliefs, and aim at preserving or protecting certain valuable goods inferred from these beliefs. For instance, environmentalists tend to consider GM crops as dangerous to natural biodiversity. Similarly, consumers often regard GM foods as being a potential risk to their health. Most risk assessment studies conclude that GM crops have no significant adverse effects on the environment or human health (see, e.g. Herring and Paarlberg 2016; Klümper and Qaim 2014). Nevertheless, local policymakers might be motivated to protect certain valuable

goods, such as biodiversity or citizens' health, and therefore aim at preventing the cultivation of GM crops on communal territories.

Another important functional incitement for a local unit to impose a cultivation ban might be the preservation of conventional and organic farming. It is believed that their existence can be better secured if the area that is owned by a commune is covered by rules that prevent farmers from cultivating GM crops. Cultivation bans might be viewed a means to guarantee the labelling threshold of 0.9% set for adventitious and/or technically unavoidable GMO ingredients, which applies to conventional as well as to organic products in the EU (Regulation 1830/2003; Regulation 1829/2003). This aspect is even more relevant for organic farming as many organic companies have voluntarily prescribed a more restrictive labelling threshold of 0.1% for GMO ingredients. Further monitoring measures to meet these thresholds would entail additional financial costs, particularly for organic farmers – a scenario that comes into relevance when GM crops are planted near organic cultivations (Consmüller *et al.* 2009).

Local policymakers might also be motivated to ban GMO cultivation due to socio-economic concerns that are related to GMO farming (see, e.g. Catacora-Vargas *et al.* 2018; Oehen and Quiédeville 2017). The industrial farming practices that are often associated with GMO agriculture are frequently considered to threaten traditional small-scale agriculture in rural spheres. Therefore, GMO cultivation might be considered a direct threat to small farmers, existing upstream and downstream industries, and consumers of food from traditional food-production systems (Kathage *et al.* 2016). However, by implementing cultivation bans, municipalities can protect and support traditional food-production systems. So, they can contribute to avoiding possible shifts in the socio-economic status triggered by GMO farming from which mainly agri-biotech companies and large-scale farmers would benefit, but actors operating in traditional agri-food systems would suffer.

Several other functional reasons that are motivated by religious, ethical, moral, or globalization-critical beliefs might motivate policymakers to take regulatory

action. When local policymakers consider certain values as not being sufficiently protected by the regulatory status quo, they may become active and try to do so themselves.

The second argument that we propose in this study is that municipalities impose cultivation bans due to political aspirations of local policymakers seeking credit for positive policy outcomes. The central objective of political parties and individual policymakers is the maximization of their vote share at upcoming elections as this increases their chances of becoming (re-)elected, which, in turn, allows for them to implement certain policies (Strøm 1990; Müller and Strøm 1999). Skjæveland *et al.* (2007) have shown that this idea also applies to the local level. Due to their vote-seeking aspirations, policymakers are responsive to public opinion: for the GMO case, several studies have shown that negative public opinion functioned as a major driver for several EU member states to impose national cultivation bans (see, e.g. Malyska *et al.* 2016; Kurzer and Cooper 2007; Legge and Durant 2010; Durant and Legge 2005).

Accordingly, policymakers operating at the local level might also have strong incentives to respond to the public rejection of GMOs – or at least to distance themselves from unpopular GMO farming (Wenzelburger and Hörisch 2016). Hence, they might regard cultivation bans as a suitable means to increase their political success. As the GMO issue has proved to predominate several local agendas and sparked intense conflicts at this level (see, e.g. Friedrich 2017; Wagner 2007; Gupta 2018), the topic should attract the attention of vote-seeking local policymakers who might hope for electoral benefits from politically exploiting the issue.

The third argument refers to policy diffusion, that is, the notion that policy decisions adopted by a political unit are affected by policies that are adopted beforehand by other political units (see, e.g. Shipan and Volden 2008; Gilardi 2016; 2012; Graham *et al.* 2013). A key mechanism underlying policy diffusion among political units operating at the same level is learning (Shipan and Volden 2008: 840). Learning can be understood as a process by which policymakers employ the experiences of other

political units to estimate the likely consequences of policy change (Gilardi 2012: 470). According to Bednar (2011: 273), the chances that policies diffuse increases in constellations when other political units are characterised by similar preferences and problems and consider a certain policy at stake as 'successful'. Why should local policymakers consider a GMO cultivation ban as successful?

Drawing on the considerations above, policymakers might consider a ban that is adopted by another commune as a suitable instrument to prevent the population from environmental or health risks potentially emanating from GMOs. Moreover, these actors might consider it to be necessary to harmonize their regulations, which might foster the diffusion of these policy measures, especially among adjacent municipalities. Finally, these bans might diffuse due to the political aspirations of policymakers in recipient municipalities. If these actors observe politicians in other communes as having benefited from adopting the regulatory measure in electoral terms, this could induce them to advocate the measure with the goal of increasing their political success as well.

2.4 Methodological Clarifications

To explore the determinants of GMO regulatory action on the local level, this study employs 131 local council resolutions taken by German cities and communes from 1999 to 2017. In Germany, overall 307 communes made use of the legal possibility to include a specific clause in their lease contracts for agricultural land that forbids farmers to cultivate GM crops on communal land. As only 131 council resolutions contain relevant information on why a commune implemented these local GMO cultivation bans, the analysis of the determinants thereof will be limited to this set of communes.

Most documents inspected are freely accessible on the internet homepage http://www.gentechnikfreie-regionen.de/regionen-gemeinden/gentechnikfreie-kommunen.html. Some missing information could be found searching the internet and by contacting the municipalities. The free accessibility of the documents enables

the reader of this study to check and replicate the results provided. The homepage that is cited above is operated by 'Friends of the Earth Germany' (Bund für Umwelt und Naturschutz Deutschland, BUND, Berlin, Germany) with the support of the 'Working group peasant agriculture' (Aktionsgemeinschaft bäuerliche Landwirtschaft, AbL, Hamm, Germany). The BUND advocates environmental protection issues, whereas the AbL aims at preserving traditional (organic and conventional) farming practices. Based on these aspirations, the two associations work closely together in advocating the strictest GMO regulations as possible. One of their lobbying strategies to accomplish this goal is their support for municipalities to ban GMO cultivation on their land.

The basic assumption underlying the use of local council resolutions is that these documents often develop from political debates between local policymakers, who are, in the first place, local councillors, and mayors (with or without party affiliation) representing the various interests of local citizens. Therefore, the documents can be considered as reflecting important parts of the societal and political debates in the respective municipalities. As indicated, many of the documents do not include relevant information regarding cultivation bans have been introduced – instead, they only inform about whether proposals for these measures have been adopted, and sometimes on the voting behaviour of the members of local councils. The varying provision of information in the council resolutions seems to be due to some formal nature of how these documents are written in the municipalities across Germany. Nevertheless, 131 documents provide multifarious information on why municipalities have imposed cultivation bans, thereby reflecting the debates that are sparked by the GMO issue in the local spheres.

From the method of document analysis, one possible limitation of this study might emerge, as it might be that this study does not encompass all the relevant reasons for regulatory action. The practical reason for this is that some arguments for banning GMO cultivation, which might have been relevant in a commune, are possibly not written down in the council resolutions, which represent our exclusive

data source. For instance, mayors hoping to generate public benevolence might have implemented a cultivation ban in their communes. However, when analysing the corresponding council resolutions, it could happen that this motive for taking regulatory action cannot be identified as no statement – implicitly or explicitly – refers to this aspect.

The study seeks to identify the drivers of GMO regulatory activity at the local level by analysing the statements included in local council resolutions. For this undertaking, qualitative content analysis appears as the most suitable method (Mayring 2000). The manual coding of the statements was started by using a coding scheme that we sketched based on the theoretical considerations. Based on an inductive procedure, we successively modified the coding scheme during the further coding process. The coding categories were revised and reduced several times until a coding scheme was derived that ensured that all the relevant empirical information contained in the documents was captured. Finally, all 131 documents were inspected again to make sure that all relevant data were included and that the assignments of the statements to the categories fulfilled the requirements of reliability.

This coding procedure resulted in various main and sub-categories, which can be inspected in Table 3 below. The five main categories the data were assigned to are the following:

- Socio-economic aspects
- Environmental and health risks
- Imminent GMO cultivation
- Local Resistance
- Diffusion

The statements that were assigned to the categories provide information on how significant certain factors are for the GMO regulatory activity of German municipalities that published corresponding information. Finally, qualitative content analysis was complemented by a quantitative content analysis that looked specifically at the frequencies of combinations of sub-categories within council resolutions that

were proposed by communes in order to identify patterns of reasons for prohibiting GMO cultivation at the local level.

Table 3. Overview of the Exploratory Findings

Category	Number Mentioned	Frequency Mentioned (%)
Socio-economic aspects	*61*	*46.56*
Impact on conventional agriculture	50	38.17
Impact on organic agriculture	25	19.08
Dependency on multinationals	21	16.03
No economic benefit	7	5.34
Low consumer demand	4	3.05
Surveillance costs	2	1.53
Land value conservation	7	5.34
Environmental and health risks	*55*	*41.98*
Risk for the environment	46	35.11
Risk for human health	36	27.48
Imminent GMO cultivation	*12*	*9.16*
Planned cultivation for scientific or commercial purposes	5	3.82
Potential cultivation due to new authorizations or changes in EU rules	9	6.87
Local Resistance	*44*	*33.59*
Rejection by the population	39	29.77
Rejection by farmers	15	11.45
Character of provision	*42*	*32.06*
Complementary to regulations on higher levels	25	19.08
Preventive	7	5.34
Symbolic	19	14.50
Diffusion	*47*	*35.88*
Neighboring municipalities adopted identical or similar regulations	34	25.95
Higher administrative units (counties) adopted identical or similar regulations	16	12.21

Note: the numbers backgrounded grey indicate how many municipalities (or which share of municipalities respectively) mentioned any of the subcategories below. For example, 61 municipalities mentioned at least one of the seven socio-economic aspects. Source: Based on data taken from GMO-free Regions in Germany (2019b).

2.5 Presentation and Discussion of the Empirical Findings

Functional considerations played a key role for municipalities when introducing GMO cultivation bans; socio-economic aspects and perceived risks for the environment or human health were mentioned most often. Sixty-one municipalities justified their cultivation bans referring to socio-economic aspects, such as negative impacts on the conventional or organic agricultural sector, which amounts to about 47%. Around 42% of the municipalities referred to risks for the environment or human health in their explanatory statements. Imminent GMO cultivation, either in the form of planned cultivation on a municipality's territory or due to new authorizations on the EU level, seemed to be less central, however (9%).

Turning to political aspirations, rejection by local farmers and by the local public appear to be important aspects. Around 34% of the communes mentioned any of the two aspects of local resistance. Finally, the documents provide evidence for policy diffusion processes. About 36% of the communes referred to cultivation bans of neighboring municipalities or higher administrative units as a reason for implementing cultivation bans. Of course, cultivation bans could diffuse due to functional considerations of recipient policymakers; policy diffusion will be examined in more detail below.

2.5.1 Functional Reasons for Banning GMO Cultivation

By exploring the council resolutions, socio-economic reasons turned out to be decisive for the communes' decisions to ban GMOs. The councils mentioned the following aspects: endangerment of conventional or organic agriculture, dependency on multinationals, the absence of economic benefits, low consumer demand, surveillance costs, and conservation of land value.

Potential detrimental effects of GMO cultivation on the conventional and/or organic agricultural sector is one of the dominant reasoning in municipalities' explanatory statements. When inspecting Table 3, which gives an overview over all statements coded, we can see that about 38% of the communes referred to negative

effects on conventional agriculture and about 19% explicitly mentioned harmful consequences for organic farmers. Most of these communes issued serious doubts on the feasibility of coexistence in Germany. For instance, the council of Metzingen noted, 'biologists are convinced that coexistence is only feasible if bigger contiguous areas without GMO cultivation are created. However, a simple separation between GMO and GMO-free cultivation is impossible because gavelkind in Baden Württemberg led to mostly small plots of land lying closely together'. Instead of coexistence, 'inevitable creeping contamination will threaten conventional and organic farmers' livelihood'. Consequences for organic farmers resulting from contamination would be particularly severe, as they would not be able to follow the guidelines of organic farming anymore, as noted by the city council of Bamberg for instance.

Apart from the threat of contamination for conventional and organic agriculture, municipalities referred to other potential problems of GMO cultivation for local farmers. One of these issues was a possible dependency of farmers on multinationals; mentioned by 16% of the communes. The municipality Brück, for example, noted, '[the seed trading company] Märkische Kraftfutter (Märka) is the main distributor of GMOs [in Brandenburg]. Their interest lies in the use of GMOs because selling genetically modified seeds would lead to an dependency on their customers'. The council of Munich stated, 'there is a threat that increasing market concentration will make farmers and consumers dependent only on a few globally operating multinationals in a few years'. Furthermore, the council of Leipzig argued that potential future market pressures could force conventional farmers to adapt to GMO cultivation. Due to the German liability rules, 'farmers will then face a high risk of heavy claims for compensation in case of contamination or negative health impacts. Most of them would not be able to afford an appropriate liability insurance'.

In addition to the potential problems of GMO cultivation, a few municipalities cast doubts on the economic benefit of GMO cultivation and pointed to the low consumer demand for GMOs in Germany. Some municipalities also worried about

potential surveillance costs resulting from measures to guarantee coexistence. Loss of land value seemed to be of some concern as well. For instance, the council of Dortmund noted, 'acreage that was contaminated by the use of genetically modified plants is limited in its usability as it cannot be used for conventional cultivation anymore. In addition, its use as compensation area is limited. Therefore, this acreage has reduced economic and ecological value'.

Interestingly, many municipalities emphasized the need to strengthen the local economy instead of preparing the ground for multinationals and called on local people to purchase local products. A councillor in Hofstetten stated, 'it is a great thing if domestic farmers are supported and people purchase products produced in the Ortenau area [the largest district in Baden-Württemberg located in the direct neighbourhood to the French border]'. The council of Neufraunhofen pointed out that 'small peasant farming characterizes most parts of Bavaria. To preserve this agricultural structure, it is of particular importance to sustain and improve the living and working conditions of the population enrooted in agriculture'. Some municipalities even took the opportunity to support local farmers directly. For instance, the council of Strausberg decided that 'the use of local organic foodstuffs in cafeterias of community facilities and at public events shall be increased'. From these findings follows that the municipalities' interests in preserving existent agricultural structures and supporting their own local economy have served as a crucial reason for banning GMOs.

Regarding the second type of functional considerations, it was argued that local policymakers might consider cultivation bans as a functional means to protect the environment and human health from uncertain risks emanating from GM crops. The study shows that, to varying degrees, municipalities referred to these two potentially affected areas when justifying their cultivation bans.

Perceived risks for the environment were mentioned most often: about 35% of the communes stated that GM crops could be harmful to the environment. Most statements explicitly referred to the danger of a loss of biodiversity due to

outcrossing or expanding industrialized agriculture. The council of the community Metzingen stated, 'the outcrossing of genetically modified organisms in the environment emerges as a great threat for biodiversity for years to come. Genetically modified organisms spread through wind and bees that transfer pollen, through humans, animals or machines that carry seeds over long distances accidentally'.

The council of Dortmund further emphasized the problem of irreversibility of outcrossing by emphasizing that 'cultivation of GMOs comes with a serious intervention into […] biodiversity in the ecosystem whose consequences are difficult to foresee. However, a complex process is set in train, which can neither be stopped nor be undone, even if it turns out that the use of biotechnology was a wrong decision'. The council of Munich explicitly mentioned a possible relationship between GMO cultivation, industrialized agriculture, and the loss of biodiversity: '[the use of biotechnology] would lead to an increase in agricultural production, a further intensification of the already drastic structural change [in agriculture], […], and a loss of genetic and regional diversity'.

Risks for human health were mentioned less frequently than risks for the environment. About 27% of the municipalities referred to potential negative impacts on local people's health as a reason for banning GMO cultivation. Most municipalities referred to risks for human health in general and emphasized the problem of the uncertainty that is inherent in this risk. For instance, the local council of Hüttisheim stated, 'the main reason [for implementing GMO cultivation bans] is local citizens' health as subsequent damages of genetically modified plants are not foreseeable'.

The third set of reasons given by the communes for adopting bans relates to their fear of 'imminent GMO cultivation'. This category includes communes that perceived the likelihood that GM crops will be planted on their territories as particularly high—either due to planned cultivations on their own land or in their neighbourhood or due to possible new GM crop authorizations or the liberalization of appropriate regulations at EU level. In other words, specific (anticipated) events were given as reasons for banning GMOs. Altogether, 9.1% of the communes made

statements in these two regards, wherefore it seems worthwhile to investigate and differentiate the two sub-categories and analyse them in further detail.

Only a small share of 3% of all municipalities justified cultivation bans with planned cultivations of GM crops for scientific or commercial purposes in their territories or in those of neighbouring municipalities. For instance, the commune of Leingarten banned GMO cultivation in response to a planned cultivation of GM maize on its territory in February 2006. Moreover, a planned release by Monsanto in another commune, Grünsfeld, led the adjacent city of Lauda-Königshofen to ban GM crops on its own territory to take a clear stance against the planned release in their neighbourhood in March 2007.

As opposed to the above, the fear of GMO cultivation on municipalities' land due to new authorizations of GM crops or the liberalization of regulations at EU level seems to be more relevant (6.9%). For instance, the council of Metzingen justified their cultivation ban in May 2004 with the end of the EU 'moratorium', because it increased the likelihood of new authorizations, and, as a result, made extensive commercial cultivation of GMOs on German acreage more likely. Likewise, the authorization of the GM potato 'Amflora' in 2010 was mentioned as a reason for the cultivation ban adopted by the city of Magdeburg in August 2010. In this case, only three weeks passed between the EU approval and a regulatory response at the local level. The new 'co-existence' rules, implemented in 2005, under which GMO cultivation was allowed in Germany for the first time, induced the community of Lahr to put the topic of biotechnology on its agenda and to eventually ban GMO farming on its territory in August 2006.

Altogether, the number of municipalities that explicitly refer to imminent GMO cultivation on their arable land is rather small. One reason for the small number of references to planned cultivations of GM crops in municipalities' explanatory statements could be the rare overall incidence of GMO farming in Germany, as pointed out in Section 2. However, this also supports our approach to investigate the

multiple possible reasons in order to answer the question of what moved the other 91% of municipalities to ban GMO cultivation.

2.5.2 Policymakers' Reasons for Adopting GMO Cultivation Bans

Some municipalities could have banned GMO cultivation due to political aspirations of local policymakers—our second theoretical explanation. According to this theoretical argument, local policymakers could attempt to increase their political success by implementing popular regulatory measures. About 33.4% of the municipalities explicitly referred to local resistance in their explanatory statements. Based on the explorative findings, one can differentiate between two actor groups: rejection by the broader local citizenship, which was mentioned by about 29.8%, and rejection by local farmers, mentioned by about 11.5% of the communes.

The documents indicate that resistance by local citizens ranges between widely diffuse rejection of GMOs and concrete resistance actions, such as petitions or citizens' consultations. For instance, the community of Ainring noted in general that it shared its populations' concerns about the consequences of GMO cultivation. On the other hand, the council of Schwäbisch Gmünd specifically describes the evolution of an action alliance that collected signatures against the cultivation of GMOs in the area. Resistance by farmers is described in a similar way. Some municipalities just mentioned their farmers' general rejection of GMOs. Others described in detail how local farmers associated to gain influence or how regional farmers' federations started to intervene.

These observations indicate that some local policymakers reacted to specific forms of local resistance and to the local public opinion in general. The findings can be interpreted against the background of our theoretical reasoning according to which local policymakers might use cultivation bans for credit-claiming reasons. As already pointed out in Section 2, municipalities de facto cannot ban GMO cultivation on their territory completely. However, some still react and prohibit GM crops on municipally owned land only. If, as a matter of fact, municipalities cannot completely ban the cultivation of biotech crops on their land, why then would they still

adopt corresponding council resolutions? Interestingly, some municipalities provided information on the genuine functions of their local cultivation bans, which can be differentiated into three sub-categories: complementary, preventive, and symbolic functions.

About 19% of the communes adopted cultivation bans with the aim of complementing regulations in place at higher levels—the regional and the federal level particularly. For instance, the documents from Rednitzhembach (2007) and Kammerstein (2007) state that there do not exist sufficient binding rules at higher political levels, wherefore cultivation bans should be adopted. The two communes' initiatives date back to 2007 when the national cultivation ban on MON810 had not been in place yet and the 'co-existence' rules already applied. Although the latter regulations are widely considered as being very strict, these rules appear as having disappointed municipalities as well as conventional and organic farmers, as these provisions de facto permitted farmers to cultivate GM crops.

Accordingly, the 'co-existence' rules were neither satisfactory for the anti-GMO actors nor for those farmers who wanted to grow GM crops for economic reasons (see Section 2, Phase 2). In February 2008—about one year before the introduction of the national cultivation ban on MON810—Weiler-Simmerberg was rather clear in this regard stating that 'while in countries such as Austria or Poland the state decided to become GMO-free, only in Germany bottom-up pressure would be needed'. This reinforces the argument that municipalities themselves become active and regulate if, from their point of view, sufficient regulatory measures have not been anchored on higher levels.

A few communities (about 5%) underlined the preventive character of their council resolutions. Although none of the farmers operating in these communes cultivated GM crops or intended to do so, these municipalities decided to take precautions to assure that these crops would not be cultivated in their territories in the future. Although a local cultivation ban did not prohibit possible future GM crop

plantings completely, it would send a clear message that GMO farming was not welcome in their municipalities.

About 14.5% of the communes emphasized the symbolic character of banning GMO cultivation in their areas. Instead of conceiving this provision as an actual opportunity to close a gap in current regulatory frameworks, they declared it as a political act and hoped for a signaling effect of this policy measure. For instance, the council of Breitenbach am Herzberg declared the commune 'as a symbolically GMO-free commune' and added, 'the political commune supports its citizens politically […] to prevent the establishment of biotechnology in agriculture'.

Although the proportion of municipalities that made corresponding statements in their resolutions is not particularly high, general empirical support can be found for the second theoretical explanation. Especially, the comparatively high number of municipalities mentioning local resistance in their explanatory statements indicates that local policymakers are responsive to their citizens. Apparently, local policymakers attempt to claim credit by adopting the popular ban of GMO cultivation.

2.5.3 Diffusion of GMO Cultivation Bans

Finally, we are going to deal with policy diffusion, the notion that policy decisions that are adopted by a given political unit are affected by policies adopted beforehand by other political units. Almost 36% of the communes made statements in their resolutions suggesting that diffusion somehow took place. Interestingly, the information obtained from these documents refers to two differing sources of such diffusion effects.

First, about 26% of the communes stated that they imposed cultivation bans due to regulatory action taken by other municipalities before. For example, the commune of Zell am Main banned GMO cultivation in May 2013 while referring explicitly to their neighbour community Rottendorf which had adopted the same provision three months before. Moreover, geographic proximity between municipalities does not seem to be a necessary condition for intercommunal effects. The city council of Creglingen, for example, argued against a planned field trial by Monsanto in

another commune (Grünsfeld) which is about 40 km away. Instead, several other factors, such as personal acquaintances between local farmers, mayors, councillors, or activists might positively condition such intercommunal effects. Hence, these findings correspond with the theoretical argument of horizontal diffusion effects between municipalities. Obviously, many communes are characterized by similar preferences and problems, and therefore consider the cultivation bans that were adopted by other communes as promising, which induces them to adopt this measure, too.

Second, the documents provide evidence for diffusion effects stemming from the county-level—and especially in those districts, where the respective county councils have declared the districts as 'GMO-free zones'. About 12.2% of the municipalities referred to decisions taken in the county councils when justifying their own provision. In some cases, the county councils, after declaring themselves as 'GMO-free', explicitly called on all communes in their district to take complementary measures and to declare themselves as free of GMOs as well. To give one example, the Bavarian commune Thurmansbang stated that 'the council of the county of Freyung-Grafenau […] adopted the basic decision to designate the district as a 'GMO-free zone. This decision should also be endorsed by the county-based cities, markets, and municipalities'. In contrast to horizontal diffusion, vertical diffusion effects, which in these cases, stem from the county level, had not been expected.

All in all, there is sufficient empirical evidence that policy diffusion played a role in spreading cultivation bans at the local level in Germany. Not only did these bans diffuse horizontally from one local unit to another, as we assumed theoretically. While vertical diffusion might be due to hierarchic coordination by respective counties, learning is probably more important in the case of the horizontal diffusion of cultivation bans. Nevertheless, as this holds true for all factors that were analysed here, it is difficult to assess how significant these diffusion effects were for cultivation bans in individual municipalities as in almost all cases various reasons were mentioned in the council resolutions.

2.5.4 The Interdependencies between the Reasons for Banning GMO Cultivation

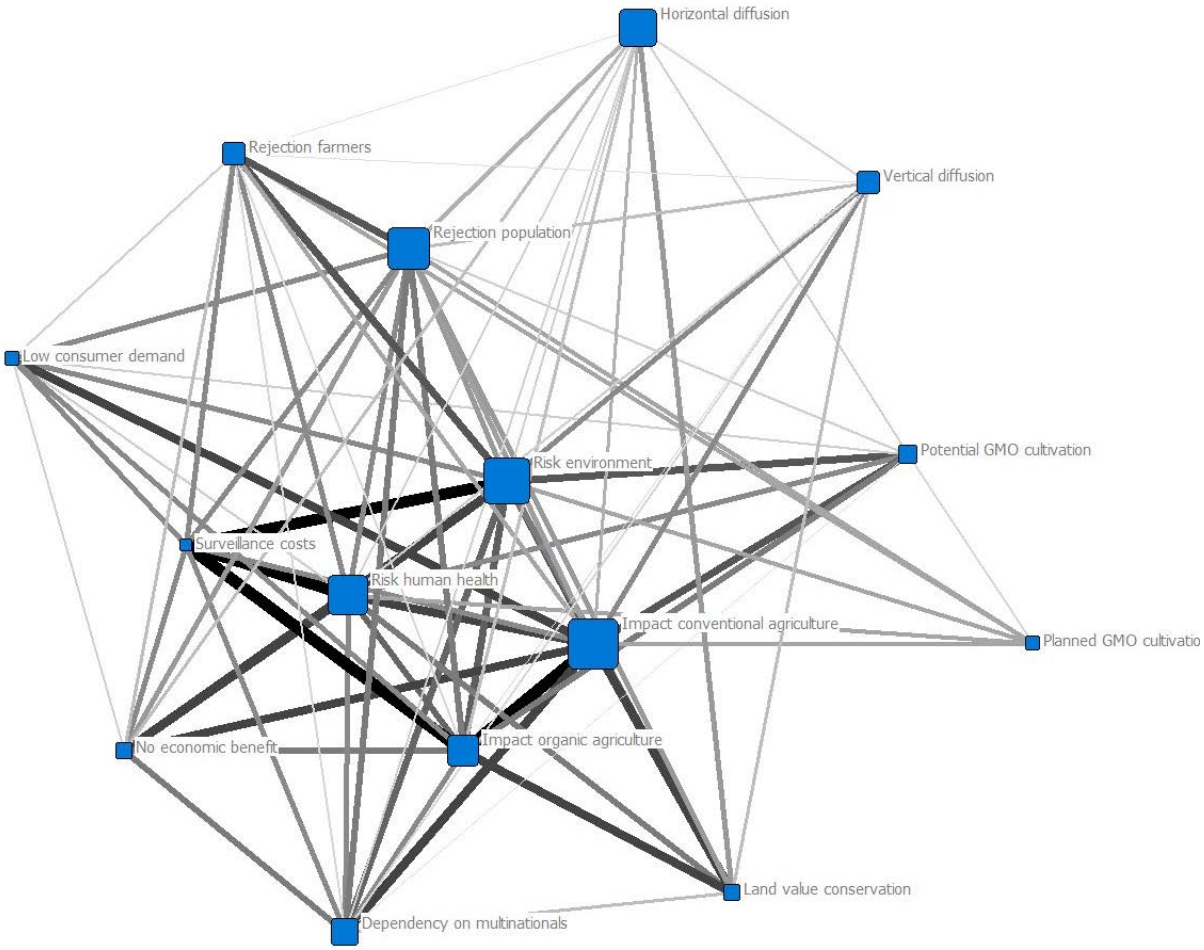
The first part of the empirical analysis focused on the single frequencies of the statements given by municipalities. The second part considers the interdependencies between the reasons noted in the local council resolutions. Which combinations of reasons appear most frequently in these documents? Are there any patterns in the combinations of reasons why GMO cultivation in local spheres should be prohibited?

Figure 4 displays the interdependencies between the various statements made by the 131 municipalities that have been investigated. We excluded the category 'Character of provision' as it rather describes the nature of the policy measure than the reasons why certain policy measures are taken. The different categories of reasons are depicted as nodes. The bigger the size of the nodes, the more frequently municipalities mentioned the respective categories. The different categories are linked by edges. The darker the colour and the bigger the size of an edge, the more frequently the two categories that are linked by the edge were mentioned together. In more detail, each edge represents the sum of joint mentions of two categories divided by the maximum number of theoretically possible joint mentions of the same two categories. For example, 'risks for the environment' was named by 46 municipalities and 'risks for human health' was named by 36 municipalities. Therefore, the number of cases where both categories could have been mentioned together is limited to 36 times. In fact, both of the categories were jointly named 27 times. Therefore, the ratio of both categories is 27 divided by 36, equalling 0.75 or 75%. The number of joint mentions is divided by the maximum number of theoretically possible joint mentions in order to control the different frequencies of mentioned categories.

Computation of Cramer's V for the interdependencies between any two of the categories delivered similar results. We decided to use the method, as described above, for the reason of easier interpretation. All of the ratios can be found in Table A2 in the appendix. NetDraw (Borgatti 2002) was used to create the graph. When looking at the graph, it can be observed that a wide variety of combinations of different reasons for prohibiting GMO cultivation exists in communities' explanatory

statements. Most of the nodes are linked by many other nodes. However, some reasons were combined many times, whereas others only occasionally or not at all. Turning to socio-economic reasons, we can see that these reasons are in general highly interconnected, which means that they are often mentioned together in one document. Most municipalities that referred to a negative impact on organic agriculture also mentioned a negative impact on conventional agriculture (24 of 25 possible combinations equalling 96%). Communes worrying about a looming dependency of their farmers on multinationals referred to a negative impact of GMO cultivation on conventional agriculture in 13 of 21 cases (71%).

Figure 4. Interdependencies between Reasons for Banning GMO Cultivation



The strongest interdependence can be observed between surveillance costs and the impact of GMOs on organic agriculture. In fact, communes mentioning the problem of surveillance costs always referred to the negative impacts on organic

agriculture as well. However, only two communes mentioned surveillance costs, resulting in 100% of possible combinations. Therefore, this finding cannot be seen as representative. Finally, the potential problems of land value conservation were often mentioned in combination with a negative impact on conventional agriculture or organic agriculture (five of seven possible combinations equalling 71% in both cases).

The strong correlation between different sub-categories of socio-economic reasons is not surprising. It is indeed more interesting that these socio-economic reasons are very often stated in combination with the risks for human health or risks for the environment. Municipalities referring to a risk for the environment were also mentioning a negative impact on conventional agriculture in 31 of 46 cases (67%). Similarly, communes referring to a negative impact on organic agriculture brought up risks for the environment in 16 of 25 cases (64%). The same pattern can be observed for socio-economic reasons and risks for human health: 26 of 36 municipalities mentioning risks for human health also referred to a negative impact on conventional agriculture (72%) and 15 of 25 communes referring to organic agriculture also mentioned risks for human health (60%).

When looking at the graph, it can be observed that these four categories are also located quite close to each other, forming a cluster of nodes. The position of nodes within the graph is determined by using a multi-dimensional-scaling technique (MDS). Multi-dimensional-scaling is a technique that is used (in network analysis) to assign locations to nodes in multi-dimensional spaces – in this case in a two-dimensional space – so that nodes that are 'more similar' are closer together. In this case, two nodes are 'similar' to the extent that they have similar shortest paths (geodesic distances) to all the other nodes (Hannemann and Riddle 2005).

Absolute distances between nodes cannot be interpreted meaningfully (a shorter distance between node A and B than between node A and C does not necessarily mean that there is a stronger interdependence between node A and B than between node A and C). However, clusters of nodes can be interpreted. The four categories

forming a cluster in this graph are interrelated to a higher degree than, for example, the categories environmental risk, horizontal diffusion, and vertical diffusion. Consequently, socio-economic aspects and environmental and health risks were not only mentioned most frequently, but they were also often mentioned in combination with each other. Finally, potential GMO cultivation was also combined frequently with a negative impact on conventional agriculture (66.6%; 6 out of 9) or on organic agriculture (56%; 5 out of 9).

Examining political aspirations, there is some overlap between the rejection of GMOs by farmers and the rejection by the local population. Especially communes referring to farmers refusing GMOs often stated a negative stance of their general local population towards GMOs (10 of 15 communities). Contrary to the patterns that were observed before, rejection by farmers and negative impacts on organic or conventional agriculture were combined less frequently (29% and 20%, respectively). However, rejection by local citizens was more frequently mentioned in combination with a negative impact on organic agriculture (56%) or with the dependency on multinationals (57%). In general, the rejection by local citizens was mentioned in combination with most of the other reasons.

Regarding diffusion effects, horizontal and vertical diffusion processes seem to be mostly independent of each other (19%). Horizontal diffusion is combined with many other categories. However, these combinations occurred rarely. Interestingly, eight of the sixteen municipalities referring to vertical diffusion also mentioned a negative impact through GMOs on conventional agriculture or risks for the environment (50%). Possibly, these considerations might have played a central role on the county-level as well.

To conclude, the reasons for prohibiting GMO cultivation were combined in a wide variety. Nevertheless, some patterns in the combination of reasons can be observed. Most prominently, the two aspects socio-economic reasons and risks for the environment and human health were not only mentioned most frequently by communes but also oftentimes in combination.

2.6 Concluding Remarks and Implications

With this study, we examined patterns of GMO regulation on the local level, an issue that has received only scant attention in hitherto research yet. The study focused on three theoretical arguments to explain why municipalities might ban GMO cultivation in their territories and found general support for each of them when analysing 131 German municipalities that took measures to prohibit the cultivation of GM crops on their arable land on a legal basis.

Functional motivations, especially socio-economic reasons and perceived risks for the environment or human health, turned out to be decisive for municipalities' decisions to impose cultivation bans. Although on the national level, Germany implemented strict rules for safeguarding 'co-existence' between GMO farming and conventional and organic agriculture, many municipalities had serious doubts about the feasibility of 'co-existence' and perceived possible 'contaminations' as severe threats, especially to organic farmers. Furthermore, communes feared that once GMOs were cultivated on a large scale, other farmers would have to adapt to GMO farming leading to a dependency on multinationals, an enhancement of industrial agriculture, and a replacement of traditional agricultural practice characterised by small-scale farming.

Municipalities also referred to risks for the environment and human health as reasons why GMO cultivation should be prohibited on their land. However, we could show that these risks are often mentioned in combination with socio-economic reasons. The impression prevails that mostly socio-economic aspects rather than perceived risks for the environment or local people's health induced municipalities to become active and impose cultivation bans. This observation corresponds with previous studies, which identified socio-economic concerns as well as perceived risks as key drivers of the low public and political support for GMOs in the EU (see, e.g. Catacora-Vargas *et al.* 2018; Kathage *et al.* 2016; Durant and Legge 2005; Frewer *et al.* 2002).

Moreover, the results of this study support the argument that local policymakers seek credit for popular cultivation bans, and, therefore, respond to the resistance of local farmers or the local population against GMO cultivation due to their own political aspirations. This observation corresponds with findings of the study presented in Chapter 3 where it is revealed that, on the German regional level, political parties as a whole, as well as politicians, recognize the credit-claiming possibilities due to the GMO issue, and, therefore, introduce popular regulations to boost their electoral success. However, policymakers might not only respond to their electorates; ideologic and ethical motives, concerns over socio-economic consequences, as well as over environmental or health risks, all represent possible personal reasons, which might motivate them to promote regulatory action.

Finally, municipalities implemented cultivation bans as a reaction to similar policies adopted beforehand by other municipalities or by units on higher political levels. While horizontal diffusion between municipalities can be explained by learning processes of actors in the recipient communes, vertical diffusion from higher political levels can be explained by hierarchic coordination.

The elaborate analysis of local council resolutions underpinned these conclusions with a number of reasons released by the municipalities to justify regulatory action. Overall, the study provides valuable insights into the various reasons as to why municipalities become active and impose bans on GMO cultivation in their respective areas. Motta (2014: 1370) stated that 'the social and environmental effects of the global expansion of biotechnology are mostly concentrated at the local level, in the rural and suburban communities that surround GM fields'. The study at hand demonstrated that GMO farming is a multi-dimensional issue at the local level: in local councils across Germany, disparate, but almost exclusively negatively biased views dominated on the (potential) effects of this farming practice, which in turn often triggered political decisions against GMO cultivation.

Municipalities' possibility to prohibit agricultural technologies on their leased land in combination with negatively biased views towards new technologies will

possibly have negative implications for future agricultural innovations. Municipalities are free to include any exclusion clause in their lease contracts. Accordingly, municipalities can prohibit farmers from using any new technology on their leased land. The new breeding technique Crispr/Cas represents a current case. On 25 July 2018, the European Court of Justice ruled that new breeding techniques, such as Crispr/Cas, would fall into the scope of Directive 2001/18/EC, which defines a GMO (CJEU 2018). Consequently, this means that the local cultivation bans already in place, which apply to GM crops of all varieties, also apply to these newly modified crops. One has to bear in mind, however, that municipalities in most cases only own a share of the land on their territory.

The results of this study further emphasize the importance of examining the full complexity of agri-food systems (see, e.g. Giampietro 2004). German municipalities' rejection of GMOs reveals the problems of looking only at single effects, such as the increase of net income gains of farmers adopting GM crops. Instead, it is important to take a holistic view and analyse the interdependencies between agroecosystems and socio-economic systems in their full complexity in order to understand whether the introduction of a new technology, GMOs in this case, will be compatible with existing socio-economic systems, accepted by society, and de facto improve the agri-food systems' sustainability in the end.

The method of document analysis comes with the possible limitation that we do not encompass all the relevant reasons for regulatory action on GMOs on a local level because arguments for banning GMO cultivation might not have been written down in the council resolutions. Thus, the results of this study might leave some space for possible variations in the relative significance of the factors underlying local cultivation bans. One possibility for future research is to examine a small number of particularly interesting communes in case studies. In addition, an analysis of municipalities in which farmers grew GM crops or where a ban was proposed, but not implemented, would be insightful. Further studies could also build on this study and focus on the role of increasing local resilience or the importance of

symbolism. By using expert interviews or surveys, more fine-grained data could be derived, which, in turn, could allow for producing more detailed knowledge about the relative significance of the various determinants of local GMO cultivation bans in specific cases. However, many local debates about GMOs took place more than a decade ago, making it thereby difficult to collect reliable data. Using these methods, therefore, comes with some problems.

Finally, the analysis of GMO regulatory activity at the local level could be expanded to other countries, where municipalities have possibilities to regulate this policy field. In this context further, interesting questions could be addressed as for example which legal possibilities municipalities have for doing so, to what extent they make use of these, whether units use informal arrangements to restrict GMO cultivation, and which factors trigger local regulatory action in these countries.

Chapter 3

3 Regulation vs Symbolic Policy-Making: Genetically Modified Organisms in the German States

3.1 Introduction

In the European Union, agricultural biotechnology policy represents a case of highly controversial, multi-level governance (see, e.g. Dobbs 2016). Within this multi-layered structure, regional entities evolved as weighty counterparts of the European Commission's (henceforth: Commission) attempts to relax the market restrictions on introduction, and the regulation, of GMOs (see, e.g. Tosun and Shikano 2016; Hunt 2012). Furthermore, the regional level plays an increasingly important role in the creation and implementation of EU law and policies (see, e.g. Panara 2015; Borghetto and Franchino 2010), and – in at least some member states, where regional entities possess appropriate legal competences – has instituted stricter GMO regulations than defined at the national level (Seifert 2006b: 426).

Once adopted, such regulations can entail far-reaching implications for regional actors along the entire food production chain.[4] Moreover, such regulations may require further policy adjustments in adjacent policy fields such as the environment or climate (Daugbjerg and Swinbank 2012: 263–264). However, despite these implications, regional units' GMO policy-making has achieved only scant attention. To reduce this research gap, we investigate the underlying conditions needed for the German federal states (Länder) to adopt GMO-related policies and regulations.

In principle, there should be little need for the German states to adopt GMO regulations. The EU's GMO legislation is considered the most restrictive worldwide

[4] These actors include farmers cultivating GM crops, conventional and organic farmers, processors, the feed industry, livestock producers, the food industry, retailers and consumers (Joint Research Centre 2016: 20).

(Seifert 2011: 21), and German federal governments have enacted several regulations – for instance, a 2009 cultivation ban on MON810 (Katzek 2014). The latter has since ended up commercial GM crop cultivations on German territory. Therefore, we argue that state governments, instead of rigid regulations, employ symbolic policy-making to signal their GMO-adverse stances to the electorate; thereby responding to the German population's broad rejection of GMOs in food and agriculture (see, e.g. European Commission 2010b).

The most important possibility to apply symbolic policy-making with respect to GMOs for a regional unit in the EU is to become a member of the European GMO-Free Regions Network. This is a transnational network of subnational units opposing the Commission's attempts to liberalise the market's introduction, and the regulation, of GMOs in the EU (Tosun and Shikano 2016: 744). Membership in the network appears largely symbolic, as it does not bring about material regulations per se. Rather, accession to the network is highly visible in the media and therefore could be used by regional governments to signal GMO-adverse stances to the electorate. Currently 11 of the 16 German states have joined the network, while five states have not. Considering these facts, our first research question is as follows: What conditions German states' accessions to the GMO-free network?

Some states have instituted additional GMO regulations – which we refer to here in a very broad sense as governmental interventions seeking to influence the behaviour of societal actors (see, Levi-Faur 2010). More precisely, the states have established largely varying regulations, which in most cases are stricter than the rules in place on a national level. Given that the German states are diverse in many respects, the second research question aims at identifying the crucial conditions for this regulatory variety: What conditions German states' adoption of GMO regulations?
To assess these questions, we first collated the states' GMO-related policies using desk research and expert interviews.[5]

[5] We conducted expert interviews with representatives of the GMO-competent ministries of the following states: Berlin, Bremen, Saarland, Saxony-Anhalt, Saxony, Schleswig-Holstein, Hamburg and

In a second step, we constructed a composite index which, besides regulations, comprises policies related to GMOs for each state in the period from 2010 to 2015. Using this index and membership in the European GMO-Free Regions Network as two separate outcomes in a fuzzy set of qualitative comparative analysis (fsQCA), we investigated the conditions for both outcomes. For explaining the two outcomes, we analysed whether several conditions were necessary and/or sufficient for the outcomes (for an overview, see Table 4 below). We selected these conditions based on previous research concerned with political drivers for the adoption of GMO regulations (Mühlböck and Tosun 2018; Bäck *et al.* 2015; Tosun and Shikano 2016; Tosun 2014), and the underlying factors for the adoption or rejection of GM crops by farmers (Consmüller *et al.* 2010; 2011; Consmüller *et al.* 2009).

One finding of the study is that the Green Party, as well as affiliated ministers, does not represent the predominant condition for a state's adoption of GMO-related policies or regulations. However, Green ministers were leading drivers for states' accession to the GMO-free network, thus signalling a GMO-adverse stance to the electorate. More-over, we reveal the differing regulatory action of CDU/CSU in the western and eastern states, which can be explained by farmers' differing interests. Furthermore, we find that SPD ministers regulated GMOs much like the other parties, but presumably for other reasons such as coalition internal pressure. Finally, strong environmental interest groups were found to have positively conditioned symbolic policy-making, but with seemingly no effect on the adoption of concrete GMO regulations.

The remainder of this study is structured as follows: In the first section, we outline the regulatory background on the German national and EU level. After introducing the German state's various GMO policies in section two, we continue by presenting our theoretical reasoning, the hypotheses and the control variables in section three. In section four we clarify the methodology employed, before we turn

Thuringia. The ministries from the other states were not willing to participate in such interviews. All interviews can be requested from the author.

to the results of the fsQCA in section five. The paper ends with a discussion of the empirical findings and some concluding remarks.

3.2 The Regulatory Context

The most important regulation in place in Germany is the cultivation ban on Monsanto's GM maize MON810 imposed by the federal government in 2009.[6] German farmers had cultivated the crop on relatively small areas from 2005 to 2009 until the ban denoted the end of commercial GM crop cultivations in Germany (see, Federal Office of Consumer Protection and Food Safety 2019). The reason for this is that MON810 was – and still is – the only GMO authorised for commercial cultivation in the EU. Moreover, in comparison to the other member states, the German coexistence regulations comprise strict ex post liability rules and moderate ex ante regulations (Consmüller *et al.* 2009: 49).

Besides commercial cultivation, the number of scientific field plots conducted by universities, other public research institutions and companies, decreased significantly from 2000. Since 2014 field trials have no longer been conducted on German territory (see, Federal Office of Consumer Protection and Food Safety 2019). One important reason for this was that the field trials have often been accompanied by riots occupying the land and destroying the plantings (Kuntz 2012). German federal governments introduced two further GMO-related policies: First a national protein strategy fostering the production of domestic protein crops for feed use, thereby reducing the high dependency on imports of GM soy products, was adopted in 2014 (Federal Ministry of Food and Agriculture 2019). Second, a GMO-free food label ('Ohne Gentechnik') was established, which is supposed to keep consumers better informed about food products that do not contain and were not produced using GMOs (see, European Commission 2013).

[6] The section is limited to the most prominent regulatory aspects in Germany. For more comprehensive investigations, see Katzek (2014), Cooper (2009) and Boschert and Gill (2005).

Moreover, the federal government made use of Directive 2015/412 and banned all eight GM maize varieties pending approval on an EU level before they were authorised for commercial cultivation.[7] Besides, the directive provides the member states the possibility to restrict or prohibit the cultivation in the aftermath of granting authorisation at the EU level. The federal government is willing to make use of this option, but until now it has been unclear whether such cultivation bans should be imposed by the federal government, the individual states or both combined.

Altogether German federal governments have implemented regulations which vastly delimit (and will further constrain) the application of GMOs in food and agriculture. These national regulations add to a regulatory regime in place at EU level, which is regarded as one of the most restrictive worldwide due to its weighty risk assessment and approval system, the relevance of the precautionary principle and the traceability and labelling regime (Seifert 2011: 22). Despite these regulations, several German states have imposed additional regulations and GMO-related policies, to which we will turn to in the following section.

3.3 The Variety of GMO Policies existing at State Level

The various GMO-related policy measures adopted by the German states are displayed in Table 4. Most of the states became official members of the European GMO-Free Regions Network by signing the Florence Charter; an official document which obligates its members – currently 64 European regions – to protect GM-free agriculture on their territories. As indicated above, the network has functioned as a counterpart of the Commission's attempts to liberalise GMO legislation, but for its members, it does not bring about any material regulations. Rather, becoming a member of the network offers regional governments the possibility to officially signal GMO-adverse positions to the public via highly visible media.

[7] The requests submitted to the Commission, among others, referred to the GM maize varieties MON810 (Monsanto) (re-authorisation), TC 1507 (Pioneer Hi-Bred/Mycogen Seeds) and 1507×59122 (Dow AgroSciences) (European Commission 2019c).

The first regulation included in the index refers to a general ban on GM crops on agriculture areas owned by a state. This measure is enabled by inserting a certain clause into a state's leasing contracts, which forbids farmers to cultivate any GM crops on areas leased from the respective state. This regulation refers only to new lease contracts but does not touch pre-existing lease contracts (GMO-free Regions in Germany 2019a). The second regulation refers to cultivation bans on GM crops around nature reserves. This provision can be effectuated by an amendment of a state's nature protection act and has been imposed by four states. These states, however, have prescribed varying distances for GM plantings to these areas; for instance, Baden-Wuerttemberg prohibited GM crops in a radius of 3000 metres to the borders of protected areas (MLR 2014), while in Brandenburg 800 metres are required (Venus *et al.* 2017: 410).[8]

Several states have introduced regional quality labels, which are supposed to guide consumers to identify regional, high quality and GMO-free food products. The integrity of these GMO-free labels is a major concern, as they comprise the 'GMO-free' ('Ohne Gentechnik') standard introduced on a national level in 2009. EU Regulation 1829/2003 requires food and feed containing GMOs to be labelled. However, products originating from animals fed with GM feed are exempt from the labelling obligations, and therefore many foods in retail are produced with GMOs but cannot be identified as such by the consumer (Venus *et al.* 2012). Due to increased consumer demands for GMO-free food, German retailers have considerably expanded their GMO-free labelled food products (see, European Commission 2013).

[8] We did not take the varying distances into further account for the indexing. Rather, we calibrated according to the mere absence or presence of such bans around nature reserves.

Table 4. Overview over the Outcomes in the German Federal States

Federal state	Signalling	Regulations		Associated measures		Index score
	GMO-Free Net-work	*Ban on state-owned ground*	*Ban around nature reserves*	*Regional quality label*	*Protein strategy*	
Baden-Wuerttemberg	X	X	X	X	X	1
Bavaria	X		X	X	X	1
Berlin						0
Brandenburg			X			0,6
Bremen	X	X		X		0,8
Hamburg	X	X				0,6
Hesse	X	X		X		0,8
Lower Saxony	X					0
Mecklenburg-West P.				X	X	0,8
North Rhine-W.	X	X			X	0,8
Rhineland-Palatine	X					0
Saarland	X					0
Saxony						0
Saxony-Anhalt						0
Schleswig-Holstein	X		X			0,6
Thuringia	X	X			X	0,8

Source: GMO-free Regions in Germany (2019a), expert interviews, desktop research.
Notes: "x" refers to the presence of the respective policy measure; the index score represents the calibrated value.

Finally, some states have adopted regional protein strategies, fostering the cultivation of protein crops for feed use. These policies do not aim at restricting the use of GMOs directly. Rather, these policies aim at substituting feed products containing GM ingredients with non-GM feed. The background for the adoption of these policies is that consumers increasingly demand GM-free animal products, but Germany's animal-based food industry is highly dependent on imported GM feed products (USDA Foreign Agricultural Service 2015b: 10–11). Based on whether the

German states have adopted the policies outlined above, we constructed an index score, which we employ as the second outcome in the fsQCA.

3.4 Theoretical Considerations and Hypotheses

The adoption of GMO regulations has been studied from various research perspectives. Although we attempt to identify the crucial factors for such regulations, theorising all possible conditions would overstretch this piece of research. Hence, we follow a theoretical approach, which puts its emphasis on actors which should be especially decisive for the adoption of GMO regulations. For this reason, we focus on the role of two actor groups. First, political parties in state governments and GMO-competent ministers affiliated to these parties. Second, regionally organised environmental interest groups. Due to this actor-centred approach, many other theoretical factors are not specified here but are summarised as control variables in the following section.

3.4.1 Political Parties

Why should political parties establish GMO regulations? To address this question theoretically, we depart from the basic assumption that political parties are generally driven by three political objectives: vote-seeking, policy-seeking and office-seeking (see, e.g. Strøm 1990).[9] As vote-seeking and policy-seeking seem more important for a party's policy-making, we subsequently focus on these two aspects.

In principle, the GMO issue should provide political parties an opportune policy field for vote-seeking activities, as due to the perceived risks for human health and the environment, many citizens in multiple member states reject GMOs. In Germany, polls show consistently low public support for GMOs (European Commission 2010b; see, also Federal Ministry for the Environment and Federal Agency for Nature Conservation 2015: 38). Hence, political parties oriented to the average voter

[9] Strøm (1990) emphasised the uncertainty about which of the three factors is predominant for political parties' positioning and policy-making on certain issues.

could adopt GMO-adverse positions and communicate these publicly to increase the vote share in upcoming elections. In contrast, the vote-seeking potentials for parties in favour of GMOs are currently rather low, especially if a party is oriented to the average voter and not a specific electorate which might advocate GM agriculture. From this perspective, parties could be expected to align their policy-making to public opinion. In the case of Germany, this would mean that political parties would offer GMO restrictive policies to the electorate. However, Tosun (2014: 367) argues convincingly that GMOs represent a very specific issue and thus cannot be expected to be predominant in influencing voting decisions.

Particularly during the 1990s and 2000s, political parties in Germany advocated GMOs for policy-seeking reasons, the most important being the increased productivity of agriculture (Boschert and Gill 2005). Still, some parties might hold positive stances on GMOs due to genuine policy-seeking considerations. Although GMOs have not (yet) proven beneficial for Western consumers, research has emphasised several benefits provided by GMOs, such as decreasing pesticide use and climate emissions or increasing biodiversity (see, Venus *et al.* 2012: 94). These examples show that political parties might not only have reasons for refusing (vote-seeking), but also reasons for supporting GM technology (policy-seeking).

Certainly, vote-seeking and policy-seeking influence whether and how political parties in government or certain ministers regulate GMOs. Particularly, research could confirm that the GMO issue mobilises citizens in the EU, and that public opinion is a major factor determining how parties and governments position themselves on the issue (see, e.g. Mühlböck and Tosun 2018; Katzek 2014; Cooper 2009; Seifert 2009; Tiberghien 2009). Seifert (2009), for instance, found a strong relationship between a GMO-hostile public and the introduction of strict GMO regulations in Austria.

However, deriving hypotheses from party-internal vote-seeking and/or policy-seeking calculations is extremely difficult, as these are rather hard to theorise. Hence several studies indicate that the most reasonable basis for deriving theoretically

well-informed hypotheses for whether political parties adopt GMO regulations is to depart from their specific partisan ideologies (see, e.g. Tosun and Shikano 2016; Tosun 2014) – a theoretical approach, which we adopt in the following section while also including vote- and policy-seeking considerations.

Partisan ideologies – and the electorate's identification with these – are critical for whether or how a political party will consider a certain issue as politically salient and bring about certain policy offers, which ultimately materialise, for instance, in regulations. Budge (1994) argued that political parties confronted with a lack of information – scientific uncertainty over risks – tend to base policy decisions frequently on their partisan ideology. This argument is applicable to GMOs since GM agriculture is characterised by high levels of scientific uncertainty with regard to potential side effects on human health and the environment.

In the following, we develop various hypotheses regarding the three most important political parties at the state level in Germany: the Greens, CDU/CSU and the SPD.[10] While the CDU/CSU traditionally represent agricultural interests (see, e.g. Linhart 2010), the Greens have more recently developed as a competing party with distinct interests in the field of agriculture. In contrast, (GM) agriculture is not considered a major issue for the SPD. At state level in Germany, individual ministers are rather autonomous and may use this leeway to draft and implement certain policies which fall within their department's competences. Therefore, besides the partisan composition of governments, we also analyse the effects of ministers in charge of GMOs. These ministers can be ministers of agriculture and/or the environment.

At the federal level, the Greens have proven to be a leading party advocating strict GMO regulations since the early 1990s (Katzek 2014; Cooper 2009). The Greens advocate for, inter alia, the protection of the environment and animals and an ecologically sustainable agriculture (Probst 2013: 174–175). Therefore, the party

[10] We also included the Liberal Party (FDP) and The Left (Die Linke) in the data set, however, these parties are not theorised here, as both are electorally less relevant compared to the other three parties.

emphasises the relevance of the precautionary principle to avoid irreversible risks stemming from practices of modern agriculture. From this position, the Greens consider GMOs to endanger their environmental protection goals. GMOs are seen to come along with risks for the environment, respectively biodiversity, animals and human health. More-over, since the bovine spongiform encephalopathy (BSE) crisis, the Greens increasingly advocate consumer protection and oppose GM feed and food accordingly. Hence, the first hypothesis is very straightforward:

H1 The Greens in government and GMO-competent ministers affiliated to this party lead to strict regulations.

The CDU and its Bavarian sister-party CSU both belong to the family of Christian Democratic parties. However, the parties have liberalised their religious and ethical-moral stances considerably since 1982 and positioned themselves more liberally on economic and social issues (Bösch 2013: 211–213). Especially the CDU along with their Christian orientation stresses liberal and conservative aspects to attract Protestant voters. However, the CDU's basic party programme from 2009 still states, for instance, a 'responsibility in front of God' and the 'Christian idea of man' (Bösch 2013: 213). Due to their religious and ethical values, both parties can be expected to increase the chances of restrictive GMO policies as these might be considered to contradict their religious values. From this position, GMOs could be considered as 'unnatural' interventions into creation, that should be further regulated.

However, the parties' positions towards GMOs is less clear, as both are leading supporters of a highly competitive and modern agriculture in economic terms. The CDU and CSU parties speak out for a realistic agricultural policy, stressing the efficiency and affordability of food. Hence, from this position, the parties could be expected to advocate GM agriculture. Due to this discrepancy, we draw on previous research presented by Bäck *et al.* (2015) and Tosun (2014), who found an increased probability of the adoption of cultivation bans if Christian Democratic parties participate in national governments. From this we infer the following hypothesis:

H2 CDU/CSU in government and GMO-competent ministers affiliated to these parties lead to strict regulations.

The SPD is characterised by a socialist partisan ideology wherefore the party is primarily oriented towards social justice and employment-related issues. Accordingly, the party focusses on policy fields such as social policy and economic policy. Moreover, the party has developed interests in environmental and climate policy due to changes in its electorate (Jun 2013: 396–398). However, agriculture is not a major field of action for the SPD. Accordingly, the SPD seems to have a less clear-cut position with regard to GMOs. Additionally, as its electorate may not be highly interested in the issue, we do not expect the party (and ministers affiliated to it) to advocate GM agriculture, or to adopt further regulations.

H3 The SPD in government and GMO-competent ministers affiliated to this party have no effect on GMO regulation.

3.4.2 Environmental Interest Groups

The GMO issue has provoked mobilisation and polarisation among various actor groups in Germany, whereupon GMO-adverse actors have increasingly overcome the influence of agribiotech-friendly actors. Environmental interest groups have proven as highly influential in framing the regulatory discourse, mobilising the public against GMOs and influencing regulatory decision-making at a national level in Germany (see, e.g. Paarlberg 2014; Kurzer and Cooper 2007; Schurman and Munro 2006). Therefore, besides political parties, we also focus theoretically on the role of these anti-GMO groups in the adoption of restrictive GMO policies.[11]

Environmental interest groups are intrinsically tied to issues such as environmental protection, sustainability, and biodiversity. As GMOs are considered to endanger these objectives, GM technology and the resulting products are rejected principally. However, these groups might have another motivation to deal with the

[11] As no appropriate data exists for GMO-friendly actor groups, we could not include these in the fsQCA.

GMO issue: to address the contested issue in such a way that mobilises the public to become members of these organisations. A substantial number of members is critical for these organisations, as this determines the manpower and financial resources required for successful campaigning. High membership numbers allow them, for instance, to exert direct influence on vote-maximising political parties, as members are also voters.

Although environmental interest groups use various means in lobbying for their objectives, the extent of membership seems to be an appropriate measure for their influence on discourses, public mobilisation and regulatory decision-making in regional spheres. Accordingly, we have included official membership data for two important environmental interest groups in our dataset: Friends of the Earth (BUND) and the Nature and Biodiversity Conservation Union (NABU).[12] Consmüller *et al.* (2010), for instance, found a negative effect of the number of BUND members on farmers' adoption of MON810 across the German states. We argue that the resources of these organisations have positive effects on the adoption of GMO-related policies:

H4 Powerful environmental interest groups lead to strict GMO regulations on a regional level.

3.5 Control Variables

The dataset comprises of several control variables, which were partially adopted from previous studies interested in GMO regulation. The first condition we control refers to the divide between the eastern and the western states, which stems from the period of Soviet reign in eastern German states (Dalton and Weldon 2010). The second condition controls post-materialist values, which are regarded as crucial for the persistent controversies over GMOs. Inglehart (1971) stated that countries tend to be characterised by more post-materialist values as their gross domestic product

[12] We also asked Greenpeace for membership data, however they were not willing to provide such data.

(GDP) per capita increases. Accordingly, we use GDP as the indicator for post-materialist values in the states. Thirdly, we control political participation, measured by the voter turnout, to take into account the pressure regional citizens might exert on political actors. The fourth control variable refers to socio-economic pressures stemming from GM crop plantings on a state's territory, measured by the proportional areas on which GM crops have been cultivated and field trials were conducted.[13] The fifth control relates to the cultivation of conventional maize, as such plantings might function as substantial equivalents to MON810 on the one side and, on the other side, could be affected by MON810 plantings in the vicinity due to pollen outcrossing.

The sixth condition controls organic farming measured as the share of organic agri-culture from total agricultural areas. Seventh, we included a control for large-scale farming, as previous research indicated that the preservation of coexistence between organic, conventional and GM agriculture is difficult to achieve, especially in small structured areas where the risk of cross-pollination from GM crops grown near conventional or organic crops is higher than in large-scale agriculture. Eighth, as GM agriculture might reduce the attractiveness of a region for tourists, we included tourism measured by the relative number of overnight stays per state. As GM agriculture may affect tourism especially in rural areas, we further control rural tourism measured by the relative number of farmers offering holiday stays. Finally, it should be noted that some studies have emphasised the high relevance of public opinion for the adoption of GMO regulations (see, e.g. Legge and Durant 2010; Bernauer and Meins 2003). However, unfortunately, we could not include a control for public opinion as the required data is not available at a state level in Germany.

[13] Such plantings might have contradictory effects on regulations: On the one hand, they might provoke resistance by regional publics and various other actors. On the other hand, agbiotech companies, farmers and other food chain actors might advocate for a preservation of the regulatory status quo or for more permissive regulations. For these actors, regulations would mean considerable costs in respect of losses, whereas they would further benefit from the status quo or benefit even more from cut-backs on existing regulations (see, e.g. Venus *et al.* 2017).

3.6 Methodological Approach: Fuzzy-Set Qualitative Comparative Analysis

To explain the different positioning of the Länder regarding GMO regulation we apply fuzzy-set qualitative comparative analysis, a method based on Boolean algebra. The goal of the method is to identify necessary and/or sufficient conditions for a specific outcome (see, e.g. Ragin 2006; 2008; Schneider and Wagemann 2012). From our point of view, fsQCA is suitable for the analysis of the research question for at least three reasons.

Firstly, it seems reasonable to assume that the conjunction of various conditions might cause the positioning of the German states on GMO regulation issues rather than individual independent factors. Accordingly, it is assumed that explanatory factors may interactively cause specific policy outcomes. Furthermore, the concept of equifinality is one of the main advantages of fsQCA. Equifinality means 'a scenario in which alternative factors can produce the same outcome' (Schneider and Wagemann 2012: 5). This assumption is appropriate for our analysis because it seems plausible that the same outcome might be caused by different paths, which means different combinations of conditions. Secondly, fsQCA is a method which is suitable for the systematic analysis of a medium number of cases. This applies to our research question of how the 16 Länder position themselves on GMO regulation issues.

Thirdly, QCA makes use of the concept of necessity and sufficiency, a differentiation we believe to be helpful when analysing Länder positioning towards GMO regulation and accession to the GMO-free network; as it seems plausible to us that some of the conditions may be necessary, but not sufficient for the outcome, or the other way around. In the following, we will first test whether single conditions are necessary for accession to the GMO-free network or a specific positioning of a federal state on GMO regulation respectively. This means that we are looking for factors that are present in all cases displaying this specific outcome. In a second step, we check whether there are conditions or combinations of conditions which are

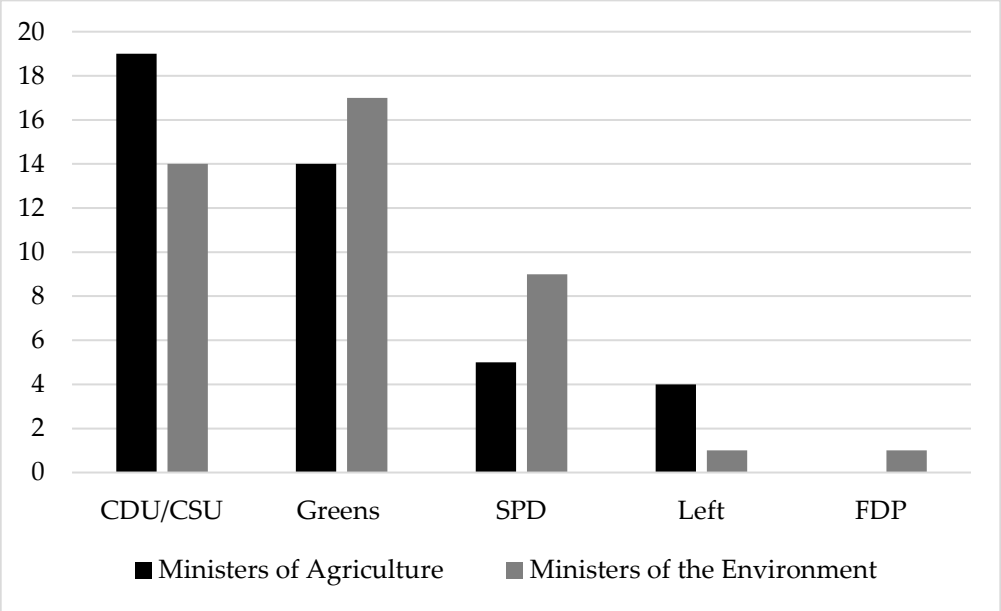
sufficient for the outcome. This means that we are searching for conditions or combi-nations of conditions which are characteristic for the cases displaying a specific position on a GMO outcome and not characteristic by the cases not having this position.

On the other hand, QCA also bears several specific characteristics that must be dealt with. Among others, the calibration of the data is required, bringing a subjective element into the analysis. Therefore, all our calibration decisions can be checked up in Table A3 which provides an overview of the calibration of the conditions. The outcomes of the German states' positions on GMO regulation are displayed in Table 4 above. This provides the possibility to check the robustness of our calibration decision. Furthermore, having only 16 cases for analysis leaves us with a high number of possible logical remainders when analysing sufficient conditions. While necessary conditions are usually tested separately, for sufficient conditions we include only those conditions which seem to be the most important; to prevent the number of logical remainders from becoming too high.

3.7 Empirical Findings

Figure 5 gives an overview of the partisan affiliation of the state ministers of agriculture and/or the environment of all 16 German states in the period from 2010 to 2015. The bar graphs indicate that these ministers were mostly affiliated to the CDU/CSU or Greens, where the Union parties slightly predominate in agriculture ministries, and the Greens in the ministries of the environment. Whilst the position of Green ministers on GMOs is rather straightforward, CDU/CSU ministers in charge of the issue might align their policy-making to different kinds of pressures, depending on the predominant kind of agriculture in a state (e.g. large-scale or organic agriculture) or whether farmers approve of GM agriculture.

Figure 5. The Party Affiliation of Ministers of Agriculture and Ministers of the Environment of the German States, 2010-2015



Source: own elaboration based on various online sources.
Note: the data refers to 42 cabinets and displays absolute numbers. In some cases, ministries comprised agriculture and environmental issues.

In the following, we will present the results of the analyses for necessity and sufficiency of the fsQCA which tests the hypotheses developed above. The results of the analysis of necessary conditions for the outcome 'Accession to the GMO-free network' are shown in Table 5.[14] The consistency value thereby measures the degree to which the conditions are in fact empirically necessary for the outcome (the same applies to the test of sufficient conditions below). In contrast, the coverage indicates how much of the outcome can be explained by the conditions; that is to say, how relevant the condition or combination of conditions is for the outcome (Schneider and Wagemann 2012: 325).[15]

[14] For all calculations, we used the fsQCA program (Ragin *et al.* 2006). Please keep in mind that ∗ is the logical AND while + is the logical OR in fsQCA notation and ~ marks the negated condition/outcome.
[15] Concerning the threshold of consistency, we follow the suggestions of Schneider and Wagemann (2012: 143) as well as Ragin (2006) and apply a threshold of 0.9 for necessary conditions.

Table 5. Necessary Conditions for the Outcome "Accession to the GMO-Free Network"

Condition	Consistency	Coverage	Condition	Consistency	Coverage
Green minister	0.67	1.00	~Green minister	0.33	0.42
CDU minister	0.43	0.61	~CDU minister	0.57	0.76
SPD minister	0.42	0.82	~SPD minister	0.58	0.61
East Germany	0.09	0.18	**~East Germany**	**0.91**	**0.97**
Maize cultivation	0.51	0.71	~Maize cultivation	0.49	0.67
Tourism	0.49	0.67	~Tourism	0.51	0.71
NABU-membership rate	0.64	0.95	~ NABU-membership rate	0.36	0.46
BUND-membership rate	0.58	0.95	~ BUND-membership rate	0.42	0.50
Voter turnout	0.73	0.86	~Voter turnout	0.27	0.45
GDP	0.67	0.92	~GDP	0.33	0.46
GM crop plantings	0.33	0.48	~ GM crop plantings	0.67	0.88
Organic farming	0.48	0.67	~ Organic farming	0.52	0.71
Large scale farming	0.33	0.48	~ Large scale farming	0.67	0.88
Rural tourism	0.48	0.73	~ Rural tourism	0.52	0.65

Source: own calculation. Consistent conditions are marked bold.

The results of the test for necessity indicate that there is one condition that fulfils the criteria of a necessary condition: Not being an Eastern state. This means that being part of the set of 'western states' is consistently and highly necessary for accession to the GMO-free network. Accordingly, while all western states are members of the network, of the eastern states only Thuringia is a member. Notably, Thuringia was also the first German state which joined (and remained in) the GMO-free network in 2010.[16] A partisan explanation of this finding is insufficient as the state joined the network under a coalition of CDU and SPD with a GMO-competent CDU minister. However, in an interview the Thuringian representative emphasised that

[16] The first state which joined the network was Schleswig-Holstein in 2003. However, after changes in governments the state first abandoned the network in 2005 and then re-entered it in 2012.

the promising prospects for organic agriculture were the reason for joining the network at that time. Thuringia supported the development of organic farming with the goal to increase the share of organic agriculture areas to 10 percent in 2020. Against this background, it seems plausible that the CDU minister has given in to the prospects of organic agriculture, a decision that would have been further facilitated by the fact that farmers were in any case not allowed to grow MON810 since 2009. All other conditions tested for necessity do not fulfil the criteria of consistency.

Table 6. Sufficient Conditions for the Outcome "Accession to the GMO-Free Network"

Condition	Consistency	Coverage	Condition	Consistency	Coverage
Green minister	**1.00**	**0.67**	~Green minister	0.42	0.33
CDU minister	0.61	0.43	*~CDU minister*	*0.76*	*0.57*
SPD minister	*0.82*	*0.42*	~SPD minister	0.61	0.58
East Germany	0.18	0.09	**~East Germany**	**0.97**	**0.91**
Maize cultivation	0.71	0.51	~Maize cultivation	0.67	0.49
Tourism	0.67	0.49	~Tourism	0.71	0.51
NABU-membership rate	**0.95**	**0.64**	~ NABU-membership rate	0.46	0.36
BUND-membership rate	**0.95**	**0.58**	~ BUND-membership rate	0.50	0.42
Voter turnout	**0.86**	**0.73**	~Voter turnout	0.45	0.27
GDP	**0.92**	**0.67**	~GDP	0.46	0.33
GM crop plantings	0.48	0.33	**~ GM crop plantings**	**0.88**	**0.67**
Organic farming	0.67	0.48	~ Organic farming	0.71	0.52
Large scale farming	0.48	0.33	**~ Large scale farming**	**0.88**	**0.67**
Rural tourism	0.73	0.48	~ Rural tourism	0.65	0.52

Source: own calculation. Consistent conditions above a consistency threshold of 0.85 are marked bold; consistent conditions above 0.75 in italics.

The analysis of sufficient conditions for the outcome 'Accession to the GMO-free network' are displayed in Table 6. The results reveal that there are many conditions which are sufficient for the outcome. If a rather conservative consistency threshold

of 0.85 is chosen, eight conditions are sufficient for accession to the GMO-free network,[17] of which some – of course – might be interrelated: A Green minister in charge of the policy field, high NABU and BUND membership rates, a high voter turnout, a comparably high GDP, being a western state, as well as being a member of a state with no or rather low GM crop plantings and large-scale farming. Furthermore, if a more relaxed threshold for sufficiency of 0.75 is chosen, the set of states with a high share of SPD ministers as well as those with a low share of CDU ministers becomes sufficient.[18]

Turning to the results for the outcome of a high GMO regulation index score Table 7 shows that there are no necessary conditions for a high score in the GMO regulation index. This is an interesting finding in itself because it means that, for example, states with a high membership score for ministers of all three party families tested have implemented rather strict GMO regulations. The same applies for eastern and western German states as well as states with rather high and low levels of maize cultivation, tourism, rural tourism, NABU and BUND membership rates, voter turnout, GDP, GM crop plantings as well as organic and large-scale farming.

Also, the results of the test for sufficiency for high GMO regulation reveal that there are no conditions which are alone consistently sufficient conditions for the outcome. This shows that explaining hard regulation is much less straightforward than explaining the signalling of an accession to the GMO-free network above (Table 8).

[17] For sufficient conditions, we take a two-step approach and implement a rather conservative threshold for consistency of 0.85 (marked bold) and a second threshold of 0.75 for sufficient conditions as suggested in the literature (Schneider and Wagemann 2012: 279; in italics).

[18] We do not display the results for the test for sufficient conditions for the combination of two or more conditions here due to the already very high number of single conditions being sufficient for the outcome.

Table 7. Necessary Conditions for the Outcome "GMO-Regulation Index Score"

Condition	Consistency	Coverage	Condition	Consistency	Coverage
Green minister	0.56	0.59	~Green minister	0.54	0.48
CDU minister	0.56	0.57	~CDU minister	0.55	0.52
SPD minister	0.38	0.53	~SPD minister	0.62	0.46
East Germany	0.28	0.39	~East Germany	0.72	0.54
Maize cultivation	0.64	0.63	~Maize cultivation	0.52	0.51
Tourism	0.60	0.58	~Tourism	0.54	0.53
NABU-membership rate	0.49	0.53	~ NABU-membership rate	0.67	0.60
BUND-membership rate	0.52	0.61	~ BUND-membership rate	0.59	0.49
Voter turnout	0.65	0.54	~Voter turnout	0.47	0.55
GDP	0.67	0.65	~GDP	0.40	0.39
GM crop plantings	0.52	0.53	~ GM crop plantings	0.60	0.56
Organic farming	0.57	0.56	~ Organic farming	0.45	0.44
Large scale farming	0.44	0.45	~ Large scale farming	0.65	0.61
Rural tourism	0.56	0.60	~ Rural tourism	0.56	0.50

Source: own calculation. No consistent conditions.

Accordingly, we also tested whether the combination of two or more conditions is sufficient for being a member of the set of states with high GMO regulation. As we have only 16 cases, we cannot test all 14 conditions separately in one model because of the enormous number of logical remainders that would result from this procedure. Correspondingly, we opt for testing the three partisan conditions we are most interested in, as well as the three conditions (from the environmental interest groups we chose NABU) that were highly sufficient (above 0.9) for accession to the GMO-free network. Concerning the treatment of the logical remainders, the 'Standard analysis' option of the fs/QCA programme of Ragin *et al.* (2006), as suggested

by Ragin (2008), was applied to derive the parsimonious solution.[19] The most parsimonious solution term is the superset of the paths that form the complex or conservative solution (Schneider and Wagemann 2012: 151–193).

Table 8. Single Sufficient Conditions for the Outcome "GMO-Regulation Index Score"

Condition	**Consistency**	**Coverage**	**Condition**	**Consistency**	**Coverage**
Green minister	0.59	0.56	~Green minister	0.48	0.54
CDU minister	0.57	0.56	~CDU minister	0.52	0.55
SPD minister	0.53	0.38	~SPD minister	0.46	0.62
East Germany	0.39	0.28	~East Germany	0.54	0.72
Maize cultivation	0.63	0.64	~Maize cultivation	0.51	0.52
Tourism	0.58	0.60	~Tourism	0.53	0.54
NABU-membership rate	0.53	0.49	~ NABU-membership rate	0.60	0.67
BUND-membership rate	0.61	0.52	~ BUND-membership rate	0.49	0.59
Voter turnout	0.54	0.65	~Voter turnout	0.55	0.47
GDP	0.65	0.67	~GDP	0.39	0.40
GM crop plantings	0.53	0.52	~ GM crop plantings	0.56	0.60
Organic farming	0.56	0.57	~ Organic farming	0.44	0.45
Large scale farming	0.45	0.44	~ Large scale farming	0.61	0.65
Rural tourism	0.60	0.56	~ Rural tourism	0.50	0.56

Source: own calculation. No consistent conditions.

The results displayed in Table 9 show that there were two consistent paths which form a sufficient condition for a high GMO regulation index in the German states. The first path comprises of all states with moderately low scores in the set of countries with CDU ministers in charge of GMO regulation, as well as moderately low NABU membership rates. Put differently, in these states SPD or Green ministers

[19] Due to space constraints, we only display the parsimonious solution as well as the results for the positive outcome for all outcomes here. The results for the negated outcomes as well as for the complex and intermediate solution of the test of sufficiency for the outcome of a high GMO regulation index score are available in the online appendix.

working in combination with low NABU membership rates conditioned the adoption of GMO regulations. This path comprises Mecklenburg-West Pomerania, Thuringia, Brandenburg and Bremen.

Table 9. Combined Sufficient Conditions for the Outcome "GMO-Regulation Index Score"

Solution Term (Parsimonious Solution)	**~CDU minister*~NABU-membership rate + Green minister*CDU minister → GMO-regulation index score**	
Variables Entered	Green minister; CDU minister; SPD minister; East Germany; NABU-membership rate; GDP	
Ideal Type	~CDU minister* ~NABU-membership rate	Green minister*CDU minister
Federal States covered	Mecklenburg-West Pomerania (1,0.8), Thuringia (1,0.8), Brandenburg (0.67,0.6), Bremen (0.67,0.8)	Baden-Wuerttemberg (0.67,1), Hamburg (0.67,0.6), Hesse (0.67,0.8), North Rhine-Westphalia (0.67,0.8), Schleswig-Holstein (0.67,0.6)
Consistency	0.89	0.96
Raw Coverage	0.49	0.41
Unique Coverage	0.37	0.28
Solution Consistency: 0.91 **Solution Coverage: 0.78**		

The second path consists of all states with high membership scores in the set of Green and CDU ministers in charge of GMO regulation, and covers the five states Baden-Wuerttemberg, Hamburg, Hesse, North Rhine-Westphalia and Schleswig-Holstein. Notably, all these states belong to the set of 'western states' which are characterised by no or moderately low GM crop cultivations. This may have made it easier for key politicians from both political parties to adopt further GMO regulations, as their relevance for farmers was anyway rather low and disappeared entirely with the ban on MON810. Bavaria, for instance, has been a supporter of GM agriculture for years. However, only CSU ministers in charge of GMOs have enacted several regulations between 2010 and 2015, the period that followed the ban on MON810.

3.8 Discussion and Concluding Remarks

The study analysed the policy variation of the German states with regard to GMOs in the period from 2010 to 2015. We differentiated between two types of policies: first, becoming a member of the GMO-free network, a highly visible act signalling a government's GMO-adverse stance; second, the adoption of regulatory/policy measures, which were captured by a composite index. We provided various theoretical explanations for the variation of both outcomes, which were subsequently tested by fsQCA. The results show that Green ministers were the leading drivers for accessions to the GMO-free network. Possibly, Green ministers intended to signal their GMO-adverse standpoint due to the party's electorate, which is highly opposed to GMOs for reasons of nature and consumer protection. Moreover, the Greens might employ symbolic policy-making to attract voters beyond its electorate, but also because they are concerned about the risk technology. However, we did not identify the Greens or their ministers as predominant conditions for the adoption of GMO policies. As indicated, this might be due to the relatively little need for the states to adopt such regulations, which applies to the Greens just as to the other parties. In sum, these findings contradict our theoretical reasoning underlying H1.

For CDU and CSU we did not find consistent effects on both outcomes of interest. This is a result which contradicts H2. Notably, the two parties regulated GMOs in the western states, while they abstained from regulating in the eastern states where GM crops were mainly cultivated. This finding might be explained by the internal divisions within these parties. Presumably, Christian beliefs are more relevant in the western states; in contrast, these beliefs might be overlaid by a more positive view of a productive agriculture, a less romantic view of the environment or less sceptical consumers in the eastern states.

Another possible explanation is that CDU and CSU are the leading parties representing agricultural interests, wherefore they refrained from regulating GMOs in the eastern states where GM farmers benefited from higher yields, while they

adopted such regulations in western states where farmers mostly refused GM agriculture. This interpretation corresponds with the different agricultural structures of the two parts of Germany, the large farms in the eastern states principally favouring GM agriculture and the smaller-scale farming hampering GMO cultivation in the western states (see Table A3 in the appendix for the average farm sizes in the 16 states).

Turning to the SPD, we assumed that this party and its ministers would not take regulatory action regarding GMOs due to its partisan ideology and its electorate interested in other policy fields. However, we find that SPD ministers regulated GMOs similarly to the other parties. This finding contradicts H3 but might be interpreted by the fact that the SPD often forms coalitions with either the Greens or the CDU, which both might push SPD ministers to adopt certain regulations. Another explanation refers to the SPD's orientation to public opinion, which might have induced SPD ministers to institute certain regulations. Hence, although GMOs might not represent a major issue for the SPD, the party can function as a condition for regulatory action.

Turning to the environmental interest groups, we found that powerful regional associations of BUND and NABU have consistently sufficient effects on the accession to the GMO-free network – a finding that so far corresponds with H4. Probably, these actors managed to exert pressure on state governments and/or competent ministers, which induced these to publicly signal GMO-adverse stances. For the adoption of concrete regulations, however, we do not find consistent effects from strong regional associations of the two interest groups. On the contrary, our results show strict GMO regulations in states where the NABU and BUND are rather weak. Therefore, in sum, we must reject H4. Possibly interest groups are less influential for the establishment of regulations, as signalling already satisfies their objectives of increasing their resources.

In summary, the study demonstrated that the German states can play an important role within multi-level GMO governance by adopting stricter regulations

than defined on a national level. However, we found that the states tend to prefer symbolic action, as opposed to concrete regulation, within their legislative leeway. Interestingly, we found neither single necessary nor sufficient conditions for a high degree of the composite index. This finding is noteworthy, as our dataset comprises data for variables which have functioned in other research settings. The relatively weak results might be due to the high complexity of the issue, which, for instance, is fraught with notions about what 'natural' is, how food shall be produced, as well as ethical and cultural implications which might also vary at the regional level (see, e.g. Devos *et al.* 2008; Lassen *et al.* 2002). Additional research is needed to further investigate the driving factors for GMO regulations on this level in more detail. For example, case studies of exceptional cases such as Thuringia could shed a more refined light on the complex conditions of GMO regulations on a regional level.

Chapter 4

4 Why Parties take Neutral Positions on Policy Issues: Insights from the German Christian Democratic Union

4.1 Introduction

Scholars have used estimated policy positions for many years to empirically assess theoretically derived assumptions about political parties' positioning on policy issues. The MARPOR project, for instance, provides longitudinal and comparative information on how parties positioned themselves on multiple policy topics in over 50 countries (Volkens *et al.* 2013). MARPOR and numerous individual studies applied different quantitative and qualitative methods for analysing the contents of election manifestos and government programs in order to generate the position data required for analysis (Klingemann *et al.* 2006; Laver *et al.* 2003; Slapin and Proksch 2008). Although these methods identify positions in these textual documents differently, their results and subjects always reflect distinct positions – policy stances that can be placed on a continuum ranging from the strongest support for a certain policy issue to its strongest rejection. However, this also means that if parties did not submit any statements regarding a certain policy issue, these 'non-positions' were simply treated as missing and their potential causes were not investigated.

However, parties can have incentives not to position themselves distinctly on policy issues – particularly prior to elections, when composing their election manifestos. For instance, a party might cease to take a position on a policy issue when it wants to pursue its policy agenda and is seeking electoral success at upcoming elections, but an external shock caused divergences between previously homogenous preferences of the party and its electorate (Meyer and Schoen 2015).

In this article, such positioning is denominated as 'neutral' position-taking. In contrast to simple 'non-positions', this position-taking is intentional and strategic. However, investigating 'neutral' positions is difficult as this activity is not indicated by textual references. This makes it challenging to distinguish between 'neutral positions' and simple 'non-positions'. Presumably, scholars have not investigated neutral position-taking for these two reasons, even though it seems likely to take place in empirical practice.

In light of this lacuna, the following research question guides this study: Do parties position themselves neutrally on policy issues for strategic reasons and, if so, why? To answer it, we focus on the Christian Democratic Union's (CDU) position-taking on the topic of agricultural biotechnology (henceforth: agribiotech) at the federal and regional levels (Thuringia) in Germany. All underlying case selection decisions are detailed below.

The remainder of this study unfolds as follows. First, it introduces and defines 'neutral' position-taking, then theorises why parties position themselves in that way. The next section examines the database and the approach of distinguishing between 'non-positions' and 'neutral' positions. The empirical section consists of two parts. The first investigates whether the federal CDU took a neutral position on agribiotech in 2017; the second examines the Thuringian CDU's position-taking on agribiotech from 1999–2009. We find that both party branches took neutral positions but for different reasons. Both took them in order to reconcile their moderate/pro-GMO (genetically modified organisms) agendas with their objectives of building coalitions with anti-GMO parties. However, the federal CDU also used their neutral position to respond to its increasingly unsupportive regional branches, whereas the regional CDU used theirs to avoid having to adopt an unpopular pro-GMO position, thereby reducing potential vote loss at state elections. The federal CDU had already positioned itself cautiously on agribiotech in the 2000s because of negative public opinion and party-internal disagreement. In 2017, however, the prospect of building a coalition with the Greens, combined with the headwind from its regional

branches, gave the party enough incentive to take a neutral position. The paper ends by reflecting on the broader implications of neutral positioning.

4.2 Theoretical Considerations

This study conceptualises parties as rational and strategic collective actors that use their strategic calculus to obtain three major political objectives: to maximise their vote share in upcoming elections (vote-seeking), to win government office (office-seeking), and to enact certain policies (policy-seeking) (Müller and Strøm 1999; Strøm 1990). Usually, parties prefer to take positions on policy issues, which concur with their policy ideal points (Budge 1994). However, they can also be motivated to take positions that deviate from these; for instance, when attempting to attract broader voter groups, they sometimes disguise their positions by de-emphasising, blurring or obfuscating (Shepsle 1972; Rovny 2012; Bräuninger and Giger 2018).

Strøm (1990) noted that parties aspire to maximise their three major objectives simultaneously if their logical bases do not contradict one another. Accordingly, this article's core argument is that, when facing conflicting political objectives, parties have strong incentives to take neutral positions on certain topics, since doing so increases their chances of realising these conflicting goals simultaneously. Put more precisely, parties take neutral stances on policy issues when they believe their preferred policy positions to be impeding the obtainment of their other desired political objectives, such as vote-seeking and office-seeking.

Accordingly, neutral position-taking can be considered a positional strategy that takes place when parties intentionally desist from taking their intrinsically preferred positions on policy issues and instead take no positions altogether. Importantly, although parties take neutral positions publicly by means of strategic documents, election manifestos or government programs, they pursue their initial policy agendas behind closed doors. Before we detail which factors favour neutral positioning, we distinguish it from 'non-positioning' and forms of partisan position-taking.

4.2.1 Differentiating Neutral Position-Taking from other Forms of Partisan Position-Taking

Non-positioning is characterised by two main features: the non-salience of policy issues for parties and their unintentional behaviour in relation to the respective topic. Policy issues can be considered non-salient for parties when they neither fall into the parties' own, their electorates', their potential voters', nor closely related interest groups' preferences. Of course, the salience of policy issues can vary according to partisan features, such as the party-family affiliation, which includes their basic ideological orientation (Budge 2015).

Importantly, parties not only lack incentives to respond to non-salient issues in terms of position-taking but simply do not consider whether it would be worth taking a position on these policy issues. In other words, parties have no ideal points on non-salient policy issues and therefore will not position themselves on them in their election manifestos. Non-positioning is thus an entirely unintentional behaviour, meaning that parties do not use it to achieve certain political objectives, such as vote-seeking or office-seeking.[20] In contrast, parties actively take neutral positions when they consider their preferred positions (ideal points) on salient policy issues to be detrimental to the obtainment of other central political objectives.

Emphasising certain issues and advertising their corresponding positions unequivocally can be a rational move for parties, yet so can disguising their positions by obfuscating them (Shepsle 1972; Rovny 2012; Bräuninger and Giger 2018). For instance, parties use position-blurring to present vague or mixed positions on policy issues in order to obfuscate the distance between themselves and its potential voters on critical policy dimensions (Rovny 2012: 273–274). Doing so on appropriate policy topics can be expedient for parties wishing to attract voters with more disparate

[20] Non-positioning can also occur when parties make mistakes in their election manifestos. This happens when parties actually have ideal points on certain policy issues and consider position-taking on these topics as being expedient politically but forget to include their corresponding position. This should, however, be less relevant for this study as national and regional parties are highly professionalised organisations, making non-positioning on relevant policy issues due to mistakes rather unlikely. In addition, parties usually use previous versions when drafting election programs, for which reason improper non-positioning seems additionally unlikely.

stances or willing to create broader political coalitions (Rovny 2012: 289). Nevertheless, blurred positions, whether obfuscated or mixed, carry some positional information, which is why they must be carefully distinguished from neutral positions.

Neutral positions are taken when parties explicitly do not want to submit any positional information on policy issues. This difference can be extremely significant. This, for instance, can happen when a party obfuscates its stance to prevent the outbreak of party-internal conflicts, electoral losses in upcoming elections, and desired coalition partners from turning away. In fact, the act of blurring carries the risk of unintended consequences, since party members, potential voters, and coalition partners can become suspicious and consider the blurred position a 'hidden' position in favour of a controversial issue. This can cause serious political damage for the party that blurred its position, especially when rival parties start exploiting the situation by portraying the party as deceptive and unstable.

Whenever position-taking on policy issues is likely to trigger politically detrimental effects for parties, we can assume that they consider neutral position-taking a more appropriate positional strategy. While obfuscating often represents a risky endeavour, parties can delimit possible negative effects by taking neutral stances on controversial issues, allowing them to pursue their policy objectives behind closed doors.

4.2.2 Explaining Factors of Neutral Position-Taking

Research on the formation of parties' positions and their position-changes has expanded considerably during the last decade, revealing numerous factors that explain how policy positions originate and why parties shift them.[21] Drawing on all these factors to theorise why parties take neutral positions on policy issues would overstretch this paper. Therefore, we use Strøm (1990) and Müller and Strøm (1999)

[21] These factors include shifts within electorates (Adams *et al.* 2004; Adams, Haupt and Stoll 2009), the influence of leader personalities and intra-party processes (Meyer 2013), party-internal organisation (leadership- or activist-dominated) (Schumacher *et al.* 2013), the policy-shifts of rival parties with similar ideological backgrounds (Adams and Somer-Topcu 2009), and the results of previous elections, especially when parties deem them insufficient (Somer-Topcu 2009).

as our starting point and build on their seminal argument that parties' political core ambitions are vote-seeking, policy-seeking, and office-seeking, and that they seek to obtain these objectives simultaneously.

Vote-seeking

One major objective of party officials when drafting election manifestos is to increase their parties' vote-share in upcoming elections (Benoit *et al.* 2009). However, parties' policy ideal points may be detrimental to vote-maximisation, for instance, if polls show that public sentiment on a policy issue is negative. Usually, very specific policy issues, such as GMOs, cannot be expected to predominate in influencing voting decisions (Tosun 2014: 367). However, if public attention is high, for instance because of certain focusing events (Meyer and Schoen 2015), parties will fear the electoral risks of having unpopular policy positions. Consequently, they may consider adjusting them to suit the favour of the average voter or specific voter groups (see, e.g., Adams *et al.* 2004).

That said, parties will usually seek to avoid position shifts, for these could be considered negative by their constituencies and thus threaten their electoral success (Somer-Topcu 2009). Therefore, it appears a reasonable strategy for them to desist from taking positions on such contentious policy issues in their election programs. On the one hand, this would neither mobilise existing voters nor attract new ones as this position-taking does not transport any kind of position-taking in terms of content. On the other, and much more importantly, adopting neutral positions would reduce the risk of incurring electoral losses, which may materialise if parties maintain their ideal points on policy issues that contradict the average voter's and/or parts of its core electorate's preferences. Altogether, it seems reasonable to assume that parties take neutral positions not to increase their electoral success but primarily to decrease potential electoral losses at elections. A parties' vote-seeking impetus therefore functions as a major incentive for neutral position-taking on policy issues.

Office-seeking

Not only does the ordinal order of parties on the left-right scale determine whether certain parties build government coalitions; their actual and concrete positions on certain individual policy issues likewise cause this effect (Laver and Schofield 1998: 111). Once we acknowledge that election manifestos serve as an important basis for parties' coalition negotiations (e.g., Budge and Laver 1993), it seems reasonable to assume that, when composing these documents, it is considered whether adopting certain positions could come into conflict with the preferences of potential coalition partners. Therefore, parties which attempt to build coalitions with those that have deviating policy objectives should have strong incentives either to align their positions to their potential partners' or to adopt neutral stances. However, while the first course of action can lead to party-internal disputes or voter estrangement, these political risks are much lower for parties that adopt neutral positions, which also reduce the risk of possible policy conflicts with the desired coalition partner. Accordingly, instead of taking their preferred positions, we expect parties to take neutral policy stances in order to prevent possible policy conflicts with their potential partners, thereby improving their chances of future coalition-building at low political cost.

Policy-seeking

Parties also use election manifestos to ensure intra-party agreement on policy issues; they do this by merging the positions of their intra-party factions into one party line in upcoming election periods (Däubler 2012). However, as implied here, the positions on policy issues can differ within political parties, and diverging ideological beliefs represent only one of the several reasons for this (Soroka and Wlezien 2010). Hence, when parties cannot reconcile different internal positions reasonably, it may be most expedient for them not to position themselves on such issues, but to adopt neutral positions instead. Although such position-taking does not solve party-internal disputes over certain policy topics, taking neutral positions

allows them to mute the internal conflicts until after the next elections, which is important as voters tend to punish parties for not being united on policy issues at elections (Greene and Haber 2015).

Interdependencies between equal parties operating on different political levels

Whether parties take neutral positions on policy issues can also be influenced by interdependencies between equal parties operating at different levels in federally structured systems (e.g., Jeffery 2009). More precisely, it has been shown that the positions of federal parties on certain policy issues influence how their regional branches take a position on policy issues (Müller 2013). Interestingly, the opposite is also true – namely that regional branches influence the position-taking of their federal counterparts (Bäck *et al.* 2014). Drawing on these insights, we assume that parties in federal systems can have strong incentives to position themselves neutrally on policy issues rather than to align their existing positions with those of their party branch(es) at the respective other level.

Top-down pressure

The top-down argument rests on the observation that federal parties pressure their regional counterparts to shift certain policy positions in order to adapt the regional parties' deviating positions with their own, since voters tend to punish parties for internal disagreement on policy issues (Greene and Haber 2015). Regional branches may comply with such demands to avoid conflict with the leading branch (Müller 2013). However, these position shifts can conflict with the regional parties' own policy agenda or the policy preferences of its regional voters or affiliated interest groups (Müller 2009). For that reason, regional parties have strong incentives not to comply with such position adjustment and may even pursue other courses of action to meet the demands of their federal branches. Taking neutral positions represents one suitable possibility since it neither offends federal branches (as position maintenance could) nor the regional branches' members, voters, and affiliated interest

groups (as a position shift could). Hence, if federal parties force their regional branches to align their positions on certain policy issues, it can be expedient for the latter to position themselves neutrally on these.

Bottom-up pressure

The bottom-up argument is based on the assumption that federal parties' policy positions represent the results of intra-party bargaining processes, in which regional branches compete with each other to get their own positions into national party manifestos (Bäck *et al.* 2014). Referring to the notion that regional branches influence the position-taking of their federal counterparts on policy topics, we argue that if the former hold widely homogeneous positions, then the federal party should be willing to adopt a corresponding policy position. After all, if a federal party aligns itself with the positions of its regional branches, an action that reflects the policy preferences of its party members and voters, it can hope for electoral benefits regarding the specific policy dimension in upcoming elections.

However, the policy positions of regional parties frequently differ or even contradict each other (Müller 2009). In this case, federal parties should be motivated to seek suitable ways of reconciling the varying stances since providing common party lines is important for party-internal cohesion as well as for voters (Greene and Haber 2015). One option for federal parties is to adopt mixed or blurred positions as this allows them to present a policy position that corresponds with those of their regional parties. Nonetheless, the adoption of such positions risks sparking (even more) party-internal turmoil, for at least some of the regional branches are likely to reject the new party line – which could in turn result in electoral losses. Hence, if federal parties facing regional counterparts with heterogenous positions wish to avoid the risk of negative political effects, the best option for them is to forgo providing a common party line, taking neutral policy positions instead.

4.3 Methodological Clarifications

Parties use election programs strategically to position themselves on certain policy issues, being aware that their election manifestos indicate their chosen positions, as well as the policies they would implement upon reaching governmental power, to the media, the electorate, and potential coalition partners (Budge 2015). Therefore, analysing election programs is considered the most suitable means of identifying parties' policy positions along with their development over time (Benoit *et al.* 2009: 443). Accordingly, the central database of this study consists of election manifestos published by German parties at the regional and federal levels prior to elections that took place from 1990–2017. Of the more than 500 election manifestos analysed, 40 documents come from federal parties while the great majority comes from the regional branches in the 16 federal states. Most election manifestos analysed can be accessed from the open access archive www.polidoc.net (Benoit *et al.* 2009). The ones not available there were found by internet research.

To identify which election manifestos contain statements related to agribiotech, we applied hand-coding based on qualitative content analysis (Mayring 2000). This detailed approach appeared most suitable as the study can benefit from interpretative decisions and context knowledge. We extracted documents which included the keywords 'genetic' (gentechnisch) or 'GMO' (GVO) and screened the texts for 'biotech' (Biotechnologie) to assess whether statements related to biotechnology were relevant for the analysis. Generally, the non-automated, interpretative coding decreased the risk of including irrelevant statements. For instance, statements related to genetic engineering for medical applications could be distinguished and excluded.

Next, the manifestos were coded manually into five categories: positions in favour of agribiotech (PRO) and against it (CON), moderate positions (MOD), and those without any relevant statements regarding the issue (NST). Moreover, we coded when parties did not publish election manifestos (NEM). Statements supporting the deregulation of GM crop application and scientific research on these crops

or emphasising the potential of GM crops were coded as 'PRO'. We coded statements as 'CON' if they proposed (stricter) regulations for commercial cultivation, restrictions on GMO research, or emphasised the possible risks of GM technology. Statements giving priority to the need to balance risks and benefits, and which thereby expressed no explicit wish to restrict the use of GMOs, were coded as 'MOD'. Finally, statements that made no (relevant) mention of agribiotech were coded as 'NST'. Hence, the latter category comprises 'non-positions' as well as potential 'neutral positions'. The assignment of the manifestos to the various categories proved challenging and was revised and double-checked several times. Table A4 in the appendix can be consulted for retracing the individual coding for the federal parties, and Table A5 for the Thuringian parties. The coding decisions for the other regional parties can be requested from the author.

Distinguishing 'neutral' positions from 'non-positions' – both coded with NST – is important because, in both cases, parties make no statements in their election manifestos. Hence, to differentiate between the two phenomena, we apply an approach that does not merely acknowledge the presence of such statements but considers two important facets of contextual information: first, the programmatic development of parties on the GMO topic over extended time periods; second, (political) incentives that might have induced them to take neutral positions in certain situations.

To start with the programmatic development, parties usually use previous election manifestos as reference documents when drafting new ones (Benoit *et al.* 2009). In light of this, it seems reasonable to assume that parties, if they positioned themselves on a topic in a certain way, and this topic remains salient, keep holding the same position, even if they do not include a statement on it in any subsequent election manifesto. To assess whether strategic rationales guided the decisions of parties to desist from position-taking, we analyse whether any party-internal and/or -external) factors induced them to do so. If this is the case, it may indeed be neutral positions; if not, non-positions are more plausible. To investigate such cases

empirically, we employed various data sources, including governmental documents, press releases, position papers, and surveys. In addition, we conducted two expert interviews to obtain more fine-grained data on the Thuringian case; the interview data can be requested from the author. Finally, these primary sources are complemented by observations influenced by the empirical insights of Cooper (2009), Katzek (2014) and Tosun and Hartung (2018).

4.4 Case Selection

We argued above that parties should be particularly willing to take neutral positions when dealing with controversial policy issues. Research has shown that moral issues, such as abortion or same-sex marriage, as well as risky technologies, such as nuclear power, animal cloning, chemicals, agribiotech, or hydraulic fracturing, represent policy topics that are particularly controversial in many countries worldwide (e.g., Sjöberg 2002). From these, we selected agribiotech, for several factors have made it a controversial topic around the world. Among these are for example socio-economic concerns, such as monopolies of multinationals in the agriculture sector; ethical concerns over GMOs being unnatural and intervening in creation; and concerns over the potential negative effects of GM crops on the environment or human health (Herring and Paarlberg 2016).

Agribiotech represents a particularly controversial issue in the EU, where the 28 member states fundamentally disagree in their standpoints towards GMOs. While some countries, including Finland, the Netherlands, Sweden, and the United Kingdom, are open to GMO agriculture, Austria, France, Germany and Greece have enacted national cultivation bans on GM crops (Tosun 2014: 370). Germany was selected, since it is politically rather divided on agribiotech, which is most prominently indicated by the countries' frequent abstentions from voting in the European Council on the approval of GM products (Mühlböck and Tosun 2018: 394). Germany was also chosen because of its federal system, in which equal parties operate at federal and regional levels (Jeffery 2009). This polity is particularly well suited for

assessing whether a party on one level of governance influences the neutral position-taking of the equal party branch on a different level.

Germany's party spectrum has changed considerably over the last few decades. Currently, it consists of six parties that operate on the federal and regional levels.[22] The CDU was selected because it is characterised by features that appear especially promising to explore (potential) neutral position-taking on agribiotech (Debus and Müller 2013). The CDU has strongly advocated agribiotech for years, but during the 2000s it grew cautious as the issue became increasingly unpopular (Katzek 2014). Recently, it has managed to retain electoral popularity while pursuing a moderate GMO agenda even though public sentiment towards GMOs remains negative (Tosun and Hartung 2018). Nonetheless, the CDU disagrees internally on agribiotech. While Christian members tend to reject GMOs as unethical interventions in God's creation, others support agribiotech as an economic means to maintain Germany's international competitiveness in the agricultural sector (Cooper 2009).

Like all German parties, the CDU usually needs to build coalitions in order to reach governmental power (Laver and Schofield 1998). However, since two of its potential coalition partners have always been (Greens), or have become (SPD), opponents of GM technology, maintaining its moderate GMO position may become difficult (Katzek 2014). Finally, the CDU is the only party in Germany to have held a moderate GMO position during the last 30 years. In contrast to the even pro-GMO FDP, it has also always been represented in the federal parliament (Bundestag) and many state governments (Debus and Müller 2013).

[22] Germany's party spectrum includes the Social Democratic Party (SPD) and the Alliance 90/The Greens (Greens), which both belong to the centre-left, and the Left Party (Left), which can be located further left. The CDU and the Free Democratic Party (FDP) both belong to the centre-right, which is also the case for the CDU's regional sister party from Bavaria, the Christian Social Party (CSU), which is also influential in policymaking at the federal level. However, as the CSU usually publishes joint election manifestos with the CDU, it is considered together with the CDU in this study. Usually, the CDU and the CSU are referred to together as the Union. The Alternative for Germany, which ranks further to the right, is not considered as it was founded as recently as 2013 and thus does not fit our longitudinal analysis.

In order to explore neutral position-taking at the regional level, we concentrate our empirical focus on the CDU as the most interesting party regarding neutral positioning on the issue of agribiotech in Germany. Regional CDU branches should also position themselves on this issue, as in Germany, the federal states have far-reaching possibilities to regulate this policy area (see, Chapter 3). Since the German unification in 1990, CDU branches have become relevant in all 16 states. We chose Thuringia considering that in this state the CDU has not positioned itself on agribiotech longer than any other CDU branch in any other non-city state (Table A6). This is remarkable as Thuringia belongs to the eastern states, which are generally rather pro-GMO, because their large-scale agricultural structures provide much more favourable conditions for GMO cultivation than their western counterparts (Table 12, below). However, in 2010, CDU-led Thuringia became the first state to join and remain in the 'European Network of GMO-free Regions' – a transnational network of EU regions that oppose GMO farming (see, Chapter 3). Unlike in the other eastern states, GMO cultivation was generally low in Thuringia (Table 12, below).

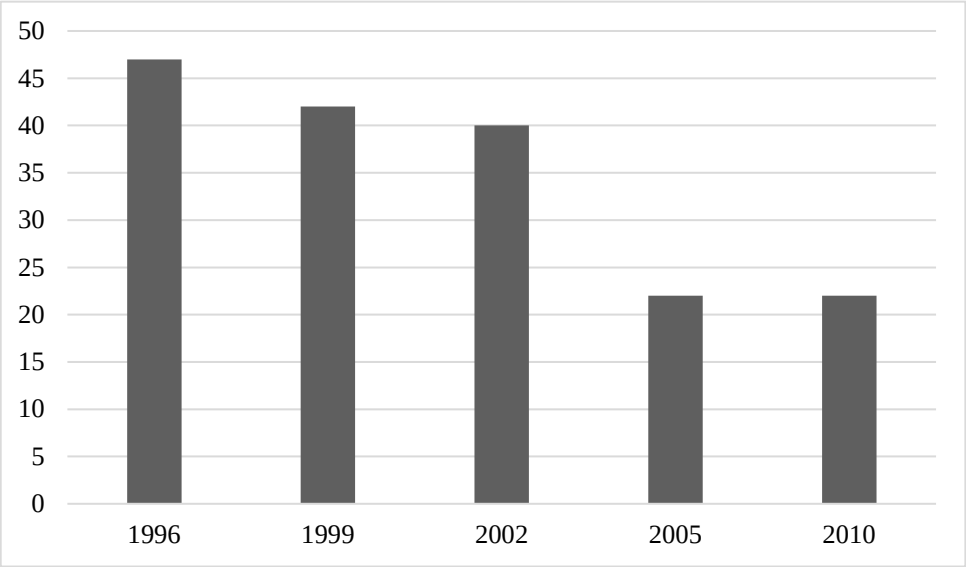
In principle, we could investigate whether the non-positionings of several other CDU branches on agribiotech actually represent neutral positions. Except for the city-states, as well as Bavaria and Baden-Wuerttemberg (see below), every branch has positioned itself pro-GMO since around 2000 and has not repositioned itself since the 2010s (Table A6). However, none of these has such striking characteristics that favour neutral position-taking on agribiotech as the Thuringian CDU. Nevertheless, as it is possible that other CDU branches took neutral positions as well, we will address this later on.

4.5 Analysis of the Position-Taking of the Federal CDU

In order to determine whether the CDU was motivated by vote-seeking aspirations to take a neutral position on agribiotech in 2017, we present Figure 6**.** This figure shows decreasing public support for GMOs in Germany from 1996–2010, and a particular decline from 2002–2005. The latter decline resulted from the bovine

spongiform encephalopathy (BSE) crisis, which spread during the 1990s and eroded the Germans' trust in the existing institutions of food supply (Feindt and Kleinschmit 2011). Even though BSE had nothing to do with agribiotech, the epidemic led to increased opposition towards the use of biotechnology in German agriculture (Herring and Paarlberg 2016: 401).

Figure 6. Public Support for GMOs in Germany, 1996-2010



Source: based on Eurobarometer data taken from Gaskell *et al.* (2010).
Note: the bars show the percentages of respondents who agreed or totally agreed to the question of whether GM food production should be encouraged.

Since 2010 the topic of agribiotech has not been excluded from Eurobarometer surveys; however, several national studies indicate that the broad anti-GMO sentiment in Germany remained high from 2010–2017.[23] Nevertheless, Table 10 shows that the CDU maintained moderate/pro-GMO positions throughout the 2000s. In contrast, the SPD shifted to an anti-GMO position in 2009, since it wished to form a coalition with the Greens (Cooper 2009: 549). Hence, neither did the CDU adjust its position in response to negative public opinion nor did it respond to important

[23] In 2010, 87% of Germans rejected GMOs and considered banning them an important measure for protecting the natural environment; in 2015, 45% of Germans believed that GM crops 'strongly' damaged the natural environment and biological diversity, and another 31% believed that GM crops were at least 'somewhat' damaging; in 2017, 79% agreed to that GMOs should be banned in agriculture (Federal Ministry for the Environment and Federal Agency for Nature Conservation 2010, 2015, 2018).

voter groups, the most influential of whom are Catholics, farmers, and older people in general.

Table 10. The Federal Parties' Positions on Agribiotech, 1990–2017

Party	**1990**	**1994**	**1998**	**2002**	**2005**	**2009**	**2013**	**2017**
CDU	NST	PRO	PRO	MOD	PRO	MOD	MOD	NST
FDP	MOD	MOD	MOD	PRO	PRO	PRO	MOD	NST
SPD	NST	PRO	PRO	PRO	PRO	CON	CON	CON
Greens	CON	CON	CON	CON	CON	CON	CON	CON
Left	NST	NST	NST	MOD	MOD	CON	CON	CON
Governing Coalition	Union/ FDP	Union/ FDP	SPD/ Green	SPD/ Green	Union/ SPD	Union/ FDP	Union/ SPD	Union/ SPD
Position	NST	PRO	MOD	MOD	PRO	PRO	MOD	MOD*

Source: based on the coding of the parties' election manifestos and coalition agreements. *The coalition contract was only adopted in 2018.

Even though the CDU liberalised its religious and ethical-moral stances considerably, the party is still a stronghold for Catholic voters (Debus and Müller 2013). However, this voter group strongly opposes agribiotech for reasons such as human inference in natural processes (Durant and Legge 2005: 191). Farmers also represent an important electoral segment of the CDU: in 2014, nearly 50% of farmers in Germany stated that they would vote for the CDU (Forsa 2015). Yet, small and organic farmers reject agribiotech in their vicinity for fear of potential 'contaminations' leading to lower market prices (see, Chapter 2). Finally, the CDU is characterised by above-average popularity in the group of older (over 60-year-old) voters (Debus and Müller 2013). Research has shown, however, that this group of voters is particularly opposed to GMOs (Durant and Legge 2005: 193).

The above-mentioned major voter groups – Catholics, farmers, people older than 60 – deemed their anti-GMO opinions confirmed by reports on the BSE crisis and by the commercial cultivation of GM crops, which started in 2005 (Table 12, below). The widespread protests and high media attention that accompanied it led to

agribiotech becoming even more critically perceived in Germany, including by the three CDU voter groups. Considering this, it would have been electorally opportune for the CDU to abandon its moderate/pro-GMO position in the 2000s, that way it would have responded to increasingly negative public opinion on the one hand and to its traditionally associated voter groups on the other. However, Table 10 shows that the CDU maintained its moderate stance until 2013, regardless of its detrimental effect on vote-maximisation. Since public opinion and central voter groups' rejection remained high from 2013–2017, vote-seeking aspirations cannot explain the CDU's neutral position in 2017.

The anti-GMO sentiment during the 2000s also sparked division within the CDU. Several CDU ministers, a faction of MPs in the Bundestag, and regional branches in states such as Hesse or Rhineland-Palatine, still supported agribiotech. However, GMO-opponents, who came from the food-producing industry and agriculture, were able to assert their positions more and more successfully (Cooper 2009: 552). Farmers and food processing companies, who traditionally supported the CDU, followed the demands of the consumer, who rejected the presence of GM ingredients in their food. The conflict between those in the CDU who saw tremendous potential in GM technology and those who declined it for economic reasons continued during the 2000s as the CDU maintained its pro-GMO agenda (Cooper 2009: 553–554).

Party-internal turmoil increased when the CSU, the CDU's electoral alliance partner at the federal level, turned against agribiotech in 2008/9. The CSU had strongly supported agribiotech since the early-1990s; however, during the 2000s, the issue became increasingly controversial within the party, prompting the CSU to adopt a negative stance prior to the regional election in 2008 (Table A5). In 2009, the Federal Minister of Agriculture, Ilse Aigner (CSU), even imposed a national cultivation ban on MON810, the only GM crop authorised for commercial cultivation in the EU (Katzek 2014: 181). Aigner banned GM maize mainly because Bavarian farmers and the regional food industry rejected agribiotech, since they had economic interests in conventional agriculture (Cooper 2009: 553). Aigner's move was heavily criticised

by politicians within the CDU; for instance, by the Minister of Research, Anette Schavan (CDU), and state ministers, such as Christian Wulff (CDU) from Lower-Saxony, one of Germany's leading agricultural states (Welt 2009).

Despite the CSU's shift of opinion, the CDU-led federal government maintained its pro-GMO course (Table 10). Most importantly, from 2015–2017, the Minister of Agriculture, Christian Schmidt (CSU), on behalf of the CDU-led government, attempted to enforce a regulatory arrangement that rendered GMO cultivation possible and facilitated GMO research in the national transposition process, which was commenced in response to Directive 2015/412. This directive grants the EU member states, and in some countries even their regional units, additional means of restricting or prohibiting GMO cultivation (Tosun and Hartung 2018). Schmidt's attempts, however, failed as the SPD, the Greens, the Federal Minister of Research, Johanna Wanka (CDU), as well as CDU-led state governments in Berlin, Hesse, Mecklenburg-West Pomerania, and Saarland opposed the CDU's legislative proposals (Tosun and Hartung 2018).

Ultimately, the disagreement within the CDU, as well as between the CDU and the CSU in the late-2000s, neither induced the CDU to abandon its moderate position in 2009 nor in 2013. However, in the transposition process of Directive 2015/412, regional CDU branches vehemently rejected the pro-GMO agenda of their federal counterpart. This increased opposition among regional CDU branches is therefore likely to have induced the federal CDU to take a neutral position in 2017. However, since this reasoning is not entirely conclusive, we will examine it more closely in due course.

Did the CDU take a neutral position in 2017 to facilitate coalition-building with (potential) partners that had different policy objectives? To answer this question, we concentrate on the CDU's coalition options before the 2017 federal elections. The CDU formed a coalition with the SPD from 2013–2017; however, already during that time, the SPD pronounced against another 'grand coalition' with the Union parties after the 2017 election (Spiegel Online 2017). Moreover, the CDU could not count on

the FDP, its preferred coalition partner, because it was unclear whether it would win enough votes to move into the Bundestag, as it was not the case after the 2013 election (Frankfurter Allgemeine Zeitung 2016).

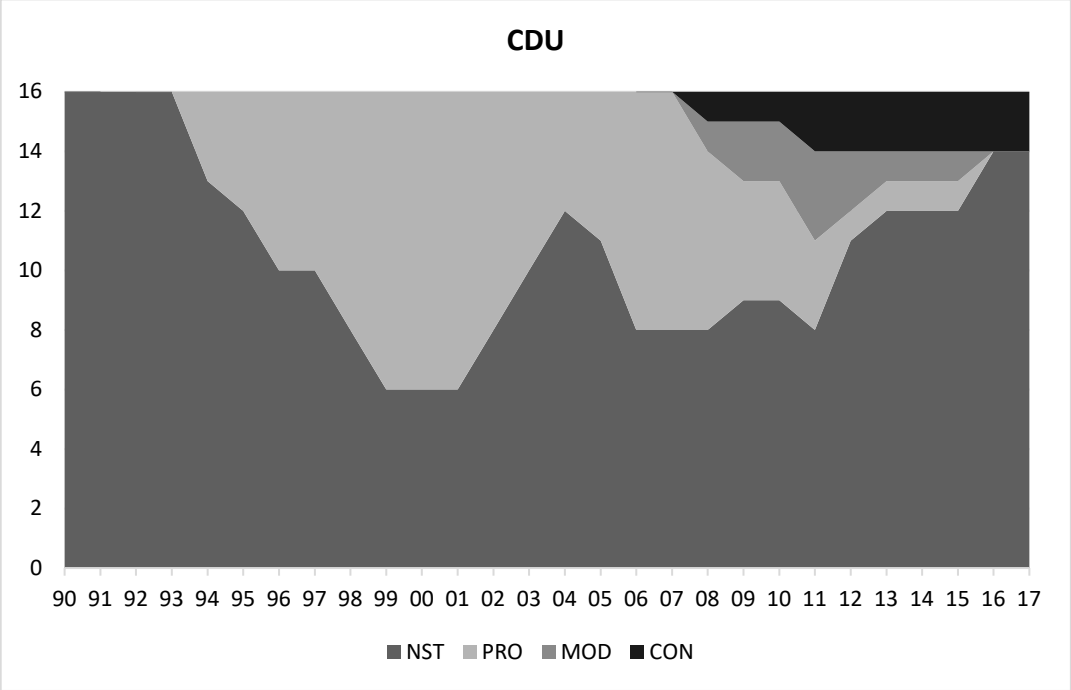
Since forming a coalition with the SPD or the FDP appeared unfavourable, the CDU considered coalescing with the Greens after the 2017 election. Two fundamental factors influenced this decision. First, several new coalitions composed of the CDU, the Greens (and the FDP) had formed at the state level in the late 2000s. These were the CDU/FDP/Green governments in Saarland (2009-2012) and Schleswig-Holstein (2017), and coalitions of the CDU and the Greens in Hamburg (2008-2010), Hesse (2014), and Baden-Wuerttemberg (2016). Second, the distances between the CDU and the Greens in several policy domains had decreased during the years prior to the 2017 election (Weckenbrock 2017). Consequently, the CDU, for the first time in history, was willing to form a coalition with the Greens in 2017 at the federal level.

However, as Table 10 shows, the distances between the two parties regarding agribiotech remained significant until 2017. While the CDU took moderately pro-GMO stances on the issue until 2017, the Greens were anti-GMO from the outset. In fact, agribiotech became one of the most important issues for the Greens after they had lost their issue ownership on nuclear power (Meyer and Schoen 2015). Research has shown that the Greens increased their electoral success by exploiting anti-GMO public sentiments, which was particularly pervasive at the time (see, Chapter 2). Hence, the policy distance between the CDU and the Greens, as well as the latter's belief in their ability to assert themselves on this specific topic, which they considered important for their political success, increased the likelihood of conflict breaking out between the two parties during coalition negotiations.

Considering that the CDU was highly dependent on the Greens as a coalition partner for the first time in 2017, it seems reasonable to deduce that it therefore positioned itself neutrally on the critical policy issue of agribiotech in order to facilitate coalition-building with the Greens. This is also supported by the fact that since the

early 1990s, when the topic was not yet salient, the CDU had always positioned itself on the topic. The notion of the CDU's neutral position-taking is also supported by the fact that, in 2018, the new Minister of Agriculture, Julia Klöckner (CDU), spoke out for liberalising the EU regulations on new genetic engineering techniques (Reuters 2018). Previously, exploratory discussions over forming a coalition government between the CDU/CSU, the Greens and the FDP had failed. And so, despite the SPD's reluctance to continue governing with the CDU/CSU, another 'grand coalition' was established after a long struggle in March 2018 (Table 10).

Figure 7. The Development of the Regional CDU Branches' Positions on Agribiotech, 1990-2017



Did the CDU take a neutral position in 2017 in response to the heterogenic positions of its regional counterparts? To address this question, Figure 7 can be consulted, which depicts the development of the positions held by the regional CDU branches on agribiotech; the detailed coding for each individual branch is given in Table A6. The figure shows that most CDU branches were pro-GMO from 1999–2001. Although some did not take any position, the positions of the regional CDU branches widely corresponded with the pro-GMO agenda of their federal counterparts (Table 10).

In 2002, the CDU shifted to a moderate stance (Table 10), and in the same year several of its regional branches abandoned their pro-GMO stances, choosing not to position themselves anymore on agribiotech (Figure 7). The CDU's statement in its 2002 election manifesto reveals that the party adopted a moderate stance in response to the increased public concerns regarding agribiotech following the BSE crisis (Table A4). Hence, the CDU did not fundamentally change its policy agenda; it is more probable that the party only took the moderate stance in order to make the negative public sentiment towards GMOs compatible with its goal of reducing electoral losses that might have resulted from being considered pro-GMO (Meyer and Schoen 2015). Strategic manoeuvring in response to the BSE crisis is particularly likely for the CDU branches in Mecklenburg-West Pomerania and Saxony-Anhalt as (productive) agriculture is highly important in all of these states (Table 12, below). The two CDU branches did not take positions on agribiotech in the election campaigns following the BSE crisis; however, they returned to pro-GMO positions before the 2006 elections (Table A6). Figure 7 illustrates the corresponding peak of non-positions between 2001–2006.

The federal CDU's pro-GMO position in 2005 widely aligned with the positions of its regional branches, proving that a bottom-up effect cannot have taken place (Table 10, Figure 7). However, a bottom-up effect does appear to have been the reason for the CDU's adoption of a moderate position in 2009 (Table 10). This is evident since the CSU, one of the most strongly pro-GMO branches, shifted to an anti-GMO stance in 2008, and pro-GMO branches from Lower Saxony (2008) and Schleswig-Holstein (2009) shifted to moderate positions (Table A6). Cooper (2009) showed that the CDU maintained its pro-GMO course, even after its regional branches, including the CSU, had withdrawn their support for agribiotech. Nevertheless, it seems plausible that the federal CDU branch responded to declining support at the regional level by moderating its positioning. The reason for this is that farmers in many states had started cultivating GM crops in 2005 – a move which led to strong anti-GMO mobilisation of environmental, agriculture and consumer associations as

well as considerable pressure on political decision-makers, especially those of the ruling parties.

Figure 7 shows that more and more regional CDU branches abandoned their pro-GMO positions in the run-up to the 2013 elections and that most of them chose not to position themselves on the topic anymore. This information may lead to the conclusion that the federal CDU took its moderate position in 2013 in response to the reduction in regional support. On the one hand, only the CDU branches from North Rhine-Westphalia, Mecklenburg-West Pomerania, and Saxony-Anhalt remained pro-GMO prior to 2013. On the other, the CDU branch in Baden-Wuerttemberg followed the neighbouring CSU in Bavaria in 2011 by shifting to an anti-GMO stance (Table A6). Cooper (2009: 553) stated that farmers' votes have always been important for the Union parties and that most German farmers rejected GMOs. This would have been especially true of these two southern states, in which farms are small-structured, industrial agricultural production is negligible, and farmers compete with nearby Austrian farmers.

In its 2013 election program the federal CDU stated that consumers should know whether food products are being produced using GM technology (Table A4). Yet, this statement does not indicate unambiguously whether the party attempted to accommodate the increasingly divergent positions of its regional branches. Hence, although a clear effect cannot be observed here, the trend shown in Figure 7 suggests that the federal CDU took their moderate position in 2013 in order to adapt to the decreasing GMO-support of its regional branches.

Finally, Figure 7 shows that the support of regional CDU branches for agribiotech had completely collapsed prior to the 2017 election as they all abandoned their moderate and pro-GMO positions. In fact, even the pro-GMO branches in Mecklenburg-West Pomerania and Saxony-Anhalt abandoned their supportive positions and have not positioned themselves on the issue since (Table A6). Considering that the support of regional CDU branches dissipated in 2016, it seems reasonable that their federal counterpart shifted to a neutral position in the 2017 election campaign in

order not to set a party line that stood in sharp contrast to the positions of the regional branches. This reasoning is substantiated by the conjecture above, namely that the federal CDU took moderate positions in 2009 and 2013 to accommodate for the regional CDU branches' decreasing support of/increasing opposition to GMOs.

Recapitulating the above, it becomes obvious that the entire evolution of the CDU's position-taking on agribiotech represents strategic behaviour. While it actually maintained its pro-GMO agenda during the 2000s, it took a moderate stance in response to the increased anti-GMO sentiment held by the German publics and major voter groups and to settle party-internal disagreement. However, these two factors were apparently not enough to convince the CDU to abandon its moderate stance and to shift to a neutral position. In fact, the party only did so in 2017, when the advantages of taking a neutral position outweighed the disadvantages. This was because the CDU was seeking a coalition with the Greens and the support of regional CDU branches for agribiotech had collapsed. These two final factors 'tipped' the CDU into taking a neutral position, which enabled the party to pursue its political objectives simultaneously. Finally, it should be noted that the CDU took their neutral position in response to the increasingly homogenous positions of its regional parties, rather than any heterogenous ones.

4.6 Analysis of the Position-Taking of the Thuringian CDU

Since there are no survey data available that document the Thuringian population's opinions on GMOs, we reconstruct them to examine whether this factor influenced the CDU to position itself neutrally on agribiotech. In the late 1980s, this issue was non-salient at the German regional level. Back then, EU institutions had not yet approved any GM crops for commercial cultivation, and the planning for scientific field experiments had just begun. In fact, only a few experts knew that relevant progress in plant-breeding had made the planting of GM crops for scientific purposes an imminent possibility.

Such scientific field experiments were the initial cause why agribiotech suddenly became salient in Thuringia in the mid-1990s. Two agribiotech companies, Hoechst-Schering AgrEvo (1993) and Monsanto (1996), soon attempted to conduct field trials in two municipalities, namely Friemar and Hohlstedt (Graswurzel Revolution 1997). These trials rapidly sparked fierce conflicts at the local level. Citizen initiatives were founded; environmental, agricultural, and consumer organisations mobilised against the trials; anti-GMO protests were organised; anti-GMO camps were constructed; and activists made the scientific releases impossible or destroyed them (Friends of the Earth 1994). Consequently, Monsanto's attempts to sow glyphosate-resistant GM canola in Hohlstedt failed, and Hoechst-Schering AgrEvo even withdrew its application for test plots with GM maize and GM canola in Friemar (Friends of the Earth 1996).

Our interviews provided critical information on why this resistance proved particularly successful. Most importantly, the movement to combat such field experiments began earlier in Thuringia than in other states and followed a more vehement course. Moreover, the movement's mobilisation efforts fell on fertile ground due to the special location of the two experimental plots. In Hohlstedt, citizens strongly opposed the field trials from the outset because the community had suffered greatly from the excessive use of pesticides during the era of the German Democratic Republic. In Friemar, the local anti-GMO movement successfully mobilised students from the nearby city of Jena to support their actions against the trials.

Regional media brought the two local conflicts to the attention of all of Thuringia, with the result that public opinion towards agribiotech in the mid-1990s swiftly became hostile. Based on the interview data, we can deduce that, even though the Thuringian CDU initially took a pro-GMO position in 1994, the party became increasingly cautious over time. This is evinced by the fact that the party has not included any positions on agribiotech in their manifestos until 1999 (Table 11). Hence, the CDU responded to the broad public rejection of agribiotech in order to avoid incurring electoral loses.

Table 11. Thuringian Parties' Positions on Agribiotech, 1990–2014

Party	1990	1994	1999	2004	2009	2014
CDU	NST	PRO	NST	NST	NST	NST
FDP	MOD	MOD	NST	PRO	MOD	MOD
SPD	NST	PRO	CON	CON	CON	CON
Greens	CON	CON	NST	NST	CON	NST
Left	NST	CON	MOD	NST	CON	CON
Governing Party/ies	CDU/ FDP	CDU/ SPD	CDU	CDU	CDU/ SPD	Left/SPD/ Green
Position	NST	NST	NST	NST	CON	CON

Source: based on the coding of the parties' election manifestos and coalition agreements.
Note: in 1999 and 2004, the election manifestos of the CDU also functioned as a government program.

Agricultural interests represent an important factor for the understanding of the Thuringian case; however, unlike public opinion, they had no significant effect on the CDU's position-taking. The Thuringian farmers' association has supported GMO farming from the very beginning until today (Mitteldeutscher Rundfunk 2018). However, the experts we interviewed made it clear that anti-GMO sentiment made the farmers' union become more cautious in its statements and generally less assertive in promoting agribiotech in the political sphere, just like the CDU.

In the same way as the majority of the population, most Thuringian farmers rejected GMO cultivation. Nevertheless, following the EU approval of MON810 in 2005, some farmers submitted – or wanted to submit – applications for cultivating this type of GM maize. In reaction, individual actors of the anti-GMO movement informed these farmers, for example, of the negative effects of GM feed on the health of dairy cows. In fact, the overall campaign led to almost all farmers refraining from submitting or withdrawing, their applications. The information campaign proved so successful in Thuringia, since – due to large farm sizes – only a few farmers operate there (Table 12).

Table 12. A Comparison of the German States

Federal state	Average farm size (hectare)	Number of farmers (in thousands)	GMO Cultivation (hectare)	GMO-free Regions Network (entry date)
Western states				
Baden-Wuerttemberg	31.7	42.4	17.4	2012
Bavaria	32.1	93.3	35.5	2014
Hesse	43	17	0.2	2014
Lower Saxony	40.9	39.5	49	2014
North Rhine-Westphalia	61.8	34,3	0.8	2011
Rhineland-Palatine	34.3	19.1	1.2	2013
Saarland	59	1.2	0	2013
Schleswig-Holstein	70.5	13.3	0.1	2012
Eastern states				
Brandenburg	237.8	5.4	3153.7	-
Mecklenburg-West P.	285.9	4.7	1743.8	-
Saxony	145.2	6.3	1800.3	-
Saxony-Anhalt	278	4.2	352.2	-
Thuringia	215.1	3.4	1	2010
City-states				
Berlin	33.1	*	0	-
Bremen	51.3	*	0	2015
Hamburg	18.5	*	0	2015

Source: the data on the average farm sizes come from Statistische Ämter des Bundes und der Länder (2010) and the data on the number of farmers were taken from the German Farmers' Union (2015). GMO cultivation refers to the planting areas of MON810 (2005–2008); this data stems from the Federal Office of Consumer Protection and Food Safety (2019). The data on the accession to the GMO-free Regions Network were taken from GMO-free Europe (2019). * The city states together have less than 900 farmers.

Accordingly, Table 12 shows that Thuringian farmers only cultivated MON810 to an extremely limited extent. Although most farmers had decided against cultivating GM crops and one interviewee estimated the Thuringian farmers' voting

preferences as being fairly evenly split between the CDU and the Left, their views had no significant effect on the CDU's position-taking.

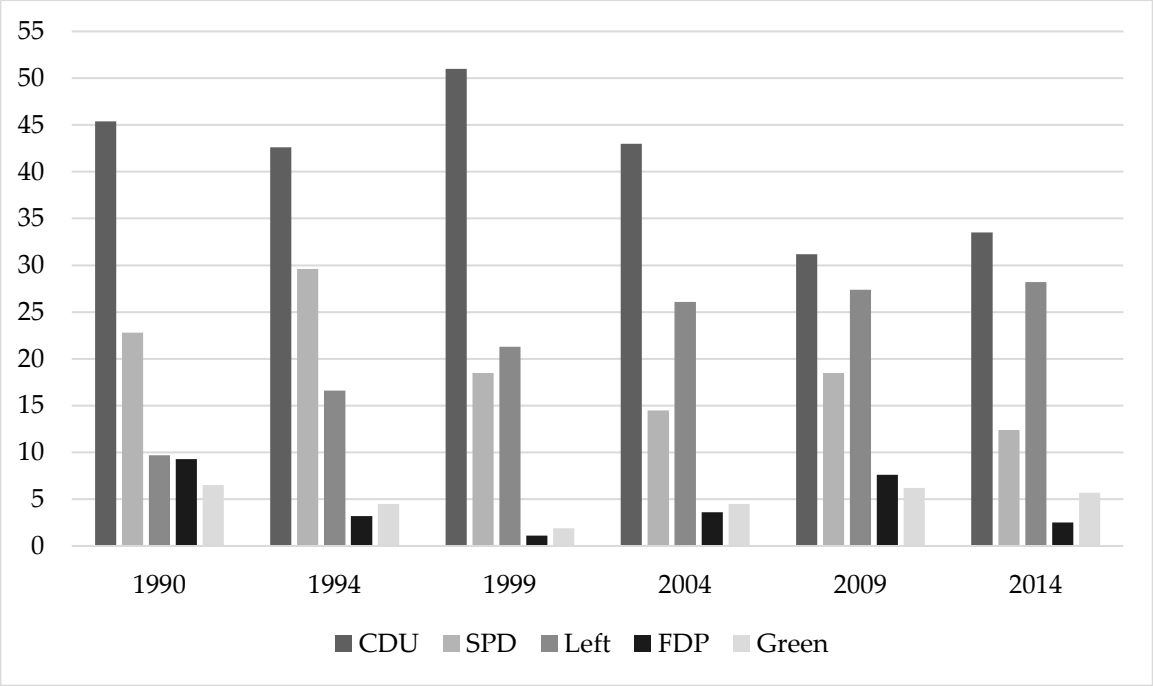
Has party-internal disagreement been the reason for the Thuringian CDU to take neutral positions since 1994? One interviewee estimated that approximately 80% of the CDU MPs have never dealt with the GMO issue themselves as it is common practice for them to support the position of their party expert. The key actor in this regard remains MP Egon Primas, who has represented the CDU in the Thuringian Parliament (Landtag) since 1990. In one interview, we learned that MP Primas has been setting the CDU's party line regarding agribiotech largely autonomously since the early 1990s. Accordingly, party-internal disagreement on this policy topic has virtually never existed as most CDU MPs have not concerned themselves with agribiotech but followed the party line. In addition, party-internal consensus arose out of the mutual agreement of the CDU MPs, who considered productive agriculture important, while possible contradictions with, for instance, Christian beliefs were of no significance.

Although the Thuringian CDU was pro-GMO for a long time, its position can be further differentiated. The party agreed with the regulations set by EU institutions on commercial usage, such as to guarantee 'freedom of choice' for consumers and farmers (European Commission 2019b). Like the FDP, the CDU had a very progressive stance on research, believing that it should be used to harness the potential of GM technology. Since MP Primas spearheaded this stance and the other MPs agreed, the CDU's possible neutral positions since 1999 cannot be explained by intra-party disagreement.

We now analyse whether the CDU had incentives to shift from its pro-GMO position to a neutral one in order to facilitate coalition-building with parties whose positions on GMO differed from their own. Having cooperated with the FDP from 1990–1994, the CDU lost its 'natural' coalition partner after the 1994 elections. Figure 8 shows the results of Thuringian state elections from 1990–2014 and reveals that

the FDP failed the 5-percent hurdle in 1994. Consequently, the CDU had to look for other possible coalition partners.

Figure 8. Election Results (%) for Regional Elections in Thuringia, 1990–2014.



Source: Own figure based on data taken from Der Bundeswahlleiter (2019).

Since the Greens and the Left had substantially different ideological stances and policy objectives to the CDU during the 1990s, the CDU excepted them as potential coalition partners. This means that only the SPD represented an appropriate partner for building a coalition government after the 1994 election – which is exactly what happened (Table 11). Although this table indicates that we coded a non-position for the SPD in 1994 and a moderate position in 1999, one interviewee revealed that the SPD was already overtly anti-GMOs in the early-1990s. Furthermore, based on information collected in the same interview, we can state that the CDU's reliance on the SPD as a coalition partner was the main reason why the CDU did not take positions in its election manifestos. The latter maintained its pro-GMO agenda up to 2009/10; however, prior to the elections in 1999, 2004, 2009, it strategically took no position on agribiotech, thereby reducing its policy distance to the SPD, their most likely coalition partner.

Until the mid-2000s, the CDU could hope for election results that enabled it to govern alone, and Table 11 shows that the party actually achieved this in 1999 and 2004. Nevertheless, prior to each election in the 1990s and 2000s, the regional party could not be sure that it would achieve the necessary majority for forming a single government, making the CDU highly dependent on the SPD as a coalition partner. The SPD exploited this situation by enforcing its anti-GMO position. As Table 11 shows, the CDU subsequently chose not to assert its pro-GMO position in the two coalition agreements made with the SPD. Larger coalition partners are usually assumed to assert their policy objectives when parties stipulate coalition agreements (Budge and Laver 1993). However, when analysing Figure 8 and Table 11, we can see that the CDU (31,2%) did not prevent the SPD (18,5%) from asserting its anti-GMO position in 2009.

2009 represented a major turning point for the agribiotech agendas of both the CDU and the state of Thuringia as the staunchly anti-GMO Minister of Health, Heike Taubert (SPD), became the head of her party's anti-GMO course (Thuringian Ministry of Health 2010). The course of action she pursued, which vehemently opposed the CDU's pro-GMO agenda, was supported by the Greens, who re-entered the Landtag in 2009 after years of absence, as shown in Figure 8. This signified the first-ever political anti-GMO alliance was established in the Landtag. The SPD, the Greens, and the Left, backed by anti-GMO groups and the overwhelmingly anti-GMO public, strongly opposed agribiotech. The anti-GMO camp gained further momentum in 2009, when the federal government banned the cultivation of MON810. The FDP, which was still moderate on agribiotech and which had also rejoined the Landtag in 2009, could do nothing about this.

In response, the CDU abandoned its pro-GMO agenda – not its neutral position – and began to oppose agribiotech actively. In 2010, the CDU faction, together with the SPD, submitted the proposition 'Thuringia active against the cultivation of genetically modified plants' to the Landtag, where it was quickly adopted (Thuringian Landtag 2010). Moreover, the CDU-led state became the first German state to join

and remain in the European Network of GMO-free Regions – a transnational network of EU regions that advocates farming without the use of agribiotech (Table 12). In 2012, Thuringia adopted another resolution, committing the state, among other measures, to advocate the extension of existing labelling obligations to animal products whose production process included genetic engineering; however, this has not yet been regulated on the EU level (Thuringian Landtag 2012). Finally, also in 2012, Thuringia hosted the 9th major conference of the abovementioned network in Erfurt (European GMO-Free Regions Network 2012).

In a last step, we investigate whether the federal CDU obliged its Thuringian counterpart to align its GMO-position and whether the regional party responded by taking a neutral position. Upon first comparison of the positions of the federal CDU (Table 10) with those of the Thuringian CDU (Table 11), it appears that these branches only held congruent positions in 1994. It has been theorised above that regional branches should only have incentives to shift to neutral stances if their policy preferences diverge from those of their federal counterparts. However, as just revealed, the Thuringian CDU actually pursued a pro-GMO agenda from 1994–2009, while it used neutral positions to limit the negative political consequences of an overtly pro-GMO position. Because the policy objectives of the two CDU branches were actually coherent from 1994-2009, it can be inferred that the regional branch did not use neutral positions to respond to any top-down pressure from its federal counterpart.

However, the anti-GMO program of the Thuringian CDU has been in contrast to the federal CDU's agenda since 2010, making a top-down effect plausible. But then again, one interviewee said that this could not have taken place as the regional branch would not have tolerated top-down interference in this domain. Rather, in line with our previous findings, the interviewee stated that it was electorally beneficial for the Thuringian CDU to distinguish itself from the anti-GMO position vis-à-vis the federal party. Figure 7 substantiates this reasoning by indicating that the support of almost all regional branches declined from 1994–2017 and that most of

them replaced their pro-GMO stances with non-positions (respectively neutral positions). Considering that the regional CDU branches performed these position-shifts while the federal CDU was moderate/pro-GMO, we can arrive at the conclusion that the neutral positions taken by the Thuringian CDU from 1999–2009 were not triggered by top-down pressure.

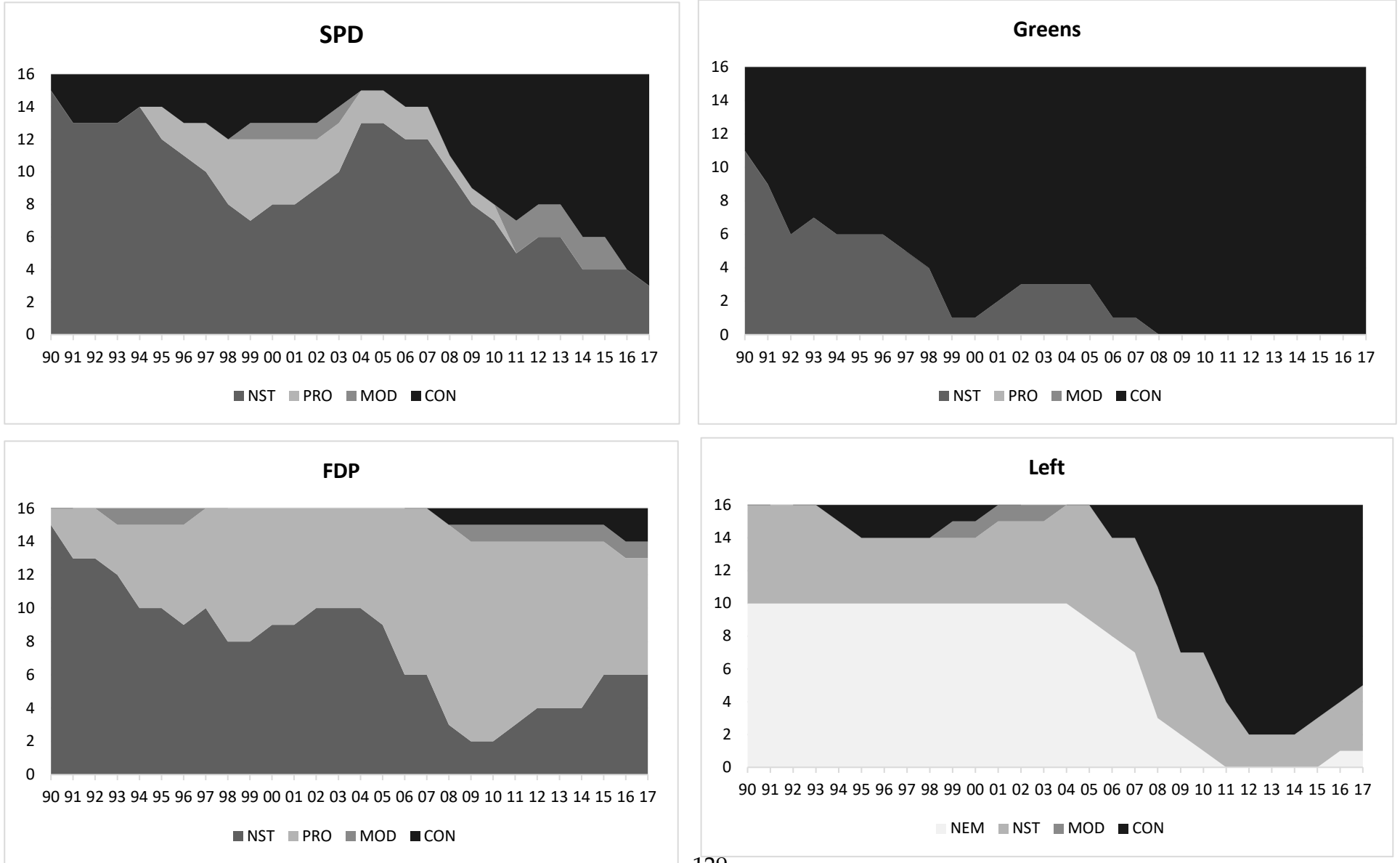
Altogether, two major factors motivated the Thuringian CDU to take a neutral position in 1999 and to maintain this strategic position until 2009. The first was the negative public opinion sparked by the conflicts which were triggered by the two scientific experiments in local spheres. The second was the CDU's endeavour to stay in power, which entailed relying on the anti-GMO SPD as a coalition partner. In addition, the CDU was strongly pressured by the SPD during their time in government with the consequence that the CDU accepted an anti-GMO position in the 2009 coalition agreement. The SPD, backed by a broad anti-GMO alliance in the Landtag and bolstered by the cultivation ban on MON810, subsequently managed to induce the CDU into pursuing an anti-GMO agenda.

Due to space constraints, it is not possible to examine in the necessary qualitative manner whether the other parties also positioned themselves neutrally on agribiotech. However, to address this briefly, Figure 9 can be consulted as it depicts the evolution of the other parties' position-taking on agribiotech at the regional level. When we compare position-taking of the regional branches with that of their federal counterparts (Table 10), two main phenomena can be observed. First, and as expected, the Greens positioned themselves most consistently anti-GMO across the two levels. Second, and more interestingly, the SPD and the FDP are both characterised by rather large divergences on this policy topic since their regional branches have only rarely taken any positions at all (Table A7, Table A9).

At least some of these supposedly non-positions may actually represent neutral positions. In other words, besides CDU branches, regional branches of the SPD and the FDP possibly positioned themselves neutrally on agribiotech for strategic reasons as well. One possible explanation for these neutral positions could be that, due

to the existence of competences to regulate agribiotech at regional level in Germany (see, Chapter 2), regional parties could be even more exposed to pressure from regional anti-GMO movements than federal parties, and therefore more frequently take neutral positions to achieve their political goals.

Figure 9. The Development of the Regional Parties' Positions on Agribiotech, 1990-2017



4.7 Concluding Remarks

Beyond its specific empirical results, this study makes two major contributions to the literature on policy positions. First, rather than ignoring supposedly non-positions, scholars should consider the possibility that these may actually represent neutral policy stances – positions that parties take strategically to reconcile their contested policy agendas with other important political objectives. Parties use neutral positions to pursue contested policy agendas while they seek to reduce possible electoral loss caused by voters turning away. They also use them to settle party-internal disagreement and to reduce policy distance between desired coalition partners. In addition, federal parties may use neutral positions to maintain policy stances that deviate from their regional branches (bottom-up).

The second key finding is that parties tend to maintain positions previously taken on policy issues even though they thereby risk negative political consequences (Budge 1994). Although it would have been opportune for the federal CDU to abandon its pro-GMO position during the 2000s, it maintained this highly controversial position for many years. It only took a neutral stance following the simultaneous emergence of several critical factors that caused it to abandon its previous moderate position. That is to say, parties make use of the positional strategy of neutral position-taking to maintain their contested policy-seeking aspirations. Hence, our results question the assumption that parties are first and foremost vote-seekers (Strøm 1990; Müller and Strøm 1999).

Finally, the present article attempted to provide a first step into exploring neutral position-taking, which is why it faces some limitations. The results are based on one party, one specific policy issue, and two contexts of partisan activities. For that reason, further research is needed to explore the determinants underling neutral position-taking; this should be done by examining other parties, policy issues, and contexts. This could improve our empirical understanding of strategic position-taking as well as our theorising on this matter.

Chapter 5

5 Inside-Lobbying on the Regulation of New Plant Breeding Techniques in the European Union: Determinants of Venue Choices

5.1 Introduction

GMOs have been among the most controversial and unpopular policy issues in the EU since the mid-1990s. Numerous actors at various political levels have been involved in the disputes raised by the topic of GMO field regulation (see, e.g. Dobbs 2016). In addition to policymakers, political parties, non-governmental organizations (NGOs) and various associations, also private companies are committed to representing their (economic) interests (see, e.g. Tosun and Schaub 2017). However, while researchers investigated the lobbying activities of anti-GMO groups (see, e.g., Bodiguel and Cardwell 2010; Clancy and Clancy 2016; Paarlberg 2014; Schurman and Munro 2006; Schurman 2004), there is a considerable need for research into the lobbying activities of companies interested in agricultural biotechnology (agribiotech).

One of the main reasons for this research gap seems to be that biotech companies usually avoid campaigning publicly as GMOs are unpopular in many countries around the world, especially in the EU (see, e.g., Herring and Paarlberg 2016). Nevertheless, these actors are frequently presumed to pursue their interests by means of inside-lobbying tactics, that is, through personal contacts with politicians or high-ranking bureaucrats behind closed doors (see, e.g. Baumgartner and Jones 2009). However, research has so far provided few empirical insights into such activities. One of the few studies to have done so comes from Lamphere and East (2017), who showed that Monsanto 'consistently employed discursive resources that concealed

details about actors and action, reflected trends among experts in global sustainability discourse, and reshaped narratives to promote itself, its products, and biotechnology in general'.

In addition, it became public in 2019 that a PR agency commissioned by Monsanto had collected data from critical journalists, politicians and other stakeholders in several EU member states, mainly on their attitudes to the active component glyphosate prior to its reassessment by the EU in 2017 (Bayer AG 2019). Since biotech companies reputedly tend to pursue their goals through inside-lobbying tactics, there is room and need for further investigations in this field. One of the fundamental aspects in this respect concerns the venues, i.e. certain institutional decision-settings, in which these firms choose to promote their widely unpopular objectives.

To reduce the above-described research lacunae, this study investigates the venue choices made by US-based Cibus in the EU multi-level system. Cibus aspired to market newly modified seeds to EU farmers even though EU institutions had not yet decided on whether products derived by 'New Plant Breeding Techniques' (NPBTs) were to be legally classified as GMOs or 'traditionally' bred products (Jones 2015c). As this classification entailed far-reaching implications, Cibus attempted to influence the EU regulatory process on NPBTs in its favor.

In light of this, the following research question guides this study: Which venues did Cibus select to promote NPBT deregulation in the EU and which factors explain these selection decisions? Our first interest is which venues Cibus chose for the promotion of the unpopular issue of NPBT deregulation in the EU, whose multi-level polity provides advocates with multiple channels and targets for lobbying their objectives (Beyers and Kerremans 2012; Princen and Kerremans 2009). Secondly, we are interested in the factors which explain Cibus' venue choices because previous research has revealed various venue-internal and -external factors accounting for advocates' choices of venues (see, e.g., Buffardi *et al.* 2015; Holyoke *et al.* 2012; Ley 2016; Ley and Weber 2015; Marshall and Bernhagen 2017; Pralle 2003).

This study draws on the concept of venue shopping, which became widespread in the last two decades, especially for analysing interest group politics (Baumgartner and Jones 2009; Pralle 2003; Beyers and Kerremans 2012; Beyers *et al.* 2015; Buffardi *et al.* 2015; Huwyler *et al.* 2018). Based on various sources, it uses counterfactual reasoning to assess the importance of institutional 'closedness' for Cibus' venue choices as well as a comparative, factor-based approach to explain the firm's choices for venues in certain EU member states. Finally, an in-depth study on Cibus' activities in Germany in that field is conducted to produce more fine-grained information on the reasons for Cibus' choices.

The results show that Cibus bypassed the EU level and chose national competent authorities (CAs), the key national bodies deciding on the legal classification of NPBT-modified crops, for its inside-lobbying tactics. The firm chose the CAs because their institutional 'closedness' promised to prevent debates on the unpopular topic of NPBT deregulation from becoming public. However, the company also did so, since the CAs' were able to produce regulatory opinions on NPBTs and influence EU decision-making by cooperating with the European Food Safety Authority (EFSA). The firm lobbied CAs, which were embedded in national contexts favorable to agribiotech, based in Finland, Germany, Ireland, Sweden, Spain, and the United Kingdom (UK). Two factors appear to have influenced Cibus' choices for these countries: high-level political support for agribiotech and the high relevance of biotech sectors. In contrast, public support for GMOs hardly had any influence, and virtually no association could be observed for the agricultural application of biotechnology in the past nor for the weakness of domestic anti-GMO lobby groups. Finally, the in-depth study on Germany affirms that 'closedness' was important for Cibus' choices and reveals that technical information served as an additional venue-internal factor that influenced the firm's choices.

The remainder of this paper is structured as follows. The second section provides an overview of the EU regulatory process on NPBTs, laying the groundwork for the empirical analysis. Next, the theoretical framework is introduced. After presenting

the database and the methodical approach, the empirical analysis is executed in three steps. First, it assesses whether institutional 'closedness' influenced Cibus' venue choices, then the institutional channel that the firm used to influence regulatory decision-making on NPBTs at the EU level is delineated. Secondly, it comparatively examines the reasons for Cibus' decision to lobby CAs in certain member states and not in others. Thirdly, the case study is used to investigate further factors that influenced Cibus' choices. The article ends with some concluding remarks.

5.2 The EU Regulatory Process

The European Commission made several attempts to agree on a regulatory approach towards NPBTs in the last decade. The authority started dealing with the issue in 2007 when it established a 'New Techniques Working Group' in order 'to analyse a non-exhaustive list of techniques for which it is unclear whether they would result in a GMO' and 'whether the resulting products fall under the scope of the existing GMO […] legislation' (European Commission 2011: 1–2). The group defined the term 'New Plant Breeding Technology' to designate eight new breeding techniques.[24] They evaluated them in the light of Directive 2001/18/EC, which defines a GMO as 'an organism/micro-organism […] in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination'. The EU's original GMO definition dates to the initial establishment of the EU regulatory framework as prescribed by Directive 90/220/EEC. Four years later, however, experts arrived at differing legal interpretations of the techniques, though most breeding tools were deemed not to produce GMOs (European Commission 2011).

The European Commission also mandated the 'Joint Research Centre', its scientific service agency, to assess the economic relevance of new breeding techniques.

[24] The working group considered the following eight breeding techniques: Oligonucleotide Directed Mutagenesis technique, Zinc Finger Nuclease Technology (ZFN) comprising ZFN-1, ZFN-2, and ZFN-3, Cisgenesis and Intragenesis, Grafting Agro-infiltration, RNA-dependent DNA methylation, Reverse breeding and Synthetic genomics (European Commission 2011).

Its report was published in 2009. The scientific experts focused on the same eight techniques as evaluated by the beforementioned working group and investigated their status of research development of, the adoption of NPBTs by the breeding sector, the potential development of commercial products, and the challenges of detecting resulting products. The report states that the level of development of new breeding techniques varies considerably and that, besides technical advantages, several challenges, of which consumer acceptance and regulatory aspects are the most important, exist for the commercialization of resulting products in the EU (Lusser *et al.* 2011).

Moreover, the European Commission requested the EFSA to deliver a scientific opinion on plants developed through two new breeding tools (cisgenesis and intragenesis). EFSA concluded that the existing guidance for the risk assessment of GM plants (food and feed and environment) was applicable also for the evaluation of plants derived by these techniques and that there was no need to develop the existing guidance (EFSA 2012: 2). Moreover, EFSA compared the hazards associated with plants developed by the two techniques with those obtained by 'conventional' breeding or by genetic engineering (transgenesis). It concluded that 'similar hazards can be associated with cisgenic and conventionally bred plants, while novel hazards can be associated with intragenic and transgenic plants' (EFSA 2012). Since 'unintended changes' might occur through various breeding techniques, EFSA suggested a case-by-case-based risk assessment for products derived by new breeding tools.

In 2015, the European Commission called upon the so-called 'High Level Group', a scientific advisory board on the EU level, to compile a report on new breeding techniques. According to the report, which was published in 2017, new breeding tools offer various benefits. Among these is the reduced risk of unintended effects, since these new tools are more precise than their 'conventional' counterparts. Moreover, the board recommended in line with EFSA that safety assessments for newly modified products should be based on case-by-case assessments (European Commission 2017).

It took more than a decade until the EU provided the member states with regulatory guidance on NPBTs. In July 2018, the Court of Justice of the European Union (CJEU) ruled that these 'genome editing' techniques should be legally classified as genetic engineering techniques, wherefore resulting products fall under Directive 2001/18/EC (CJEU 2018). The phase preceding the final regulatory decision, when plant scientists increasingly applied NPBTs, represented a crucial period for lobbying activities.

5.3 Theoretical Framework

This study draws on the concept of venue shopping, which originally relates to advocates who face obstacles in certain decision-settings and therefore look out for other ones, which they consider more promising for the promotion of their policy objectives (Baumgartner and Jones 2009: 36). Recently, scientific attention surrounding advocates' decision to select certain venues has increased; scholars refer to this as venue choice (Ley 2016; Ley and Weber 2015; Marshall and Bernhagen 2017; Huwyler *et al.* 2018). This study concentrates on the factors that influenced Cibus' venue choices when this firm looked out for the most suitable decision-settings for promoting NPBT deregulation in the EU multi-level system.

5.3.1 Unpopular Policies and Institutionally Closed Venues

Baumgartner and Jones (2009: 36) have argued that some venue shoppers attempt to realize their policy objectives by inciting policy conflicts as this generates public attention and mobilization ('image manipulation'), while others practice inside-lobbying tactics based on personal contact with politicians and high-ranked bureaucrats. The central variable determining which of these two fundamentally diverging strategies advocates opt for essentially relates to policy objectives. Hence it seems expedient to distinguish whether their pursued policy goals are popular or unpopular in certain societal/political spheres.

When advocates strive for popular policy objectives, which most citizens and the media welcome, they can use these headwinds to assert themselves in public discourses and accomplish their policy goals. However, when advocates seek widely unpopular policy objectives, they will struggle to assert themselves in public discourses because their policy opponents are backed by the major population and the media. To increase their chances of achieving their unpopular policy objectives despite this disadvantage, advocates make use of certain strategies. Weaver (1986) noted in his seminal work that political actors employ certain 'blame-avoidance' strategies to reduce the risk of potential political losses when pursuing unpopular policy reforms because voters tend to be more sensitive to real or potential losses than to gains (see, e.g., Hood 2011; Hood *et al.* 2016; Hinterleitner 2017). The domain of social policy reform in particular has investigated these strategies, analyzing which specific strategies political advocates opt for and why (Vis 2015). Nevertheless, this lens of blame avoidance also been applied to other policy domains, researching, for example, governments' use of strategic communication for justifying the liberalization of national GMO regulatory frameworks (Wenzelburger and König 2017).

At first glance, it appears that Cibus could have attempted to realize its objective of deregulating NPBT by mobilizing the public. After all, EU citizens are generally unfamiliar with the NPBT topic, meaning that framing strategies, for instance, could be successful. However, the decade-long struggle over GMOs has indicated that topical unfamiliarity, in combination with negative public bias, results in the instinctive rejection of technological innovations (Legge and Durant 2010). In addition, the GMO case has shown that anti-GMO groups have been exploiting the topic since the mid-1990s to shape anti-GMO public sentiment (see, e.g., Clancy and Clancy 2016). This, in turn, has induced policy-makers in several member states to abandon supporting GMOs and instead advocate stricter regulations (see, e.g., Schurman and Munro, 2006). Accordingly, we have reason to assume that the strategic calculations underlying Cibus' venue choices will differ from those of venue

shoppers seeking popular policy objectives. Consequently, we can infer from this that the company should not have incentives to choose venues that generate public attention and mobilization. Rather, we expect Cibus to opt for those venues, which facilitate its pursuit of NPBT deregulation behind closed doors.

Research has shown that venues differ from each other institutionally in many ways and that advocates take features such as internal rules, decision-making procedures and institutional actors into account before choosing in which venues to pursue their policy objectives (Ley 2016; Ley and Weber 2015; Marshall and Bernhagen 2017; Constantelos 2010; Holyoke *et al.* 2012; Huwyler *et al.* 2018). In light of this, the first major argument of this article is that Cibus will choose venues that are characterized by institutional 'closedness'.

Institutionally 'closed' venues can be conceived as decision-making arenas that inhibit participation. For instance, participation can be confined to small sets of actors comprising, as a minimum, the venue shopper himself and the venue decision-maker. Hence the public, the media, and policy opponents have no or only limited access to such 'closed' venues. This implies that institutional closedness limits the possibilities of external actors to interfere in venue-internal processes and to influence the judgments of venue decision-makers. However, it also means that advocates of unpopular policy objectives can better anticipate the probable outcomes of their access to such venues. Furthermore, limited participation reduces the transparency of venue-internal processes, meaning that social debates are unlikely to emerge, even though unpopular policy options might be at stake. This further raises the likelihood of advocates realizing unpopular policy goals. For example, bureaucratic authorities are more closed than, say, legislative bodies, in which internal processes are more easily influenced by the public or policy opponents.

Taken together, this paper argues that Cibus will choose venues characterized by institutional closedness for their promotion of NPBT deregulation since these reduce the risk of sparking public debates, which could ultimately threaten their chances of success.

5.3.2 Venue Decision-Makers and Venue Contexts

Research has shown that venue shoppers take several venue-related factors into account before making their choices (see, e.g., Buffardi *et al.* 2015; Holyoke *et al.* 2012; Ley 2016; Ley and Weber 2015; Marshall and Bernhagen 2017; Pralle 2003). Nevertheless, venue decision-makers ultimately represent the key actors, who determine whether their activities will be successful. Holyoke and colleagues (2012) have shown that policy advocates assess their congruence with venue decision-makers regarding mutual policy preferences and ideological stances before making their venue choices. This information is crucial for venue shoppers as it is the most revealing indicator of how successful their lobbying in a particular venue is likely to be.

However, advocates often lack the necessary information concerning venue decision-makers, for instance, when no working contacts previously existed or when advocates access multiple venues to promote their policy goals ('venue diversification') (Baumgartner and Jones 2009). When advocates lack information on how venue decision-makers will most probably decide on certain issues, on which parameters will the venue shoppers base their venue choices? Ley and Weber (2015) indicated that venue shoppers choose venues by strategically assessing venue contexts. This argument aligns well with one central premise of behavioral theory, which states that societal contexts shape humans' attitudes, standpoints, and decisions (see, e.g. Larrick 2016). On this theoretical ground, we presume that advocates, who look out for the most promising venues to promote their objectives but lack information on venue decision-makers, will strategically consider venue contexts, since these shape the judgments of venue decision-makers.

Assessing venue contexts should be less promising when issues are uncontroversial and scientifically certain as, in these cases, decision-makers will guide their judgments using certain standard procedures. However, consideration of venue context should be expedient for advocates pursuing cutting-edge projects, since these entail scientific uncertainty and decision ambiguity (see, Florin 2014). For

example, certain member states invoked the precautionary principle for dealing with the uncertain risks arising from GMOs, while others did not (Tosun 2013a). In this light, we assume that, when dealing with scientifically uncertain/ambiguous policy issues, venue contexts may critically influence the judgments of venue decision-makers. Generally, this reasoning should apply to almost all venues, because ultimately venue decision-makers make formal decisions. Florin (2014), for instance, has shown that bureaucratic agencies do not necessarily guide their decisions by following certain standard procedures that have been provided by scientific evidence; rather, even scientific bodies are responsive to societal or political pressures/demands.

NPBTs represent an ambiguous and scientifically uncertain issue, which is why regulatory decision-making on this topic is cutting edge. In other words, regulators may arrive at different assessments of these new breeding tools. There is reason to expect that certain contextual factors may crucially influence venue decision-makers' judgments on whether NPBTs should be regulated under the provisions already in place for GMOs. We therefore expect Cibus to choose venues located in contexts that are favorable to NPBT deregulation.

5.3.3 Reasons for Cibus' Venue Choices

The first contextual factor that we expect to favor NPBT deregulation, and which might have influenced Cibus' venue choices, relates to the application of agribiotech in domestic agriculture in the past. When farmers could plant GM crops or, put differently, where legislators did not prohibit them from doing so (even though appropriate legal possibilities existed), agribiotech served as a part of agricultural production. For this reason, future applications of NPBTs should be more likely in these countries. Accordingly, Cibus can be expected to choose venues in member states in which GMO farming took place since venue decision-makers should always consider the future relevance of agribiotech, for example, to the agricultural

productivity and competitiveness of a country and therefore decide in favor of NPBT deregulation.

The second factor of importance for this analysis is public support for agribiotech. Venue decision-makers are necessarily part of their respective societies, and collective attitudes on policy issues rub off on those of individual actors. So, if a national public is generally positive towards agribiotech, venue decision-makers in this country should also view this issue generally positively and voice regulatory opinions in favor of NPBTs. Given that venue decision-makers are influenced by public sentiment on policy issues, we expect Cibus to choose venues located in member states in which most citizens are open to agribiotech.

The third factor that we expect to influence Cibus' choices is political support for agribiotech. Governments usually have a leadership role vis-à-vis subordinate authorities. Hence, in countries where leading politicians are positive towards agribiotech, their top-down instructions are likely to materialize in venue decision-makers deciding in favor of NPBT deregulation. If agribiotech is supported at high political levels in a member state, this should increase Cibus' willingness to select a venue for inside-lobbying in this country.

The fourth factor relates to the economic relevance of domestic biotech sectors. National key industries can have a strong influence on the decisions of venue decision-makers as they often have long-standing working relationships with agency employees. Given that the operations of venue decision-makers are influenced by the importance of certain industry sectors, we expect Cibus to choose venues in member states that have strong biotech industries.

The fifth factor important for this study relates to domestic anti-GMO lobby groups. These groups, among others, consist of NGOs as well as environmental, agricultural and consumer associations and have mobilized against GMOs in many member states, compelling policy-makers on different levels to enact stricter regulations (see, e.g., Paarlberg 2014). Even though these groups have limited access to institutionally closed venues, they may interfere in venue-internal processes by

attracting public attention towards the unpopular topic of NBPTs and by mobilizing against it, which could ultimately result in venue decision-makers choosing to regulate NPBTs. Accordingly, we expect Cibus to select venues in those countries, in which anti-GMO groups are weak.

In sum, we expect Cibus to choose venues in member states in which: 1) agribiotech has been relevant in agricultural production; 2) the public is relatively open to agribiotech; 3) agribiotech is supported at high political levels; 4) biotech industries are powerful; 5) anti-GMO groups are weak.

5.4 Clarifications on Data and Methods

The dependent variable of this study, *CA Accessed*, is binary and takes the value 1 for those member states, in which CAs received Cibus' requests for scientific field trials with its NPBT-modified canola as prescribed by the EU's authorization procedure for the experimental release of GMOs into the environment (European Commission 2018a). There are two main reasons why Cibus used requests for scientific field trials to influence the EU regulatory process on NPBTs.[25]

To assess whether the feature of institutional 'closedness' influenced Cibus' venue choices, we discuss the 'closedness'/'openness' of several venues that the EU multi-level system provides and that the firm could have lobbied. Based on counterfactual reasoning, we examine whether it is plausible that this factor affected Cibus' venue choices. Accordingly, the data were gathered by means of Internet research on biotech lobbying and from previous research on venue shopping in the EU multi-level system.

To examine the effects of the factors specified in the previous section, we used different measurements. Generally, all indicators are not older than 2014, which is

[25] The first one is that the cultivation of the specific canola variety is considered suitable only for agricultural use in Scandinavian countries because of the climate. However, the company filed requests to countries across the EU. The second reason is that the specific herbicide-tolerance of the canola contradicted usual commercialization practices in the EU as crops with these traits are usually not used in EU agriculture (Agrarzeitung 2015).

important because Cibus performed its lobbying activities from 2011–2014. For methodical reasons, all indicators which were not already binarily were coded in this way. Table 15 below presents the indicators for all EU member states.

First, the indicator of *GMO farming* is used to assess whether the past application of agribiotech in domestic agricultures has influenced Cibus' choice. The indicator reports whether GM crops were ever cultivated commercially in a member state. The data were taken from the annual report of the US Department of Agriculture on agribiotech in the 28 EU member states (USDA Foreign Agricultural Service 2015a). Secondly, to measure the public support for GMOs in the member states, we used the result of the question of the 2010 Special Eurobarometer on Biotechnology, which asked the respondents whether they agreed or disagreed that the development of GM foods should be encouraged (European Commission 2010b). To make the indicator *Public GMO-support* binary, we calculated the average for all member states (25.96%), then separated the countries against this threshold.

Using data on the voting behavior of national governments on the authorization of new GM products in the Council of the European Union, we examine whether it affects Cibus' venue choices (*Council Voting)*. If governments voted more often 'Yes' or 'Abstention' than 'No', they can be assumed to support NPBT deregulation. In addition, we combined the 'Yes' and 'Abstention' votes, since the latter is usually considered a softer form of approval as abstentions prevent the Council from reaching qualified majorities, thereby prevent the authorization of GM products. The data on this variable were taken from Mühlböck and Tosun (2015).

The fourth indicator refers to the economic relevance of domestic biotech sectors and indicates whether or not a member state has a leading biotech industry. The data for the variable *Strong biotech industry* were taken from Cooper (2009: 537). Finally, to determine whether anti-GMO groups are influential – the fifth factor – we used the indicator *Weak Anti-GMO Lobby*, which indicates in binary fashion whether or not the environmental NGO 'Friends of the Earth' operates in a member state. We used this indicator as research has shown that this NGO, in particular,

functioned as the key actor of GMO resistance in several member states (Seifert 2012: 218). Since data on anti-GMO groups in the EU-28 were not available, we asked Friends of the Earth and Greenpeace for member data, but unfortunately, we did not receive it. Therefore, we took data for this variable from the Friends of the Earth Europe Annual Review (2014).

Based on the five binary indicators, we created a crosstab and calculated Cramers' V to explain Cibus' venue choices comparatively (see, Table 14 below). Cramers V is a contingency coefficient that lies between 0 and 1. It is a measure of the strength of the relationship between two nominally scaled variables if at least one of the two variables has more than two values. If Cramer's V = 0, then no association exists between two variables; if Cramer's V = 1, a perfect connection exists between the variables (Cramers' V = 0.1–0.3: weak association; 0.4–0.5 middle association; > 0.5 strong association).

Finally, to explore Cibus' venue choice for Germany, several primary data sources were used, including official documents, position papers, legal opinions, and scientific reports. In addition, partly redacted confidential communication between Cibus and the German CA were consulted. These data were obtained by German NGOs by means of a freedom of information request and can be accessed in the online appendix. Lastly, we complemented the database for the case study by drawing on insights from Corporate Europe Observatory (2016) and Sprink and colleagues (2016).

5.5 Empirical Analysis

Cibus considers itself the 'world leader in advanced breeding technologies, generally, and advanced non-transgenic [non-genetic engineering] breeding, specifically' (Cibus 2018). The company employs a breeding technique called 'Rapid Trait Development System', which, it claims, facilitates non-genetic engineering plant breeding. Using this breeding tool, the company developed several plants: herbicide tolerant canola, Glyphosate tolerant flax, herbicide-tolerant rice, and potato

resistant to Phytophthora (Cibus 2018). However, none of these products have been commercialized in the EU yet – unlike in other countries, including, the US and Canada (The Western Producer 2016).

5.5.1 Assessing the Effect of Institutional Closedness on Cibus' Choices

As indicated above, the fundamental competences for the regulation of NPBTs reside at the EU level, where the European Commission, the Council of the European Union, the European Council, the European Parliament, the CJEU, the EFSA, as well as the various subdivisions of these bodies, such as the Directorate-Generals in the European Commission, all represent possible venues that Cibus could have accessed (Beyers and Kerremans 2012). Most of these venues, except for the European Parliament, are rather closed in institutional terms, for which reason one might think that they offered promising venues for Cibus aspirations.[26] However, lobbying these venues would not have guaranteed success for the company, because EU institutions have failed for about a decade to establish an NPBT regulatory approach, as indicated in Section 2 above. Hence, it is highly plausible that the persistent EU regulatory gridlock on NPBTs compelled Cibus to make use of the multilevel system and look out for promising venues for their promotion of NPBT deregulation at the member state level. Consequently, Cibus selected national CA's for its lobbying strategy.

The CAs are staffed with appointed and career professionals and are designed to concentrate their scientific and technical expertise on tasks ranging from food, animal feed, consumer products, pesticides, and veterinary drugs to GMOs. The national agencies work closely together within the network on GMO risk assessment, which allows them to share information, expertise and practices among each other and particularly with EFSA (European Food Safety Authority 2018). Both the CA-

[26] The consequences of the institutional 'openness' of the European Parliament is shown by the fact that a proposal filed by a British MP (EPP) in 2016 (i.e. after Cibus' activities) to classify NPBTs as 'precision breeding' (i.e. not genetic engineering) was cut from the European Parliament's agenda before it reached the decision-making stage (European Parliament 2016).

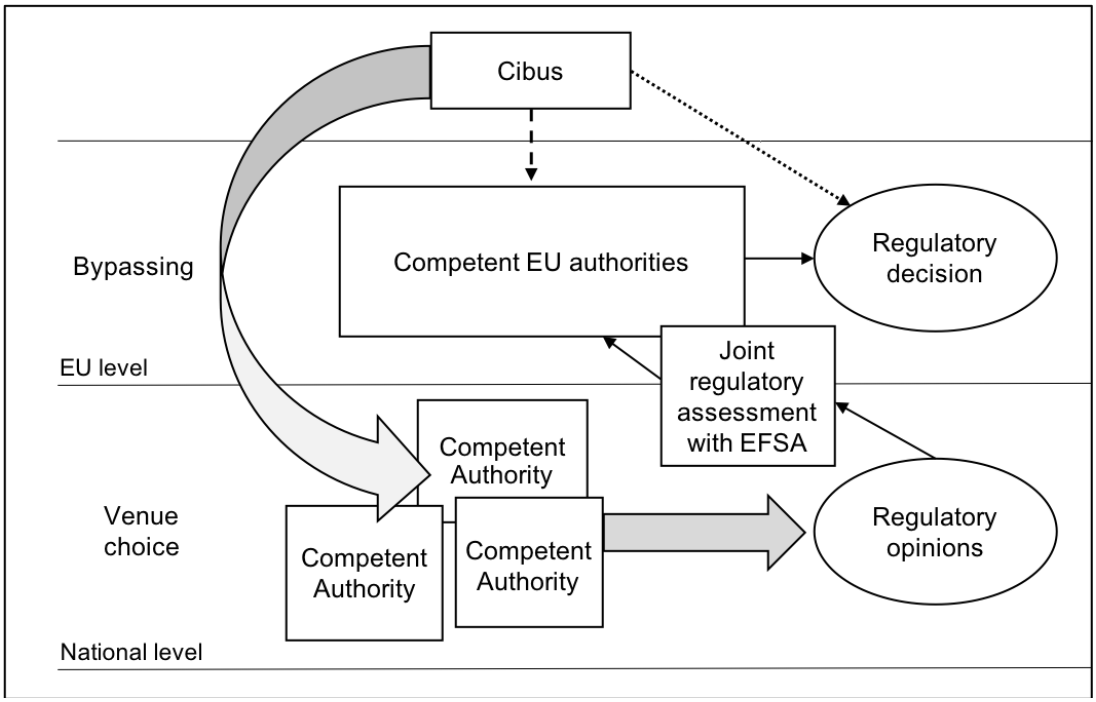
internal processes as well as their operations within expert networks take place behind closed doors. Usually, the agencies only publish their final assessments and press releases, and internal processes are generally not accessible to the public. Therefore, external actors have extremely limited possibilities to intervene in either the internal or network-based processes of the CAs.

For this reason, it seems plausible that Cibus' selected the CAs because of their institutional closedness. The company could be certain that social debates and policy conflicts would be unlikely to emerge from their accessing of these venues, which consequently increased its likelihood of success. Nevertheless, we cannot provide sufficient evidence at this point that Cibus' venue choices were in fact primarily affected by the feature of closedness, since two other factors are also likely to have influenced its choices.

The first of these concerns the necessary competences of venue decision-makers to assess whether NPBT-modified crops represent GMOs. This decision is such a complex one that many venue decision-makers, such as politicians, cannot even answer it competently at all. However, the CA professionals have the scientific and technical expertise to classify NPBTs on scientifically sound bases. The second factor relates to the fact that the basic regulatory decisions on NPBTs are taken at the EU level and not at national or regional levels. Hence Cibus could, for instance, have lobbied competent ministries, such as those for agriculture or certain expert commissions. However, this would not have been expedient for them, for the influence of these venues on the NPBT regulatory process at the EU level, even though it may be present, is generally unclear. The CAs can, however, use the institutionalized cooperation bodies with EFSA to exert influence over the regulatory assessment of biotechnology products (see below).

The opportunity structure, as well as the way Cibus aimed to influence the EU regulatory process on NPBTs, is schematized in Figure 10. Cibus made use of two institutional procedures as defined by EU law. The first one is the authorization procedure for experimental GMO releases carried out by national agencies in the member states, namely CAs. The second procedure is the institutionalized cooperation of these national bodies with EFSA in the regulatory assessment of biotechnology products.

Figure 10. Scheme of the Opportunity Structure



Source: own presentation.

The authorization procedure for the experimental release of GMOs into the environment requires that a 'person or a company […]first obtain written authorisation by the competent national authority of the [m]ember [s]tate within whose territory the experimental release is to take place' (European Commission 2018a). Usually, when a CA has to decide on a request for an experimental release, it bases its decision on an evaluation of the risks to the environment and human health presented by the GM crop (Directive 2001/18/EC). The European Commission (2018a) denominates such an authorization process as a 'purely national procedure as it is only applicable in the [m]ember state where the notification was submitted'.

However, Cibus did not request the CAs for scientific releases of GM crops, which would have triggered the standard procedure commonly applied for years. Rather, the company requested the bodies for scientific releases of a crop modified by its new breeding technique (Rapid Trait Development System). Hence the request denoted a completely new challenge for the CAs, which had to evaluate whether they considered the crop a GMO. Only after these assessments could they decide on the release of the Cibus' modified canola. Of course, the firm could have performed this lobbying strategy during the phase of NPBT regulatory gridlock at the EU level, as indicated in Section 5.2.

In the second procedure, the CAs cooperate with EFSA in the regulatory assessment of biotechnology products. EFSA is the key player for scientific advice on and risk assessment of food products developed by agricultural biotechnology at the EU level (Paoletti *et al.* 2008). While EFSA provides scientific information, the decision-making on the authorization, inspection, and control of products is the responsibility of the risk managers, namely the European Commission and the individual member states. Although the member states mainly function as risk managers, at least two channels exist by means of which national decisions can influence regulatory activities at the EU level.

First, the CAs can influence GMO assessments conducted by the EFSA. They do this by issuing opinions on EFSA safety assessments when GM products are to be cultivated or processed commercially. EFSA consults the CAs on every GMO application and provides feedback to their scientific concerns during the risk assessment process (Paoletti *et al.* 2008: 71). Secondly, national bodies can promote their views by means of information and expertise exchange as well as by best practices within a joint network, in which they work together with EFSA on certain projects on GMO risk assessment (European Food Safety Authority 2018).

Taken together, there is reason to assume that Cibus' venue choices were indeed influenced by the feature of institutional closedness. Nevertheless, apparently, two other factors also motivated Cibus to choose the national CAs: their specific

competence for classifying NPBTs, and their privileged ability to influence EU regulatory decision-making via EFSA. Since the CAs were institutionally closed, capable to assess NPBTs in regulatory terms, and could, at least in principle, influence EFSA opinions, they represented favorable venues for Cibus' lobbying aspirations. Nevertheless, our results on institutional closedness are not entirely clear, which is why we further examine the relevance of this aspect in the in-depth study on Germany.

5.5.2 Comparative Explanation of Cibus' Venue Choices

When Cibus started filing requests for field experiments in 2011, the firm lacked information regarding how the CAs would classify NPBTs in regulatory terms, for these bodies had scarcely dealt with the issue of NPBT regulation. After all, NPBTs only started to be developed during the mid-2000s, and for years no commercially relevant applications existed that would have activated the CAs to deal with this issue.[27] Due to this lack of information, Cibus presumably had strong incentives to consider certain contextual factors in their assessment of how successful they were likely to be when lobbying CAs in particular member states.

Table 13 shows that Cibus chose CAs in six EU member states, namely Finland, Germany, Ireland, Sweden, Spain, and the UK in order to provide regulatory opinions on its NPBT-modified canola. Even though it is not the focus of this study, the company's success in this regard should be noted as each of the CAs came to the opinion that the crop should not be regulated as a GMO.[28] Can these – from Cibus' point of view, successful – venue choices be in terms of the indicators introduced above?

[27] The first NPBT crops reached marketability in the early 2010s, which increased the need for appropriate regulatory frameworks, including the legal assessment of NPBTs, around the world (Wolt *et al.* 2016).

[28] In addition, the authorities noted that if the European Commission arrived at a differing evaluation, they would reconsider their opinions. Although Cibus' main interest was not to conduct field trials in these countries, it started executing field trials in Sweden and the UK after the authorities permitted these experiments (Gen-ethisches Netzwerk 2015).

Table 13. The CAs' Regulatory Opinions upon Cibus' Request, 2011–2014

Member State	Competent Authority	Regulatory Opinion
Finland	Finnish Board of Gene Technology	non-GE
Germany	Federal Office of Consumer Protection and Food Safety	non-GE
Ireland	Food Safety Authority of Ireland	non-GE
Spain	Inter-ministerial Council for GMOs	non-GE
Sweden	Swedish Board of Agriculture	non-GE
United Kingdom	Department for Environment, Food and Rural Affairs	non-GE

Source: Own compilation based on various data sources.

Table 14 presents the results of a crosstab of the 28 EU countries, separated into 'CA Accessed' and 'Other Member States' – i.e. those which have not received request for field trials by Cibus. In addition, the crosstab encompasses the five indicators introduced for calculating the associations for each of them separately. The following interpretation of the results can be easily comprehended by using the overview of the member states and the indicators given by Table 15 below.

The calculation of Cramer's V in Table 14 shows that no association exists between *GMO Farming* and Cibus' venue choices. The company filed requests to only two of the six countries in which GMO cultivation took place, namely Germany and Spain (33,3%). However, GMO farming was of minor importance in Germany until it was banned in 2009 (Cooper 2009). Only in Spain, where the EU-wide most liberal GMO regulatory framework exists, does GM maize continue to be an important economic factor. Remarkably, the firm also targeted Finland, Ireland, Sweden, and the UK, even though farmers have never cultivated GM crops for commercial purposes in these countries (Table 15). Furthermore, farmers also planted GM crops in six member states, whose CAs did not receive requests from Cibus (27,27%): the Czech Republic, France, Poland, Portugal, Romania, and Slovakia.

Table 14. Results of the Crosstab

	CA Accessed (6 MS)	**Other Member States (22 MS)**	**Cramer's V (p-value)**
GMO Farming	33,3% (2 MS)	27,27% (6 MS)	0,0535 (0,8231)
Public Opinion	83,33% (5 MS)	45,45% (10 MS)	0,3117 (0,2351)
Council Voting*	100% (6 MS)	33,33% (7 MS)	0,5548 (0,0156)
Strong Biotech Industry	66,66% (4 MS)	9,09% (2 MS)	0,5757 (0,0129)
Weak Anti-GMO Lobby	16,66% (1 MS)	22,73% (5 MS)	0,0598 (0,8065)

* Bulgaria was excluded from the analysis.

The computation of Cramer's V indicates a weak relationship between those countries which Cibus targeted and public support for agribiotech (*Public Opinion)*. The firm lobbied Ireland, Finland, Sweden, Spain, and the UK (83,33%) – all countries, whose populations view agribiotech relatively positive (Table 15). Of the six countries accessed, only in Germany was public opinion below the average of all the member states. The publics in Belgium, the Czech Republic, Denmark, Estonia, Hungary, Malta, the Netherlands, Poland, Portugal, and Slovakia also consider agribiotech relatively positive (Table 15; 45,45%); however, Cibus did not file requests to those countries' CAs.

Cramer's V shows a strong association for *Council Voting*. In other words, all countries in which CAs were requested by Cibus voted in favor of the authorization of new GM products in the Council of the European Union (100%). This pattern even includes Germany, which often abstained from such votes due to inter-ministerial disagreement (see above). Remarkably, seven other countries – Belgium, Czech Republic, Estonia, France, Netherlands, Slovakia, and Slovenia – also voted

mostly in favor of new authorizations in the Council (33,33%); however, none of their CAs received Cibus' requests.

Table 14 also shows a strong association for *Strong Biotech Industry*. Of the countries with powerful biotech industries, Finland, Germany, Sweden, and the UK have been lobbied by the firm (66,66%). While France and the Netherlands, the other two member states with powerful biotech sectors, were not lobbied by Cibus (9,09%), Ireland and Spain received requests for field experiments with the modified canola, even though they have no major biotech industries (Table 15).

Finally, Table 14 shows that no association exists between the indicator *Weak Anti-GMO Lobby* and Cibus' venue choices. Of the member states lobbied by the firm, only the UK has a non-influential anti-GMO lobby (16,66%). The other member states with weak anti-GMO lobbies are Greece, Italy, Portugal, Romania, and Slovenia (Table 15, 22,73%). From our point of view, the indicator employed for this variable seems rather reliable for Portugal, Romania, and Slovenia; however, it does not appear to fit with Greece and Italy since these two countries have relevant anti-GMO lobbies, which mostly come from the agricultural sector and defend the economic interests of organic and conventional food production chains.

Taking the observations together, two factors can be observed that appear to have influenced Cibus' choices for CAs in certain member states: high-level political support for agribiotech *(Council Voting)* and the high relevance of biotech sectors *(Strong Biotech Industry)*. Values for Cramer's V for these main explanatory factors are statistically significant at the 5% level, which further strengthens our results, especially when considering the low number of cases (p-values: 0,0156; 0,0129). Public support for GMOs *(Public Opinion)* turned out to have minimal influence. The relationship is also not statistically significant. It should be noted, however, that, due to the small number of cases, weak associations are less likely to be statistically significant in general. Virtually no association could be observed for the agricultural application of biotechnology in the past *(GMO Farming)* nor for the weakness of domestic anti-GMO lobby groups (*Weak Anti-GMO Lobby)*.

Table 15. Overview of the Indicators

	Member State (* CA Accessed)	GMO Farming	Public Opinion	Council Voting	Strong Biotech Industry	Weak Anti-GMO Lobby
1	Austria					
2	Belgium		X	X		
3	Bulgaria			-		
4	Croatia					
5	Cyprus					
6	Czech Republic	X	X	X		
7	Denmark		X			
8	Estonia		X	X		
9	Finland*		X	X	X	
10	France	X		X	X	
11	Germany*	X		X	X	
12	Greece					X
13	Hungary		X			
14	Ireland*		X	X		
15	Italy					X
16	Latvia					
17	Lithuania					
18	Luxembourg					
19	Malta		X			
20	Netherlands		X	X	X	
21	Poland	X	X			
22	Portugal	X	X			X
23	Romania	X				X
24	Slovakia	X	X	X		
25	Slovenia			X		X
26	Spain*	X	X	X		
27	Sweden*		X	X	X	
28	United Kingdom*		X	X	X	X

Note: Bulgaria voted each once with 'Yes' and 'No' in the Council.

The varying associations can also be seen in cases that arguably provide relatively unfavorable contexts for Cibus' objective of NPBT deregulation. For instance, Table 15 indicates that GM crops have never been cultivated commercially in Ireland, that the Irish biotech industry is not particularly powerful, and that anti-GMO

lobbies exist in this country. Nevertheless, Cibus' lobbied the country, presumably because Irish governments strongly supported GMOs.

Based on these findings, it is also worth considering the countries that were not selected by Cibus, since several interesting patterns can be observed. According to Table 15, the Czech Republic and Slovakia in particular would have represented rather favorable contexts for Cibus' venue strategy. In both countries, farmers commercially cultivated GM crops, the public was relatively positive regarding GMOs, and governments mostly voted in favor of new GM products. However, since the factor of strong biotech industries appears to have had a rather strong influence on Cibus' venue choices, Cibus might have been motivated to leave these two countries out of its lobbying strategy since of neither them have especially strong biotech sectors.

Furthermore, interesting patterns exist regarding a large group of countries to which Cibus also filed no requests. Austria, Bulgaria, Croatia, Cyprus, Greece, Italy, Latvia, Lithuania, and Luxembourg all represent countries that are characterized by overtly unfavorable contexts in terms of the indicators (Table 15). The fact that no CAs in these countries were chosen by Cibus generally substantiates our empirical observations above. Finally, there is another group of countries that is characterized by rather favorable contexts for NPBT deregulation, which, however, has also not been lobbied by the firm. This group consists of Belgium, Estonia, France, the Netherlands, Poland, and Portugal (Table 15).

Overall, we find empirical support for the reasoning that Cibus selected CAs in member states where agribiotech is supported politically at high levels and where strong biotech industries exist. It becomes even clearer that Cibus made their venue choices for strategic reasons, when considering also those member states whose CAs were not accessed by the company. Next, the case of Germany is investigated in order to reflect both the relevance of institutional closedness and certain venue-external factors. In addition, the case study serves to explore venue-internal factors that might have influenced Cibus' venue choices.

5.5.3 Explaining Cibus' Choice of Germany

In 2014, the German CA – the Federal Office for Consumer Protection and Food Safety (BVL) – received Cibus' request for field experiments by Perseus Consulting (Perseus), a consultancy that specializes in 'biotechnology regulatory challenges' (Perseus 2018). The BVL's response to this request provide enlightening insights for our argument regarding institutional closedness. The BVL wrote back that

> *'the evaluation of your request by the BVL will not include any participation or active information of the public or involvement of other authorities. We will probably ask our national expert committee (ZKBS [Central Commission for Biological Safety]) for an opinion on the request.'*

This statement indicates that the BVL was aware of how important it was for Cibus that the proceedings take place behind closed doors. Therefore, even the German CA's awareness that Perseus wanted the regulatory assessment to be dealt with away from other stakeholders and the public supports our above reasoning regarding institutional closedness.

Technical Information & Personal Contacts

In fact, the BVL mandated the ZKBS to be the evaluation authority. This advisory body should now assess whether the modified canola falls into the scope of the German genetic engineering law, which reflects the GMO definition included in Directive 2001/18/EC. What is important here is that the ZKBS had already published a position paper on NPBTs in 2012. Therein, the experts concluded that most NPBT-modified products, including such produced by Cibus, should not be considered and regulated as GMOs (BVL 2012). In fact, the committee, upon the BVL's mandate and in line with its previous opinion, classified Cibus' canola as non-GMO (ZKBS 2015). Does this opinion represent an unpredictable, fortunate decision for Cibus or did its consultant, Perseus, know about how ZKBS would classify the crop?

Apparently, the latter holds true. In the request for the field trials sent to the CAs, Perseus, among many other things, refers to the ZKBS's 2012 regulatory opinion

(Perseus 2014). Most importantly, Perseus states therein that the ZKBS concluded that 'organisms which have been generated using the ODM [Oligo Directed Mutagenesis] technique are not GMOs' (Perseus 2014: 9). To make this clear: it is scientifically widely undisputed that the breeding technique employed by Cibus to modify the canola (Rapid Trait Development System) represents one variant of ODM. Interestingly, Perseus, in its request for field trials, also referred to the regulatory opinions from two other CAs that received requests – the UK DEFRA and the Swedish Board of Agriculture, which had also concluded that the canola would not fall in the scope of their respective national GMO legislations (Perseus 2014: 8).

Hence, it can be concluded that Perseus was aware that the BVL would mandate the ZKBS to evaluate Cibus' canola. On this ground, the consultant apparently anticipated the BVL's regulatory opinion. Ultimately, in early-2015, Cibus received the response from the German CA, Perseus had anticipated. In fact, the BVL stated that the canola would not be considered a GMO in Germany, wherefore it would be deregulated, which means that field trials with the crop could be conducted without regulatory oversight (BVL 2015a).

Since personal contacts lie at the centre of theoretical considerations on inside-lobbying tactics, we also attempted to empirically investigate a possible influence of such relationships between the lobbyist (Perseus/Cibus) and the venue decision-maker (BVL) on Cibus' venue choices. Therefore, we asked several actors for interviews; however, unfortunately, we could interview only one expert as the others have not responded to our requests. The anonymous expert did not want to comment on possible personal contacts, however, according to the expert, a personal relationship appeared as not being decisive for Cibus to request the BVL. Instead, the interviewee pointed out that it would have been much more important that the outcome of the inquiry to the BVL had been open in principle, which means that the BVL could have assessed Cibus' rape as a GMO but also as a non-GMO. This is remarkable, as it corresponds with our above observation regarding the relevance of the ZKBS (2012) regulatory opinion.

Nonetheless, to shed at least some light to whether personal contacts influenced Cibus' venue choices we again consulted the e-mail correspondence between Perseus and the BVL. The e-mails at least suggest that personal contacts between both sides might have existed. The fact that the leading officials of Perseus and the BVL addressed each other by their forenames in the e-mails at least points into that direction, especially when considering that, in Germany, people usually use their forenames if a personal relationship exists. Although this observation might indicate a personal relationship, it is far from being sufficient enough to draw any conclusion regarding whether this influenced Cibus to choose the BVL for its lobbying strategy.

In sum, one venue-internal factor appears to have influenced Cibus' choice for the German CA, namely the 'technical information' published by the ZKBS in 2012. Since Perseus apparently knew the bureaucratic procedure, according to which the BVL usually relies on ZKBS opinions in such cases, the firm could be confident that lobbying the BVL would be successful.

Anti-GMO groups

Finally, the German case illustrates the relevance of anti-GMO groups, a venue-external factor that we viewed as being of minor importance for the venue choices taken by Cibus above. First of all, Germany diverges significantly from the other five countries that were lobbied because it is the only one in which the CAs' decision to deregulate Cibus' canola sparked strong resistance of an anti-GMO coalition. In Germany, this coalition consisted of various environmental, agricultural, and consumer associations. Responding to the BVL's de-regulatory decision, the anti-GMO coalition legally contested it in March 2015. The coalition stated that the BVL would not have the competence to evaluate whether the canola represented a GMO and that this regulatory decision would fall into the sole competences of the European Commission. Moreover, the objection criticized that a non-application of co-existence rules to Cibus' canola would carry high risks of crossover with conventional

canola as this crop is one of the most frequently planted crops in Germany (Brockmannn 2015).

In June 2015, the BVL (2015b) rejected the legal objection and confirmed its initial notification, though this did not induce the anti-coalition to resign. On the contrary, the latter issued a legal complaint against the BVL's rejection in July 2015, obligating the BVL to inform the European Commission by the end of that same month that the court proceedings effectuated a suspension of its regulatory decision. As a result, this prohibited Cibus from carrying out further field trials in Germany, at least not until a final court decision was reached. In the meantime, in June 2015, as another result of these proceedings in Germany, the European Commission (2015) warned the member states against the unauthorized approval of field trials with Cibus' canola.

The authority stated that it had already conducted a legal analysis of NPBTs and their resulting products against the backdrop of Directive 2001/18/EC. They therefore asked the member states to adopt a 'protective approach', which meant that they should not approve field trials with the canola – as well as stop existing experiments – until the legal status of NPBTs could be clarified at the EU level (European Commission 2015). It took three more years until the CJEU ruled that the NPBTs represent genetic engineering techniques and that products of these new tools fall within the scope of Directive 2001/18/EC (CJEU 2018). Accordingly, the BVL withdrew its regulatory opinion on Cibus' canola in August 2018, and, since then, the scientific authority has considered the modified crop as being a GMO (BVL 2018).

Taken together, the in-depth study substantiates our assumption that institutional closedness represented an important factor for Cibus when calculating its venue choices, since the BVL and Cibus' consultant, Perseus, addressed the topics of limited participation and transparency in their communication. Moreover, the venue-internal factor of technical information provided by a venue helps explaining Cibus' choice for Germany. Whether personal contacts influenced the choice for Germany could not be clarified sufficiently. However, we could show that venue-

external factors can be significant when determining whether lobbyists will achieve their policy goals because a German anti-GMO coalition managed to interfere with the processes of the BVL. Finally, we could show that Cibus accessed the German CA hoping that this would remain hidden; however, the anti-GMO coalition became active and prevented Cibus from obtaining a blank check for NPBT deregulation.

5.6 Concluding Remarks

This study investigated the inside-lobbying activities of Cibus, a US biotech firm that advocated the deregulation of NPBTs within the EU and hoped thereby to market its newly modified seeds to EU farmers. Based on the concept of venue shopping, the study focused on two main explanations for why this firm chose national CAs in certain member states to pursue NPBT deregulation. By using different sources and methods, the study found general support for both arguments, namely that advocates of unpopular policy objectives favor institutionally closed venues and that they strategically assess the favorability of certain contextual factors before choosing venues.

The results of this study support the argument that advocates of unpopular policy objectives favor institutionally closed venues as these reduce the risk of policy conflicts entering the public sphere. In principle, the EU multi-level system provided Cibus with multiple channels and targets for lobbying NPBT deregulation. However, the company chose the CAs as it could be certain that social debates and policy conflicts would be unlikely to emerge from accessing these bureaucratic and science-based authorities. The case study on Germany substantiates this finding as limited participation and transparency have been important issues in the communication between the German CA (BVL) and Cibus' consultancy Perseus. However, it also turned out that Cibus' chose the CAs both because of their specific competences, which allowed them to classify NPBT-modified crops in regulatory terms, and because of their influence on EU decision-making.

The second major argument explaining Cibus' venue choices was based on the assumption that venue decision-makers ultimately represent the key actors who determine whether lobbying activities in these decision-making arenas will be successful. We argued that when advocates lack information regarding the decisions which venue decision-makers will likely make, they will strategically consider venue contexts, for these influence the judgments of venue decision-makers when dealing with issues that are cutting-edge in terms of scientific uncertainty and decision ambiguity. Five indicators were used for assessing how favorable national contexts were towards NPBT deregulation, and two factors were ascertained as explanations for Cibus' choices of Finland, Germany, Ireland, Sweden, Spain, and the UK. The first one relates to the high-level political support for agribiotech, as measured by the voting behavior of national governments on the authorization of new GM products in the Council of the European Union. The second factor refers to the economic relevance of national biotech industries, as provided by Cooper (2009). While public opinion on GMOs turned out to have minimal influence, virtually no associations could be observed for prior agricultural application of biotechnology nor for the weakness of domestic anti-GMO lobby groups.

Finally, the case study of Germany revealed that one venue-internal factor also influenced Cibus' choice for this country, a member state that can be considered as being 'conflicted' on agribiotech. This factor relates to specific technical information provided by the venue. More precisely, Cibus could be sure that lobbying the German CA would be successful as it had access to an opinion promoting the deregulation of NPBTs, which was published by the German expert panel (ZKBS) in 2012. Apparently, Cibus knew that this opinion would function as the basis of the BVL's decision.

Overall, the study showed that lobbyists may carefully consider venue-internal and -external factors to calculate their chances of success before opting for certain venues. Nevertheless, this study examined a very specific empirical case, which is why the generalizability of the results obtained is limited. In order to produce more

generalizable insights, and to examine the importance of other influential factors, further qualitative research is needed. Future inquiries could, for instance, analyze how influential resource endowments are for lobbyists' venue choices. This determinant is widely considered influential, but did not play a role in the case at hand.

The central take-home message for companies and business associations is that looking out for suitable venues is worthwhile, especially if they are seeking to promote unpopular topics. Institutionally closed venues are particularly suitable for advancing unpopular topics, but the suitability of each needs to be carefully assessed in order to minimalize the risk of producing negative effects. In addition, considering venue-internal information, such as the decisions which decision-makers will (most probably) reach on certain issues, and venue-external information, such as societal and political support for policy topics, is particularly important. Policy-makers can take away from this piece that scientifically and technically-based decisions can spark societal conflicts if they become known to the general public. If this is the case, political actors need to take the appropriate decisions through democratic procedures. Finally, if civil society is interested in uncovering inside-lobbying activities, it should support respective interest groups and NGOs as these have the means to investigate such lobbying tactics, initiate public discourses, and even take legal action.

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Appendix

Table A1. List of Municipalities with Cultivation Bans

Name of municipality	State	Date
München	Bavaria	01.02.1999
Riedstadt	Hesse	24.06.1999
Adendorf	Lower Saxony	15.07.1999
Schwebheim	Bavaria	26.08.1999
Maintal	Hesse	06.09.1999
Burgkunstadt	Bavaria	17.09.1999
Kümmersbruck	Bavaria	12.10.1999
Langenhagen	Lower Saxony	29.11.1999
Reutlingen	Baden-Wuerttemberg	15.12.1999
Neetze	Lower Saxony	17.02.2000
Burgdorf (Hannover)	Lower Saxony	09.03.2000
Seligenstadt	Hesse	28.03.2000
Waldbüttelbrunn	Bavaria	03.05.2000
Friedrichsdorf (Taunus)	Hesse	18.05.2000
Neustadt an der Aisch	Bavaria	07.06.2000
Nidderau	Hesse	16.06.2000
Blaubeuren	Baden-Wuerttemberg	01.09.2000
Hannover	Lower Saxony	01.09.2000
Schwalmtal (Niederrhein)	North Rhine-W.	29.11.2000
Margetshöchheim	Bavaria	01.01.2001
Blaustein	Baden-Wuerttemberg	24.04.2001
Witzenhausen	Hesse	01.04.2003
Neuendettelsau	Bavaria	15.12.2003
Wetter (Ruhr)	North Rhine-W.	16.12.2003
Markt Emskirchen	Bavaria	20.02.2004
Laatzen	Lower Saxony	26.02.2004
Gerhardshofen	Bavaria	15.04.2004
Gutenstetten	Bavaria	19.04.2004
Münchsteinach	Bavaria	20.04.2004
Marburg	Hesse	30.04.2004
Blomberg (Lippe)	North Rhine-W.	01.05.2004
Ingolstadt	Bavaria	19.05.2004
Lüneburg	Lower Saxony	27.05.2004
Schlangenbad	Hesse	02.06.2004
Darmstadt	Hesse	24.06.2004
Hüttisheim	Baden-Wuerttemberg	29.06.2004
Uhldingen-Mühlhofen	Baden-Wuerttemberg	29.06.2004

Mechernich	North Rhine-W.	06.07.2004
Bad Zwesten	Hesse	08.07.2004
Herdecke	North Rhine-W.	15.07.2004
Bochum	North Rhine-W.	20.07.2004
Mösbach	Baden-Wuerttemberg	31.07.2004
Tittmoning	Bavaria	05.08.2004
Sehnde	Lower Saxony	29.08.2004
Schöffengrund	Hesse	13.10.2004
Metzingen	Baden-Wuerttemberg	14.10.2004
Lengerich (Westfalen)	North Rhine-W.	23.11.2004
Freiburg im Breisgau	Baden-Wuerttemberg	14.12.2004
Kassel	Hesse	24.01.2005
Ühlingen-Birkendorf	Baden-Wuerttemberg	24.01.2005
Neuss	North Rhine-W.	02.02.2005
Kirchhain	Hesse	14.02.2005
Nettetal	North Rhine-W.	22.02.2005
Augsburg	Bavaria	04.03.2005
Klettgau	Baden-Wuerttemberg	14.03.2005
Pattensen	Lower Saxony	15.03.2005
Waldbronn	Baden-Wuerttemberg	13.04.2005
Neunkirchen (Hunsrück)	Rhineland-Palatine	19.04.2005
Dortmund	North Rhine-W.	21.04.2005
Ansbach	Bavaria	13.05.2005
Eberswalde	Brandenburg	16.05.2005
Leipzig	Saxony	18.05.2005
Karlsbad (Baden)	Baden-Wuerttemberg	06.06.2005
Tübingen	Baden-Wuerttemberg	13.06.2005
Kamen	North Rhine-W.	14.06.2005
Bornheim	North Rhine-W.	31.08.2005
Weingarten (Baden)	Baden-Wuerttemberg	28.11.2005
Berliner Stadtgüter	Berlin	09.12.2005
Königsmoos	Bavaria	13.02.2006
Leingarten	Baden-Wuerttemberg	24.02.2006
Karlsruhe	Baden-Wuerttemberg	28.03.2006
Neustrelitz	Mecklenburg-West P.	30.03.2006
Dossenheim	Baden-Wuerttemberg	25.04.2006
Markt Langquaid	Bavaria	03.05.2006
Huglfing	Bavaria	04.05.2006
Waghäusel	Baden-Wuerttemberg	08.05.2006
Nußloch	Baden-Wuerttemberg	17.05.2006
Mögglingen	Baden-Wuerttemberg	29.06.2006
Lahr (Schwarzwald)	Baden-Wuerttemberg	15.08.2006
Greven	North Rhine-W.	24.08.2006
Ladbergen	North Rhine-W.	21.09.2006
Deidesheim	Rhineland-Palatine	21.09.2006
Ampfing	Bavaria	10.10.2006
Lauffen am Neckar	Baden-Wuerttemberg	25.10.2006
Weiden in der Oberpfalz	Bavaria	27.10.2006

Speyer	Rhineland-Palatine	14.11.2006
Emsdetten	North Rhine-W.	29.11.2006
Rostock	Mecklenburg-West P.	06.12.2006
Wiesenfelden	Bavaria	07.12.2006
Bonn	North Rhine-W.	14.12.2006
Saerbeck	North Rhine-W.	14.12.2006
Markt Offingen	Bavaria	08.01.2007
Hennef	North Rhine-W.	16.01.2007
Lichtenau (Baden)	Baden-Wuerttemberg	23.01.2007
Fischbachtal	Hesse	30.01.2007
Wendlingen am Neckar	Baden-Wuerttemberg	16.02.2007
Röbel	Mecklenburg-West P.	20.02.2007
Waren (Müritz)	Mecklenburg-West P.	22.02.2007
Zepkow	Mecklenburg-West P.	08.03.2007
Chemnitz	Saxony	14.03.2007
Schotten	Hesse	15.03.2007
Lauda-Königshofen	Baden-Wuerttemberg	19.03.2007
Fincken	Mecklenburg-West P.	20.03.2007
Grünsfeld	Baden-Wuerttemberg	27.03.2007
Bühl (Baden)	Baden-Wuerttemberg	28.03.2007
Bollewick	Mecklenburg-West P.	29.03.2007
Sietow	Mecklenburg-West P.	29.03.2007
Strausberg	Brandenburg	29.03.2007
Melz	Mecklenburg-West P.	02.04.2007
Buchholz (bei Röbel)	Mecklenburg-West P.	04.04.2007
Stuer	Mecklenburg-West P.	12.04.2007
Bad Nauheim	Hesse	26.04.2007
Igersheim	Baden-Wuerttemberg	26.04.2007
Kammerstein	Bavaria	01.05.2007
Günzburg	Bavaria	07.05.2007
Obertaufkirchen	Bavaria	16.05.2007
Echzell	Hesse	21.05.2007
Schopfheim	Baden-Wuerttemberg	21.05.2007
Büchenbach	Bavaria	22.05.2007
Creglingen	Baden-Wuerttemberg	22.05.2007
Wertheim	Baden-Wuerttemberg	22.05.2007
Bernbeuren	Bavaria	23.05.2007
Bad Rappenau	Baden-Wuerttemberg	30.05.2007
Windeck	North Rhine-W.	30.05.2007
Königheim	Baden-Wuerttemberg	18.06.2007
Florstadt	Hesse	29.06.2007
Glauburg	Hesse	04.07.2007
Markt Pretzfeld	Bavaria	24.07.2007
Rednitzhembach	Bavaria	26.07.2007
Markt Schwanstetten	Bavaria	31.07.2007
Kempten	Bavaria	02.08.2007
Altenstadt	Hesse	09.08.2007
Havixbeck	North Rhine-W.	06.09.2007

Ginsheim-Gustavsburg	Hesse	15.09.2007
Bodolz	Bavaria	27.09.2007
Wasserburg	Bavaria	09.10.2007
Malchin	Mecklenburg-West P.	17.10.2007
Markt Neunkirchen am Brand	Bavaria	17.10.2007
Markt Bad Grönenbach	Bavaria	22.11.2007
Memmingen	Bavaria	29.11.2007
Hohenpeißenberg	Bavaria	19.12.2007
Soltau	Lower Saxony	20.12.2007
Markt Weiler-Simmerberg	Bavaria	11.02.2008
Fischen im Allgäu	Bavaria	18.02.2008
Schnaitsee	Bavaria	19.02.2008
Ortenberg	Hesse	26.02.2008
Bernau bei Berlin	Brandenburg	28.02.2008
Ingersheim	Baden-Wuerttemberg	11.03.2008
Amöneburg	Hesse	17.03.2008
Jengen	Bavaria	17.03.2008
Oberkirch	Baden-Wuerttemberg	31.03.2008
Oberasbach	Bavaria	07.04.2008
Oberreute	Bavaria	08.04.2008
Röthenbach	Bavaria	15.04.2008
Ellwangen (Jagst)	Baden-Wuerttemberg	17.04.2008
Pankow	Berlin	17.04.2008
Welzheim	Baden-Wuerttemberg	22.04.2008
Hergensweiler	Bavaria	28.04.2008
Alfdorf	Baden-Wuerttemberg	05.05.2008
Schwäbisch Gmünd	Baden-Wuerttemberg	11.06.2008
Weimar	Thuringia	11.06.2008
Lindau	Bavaria	17.06.2008
Obermichelbach	Bavaria	17.06.2008
Gnarrenburg	Lower Saxony	23.06.2008
Burggen	Bavaria	24.06.2008
Hasloch	Bavaria	26.06.2008
Nonnenhorn	Bavaria	07.07.2008
Weißensberg	Bavaria	10.07.2008
Brück	Brandenburg	06.08.2008
Linthe	Brandenburg	07.08.2008
Markt Heimenkirch	Bavaria	08.09.2008
Markt Kaufering	Bavaria	16.09.2008
Markt Scheidegg	Bavaria	19.09.2008
Markt Pöttmes	Bavaria	23.09.2008
Dinkelsbühl	Bavaria	24.09.2008
Kitzingen	Bavaria	07.10.2008
Leutershausen	Bavaria	14.10.2008
Lindenberg	Bavaria	23.10.2008
Traunstein	Bavaria	23.10.2008
Limbach-Oberfrohna	Saxony	28.11.2008
Langensendelbach	Bavaria	01.12.2008

Bremen	Bremen	09.12.2008
Wildsteig	Bavaria	13.01.2009
Weilersbach	Bavaria	16.01.2009
Freyung	Bavaria	02.02.2009
Dietramszell	Bavaria	17.02.2009
Wielenbach	Bavaria	17.02.2009
Baden-Baden	Baden-Wuerttemberg	02.03.2009
Panketal	Brandenburg	13.03.2009
Kronach	Bavaria	16.03.2009
Wonneberg	Bavaria	17.03.2009
Illerkirchberg	Baden-Wuerttemberg	19.03.2009
Markt Hirschaid	Bavaria	24.03.2009
Ulm	Baden-Wuerttemberg	25.03.2009
Greifswald	Mecklenburg-West P.	30.03.2009
Vöhringen	Bavaria	30.03.2009
Grasbrunn	Bavaria	31.03.2009
Thurmansbang	Bavaria	02.04.2009
Markt Schierling	Bavaria	06.04.2009
Stegaurach	Bavaria	07.04.2009
Morschen	Hesse	16.04.2009
Belzig	Brandenburg	20.04.2009
Alheim	Hesse	22.04.2009
Markt Jettingen-Scheppach	Bavaria	27.04.2009
Markt Mallersdorf-Pfaffenberg	Bavaria	28.04.2009
Roggenburg	Bavaria	28.04.2009
Markt Marktrodach	Bavaria	05.05.2009
Thulendorf	Mecklenburg-West P.	26.05.2009
Ainring	Bavaria	09.06.2009
Stockheim	Bavaria	15.06.2009
Neu-Ulm	Bavaria	24.06.2009
Markt Teisendorf	Bavaria	06.07.2009
Heilsbronn	Bavaria	09.07.2009
Kiel	Schleswig-Holstein	09.07.2009
Schwaigern	Baden-Wuerttemberg	14.07.2009
Golzow	Brandenburg	07.08.2009
Illertissen	Bavaria	01.09.2009
Hohenthann	Bavaria	09.09.2009
Parkstetten	Bavaria	12.09.2009
Suhl	Thuringia	23.09.2009
Nuthe-Urstromtal	Brandenburg	08.10.2009
Markt Velden	Bavaria	26.10.2009
Wurmsham	Bavaria	26.10.2009
Nentershausen	Hesse	10.02.2010
Ehekirchen	Bavaria	13.04.2010
Dinslaken	North Rhine-W.	19.04.2010
Bad Heilbrunn	Bavaria	20.04.2010
Bamberg	Bavaria	21.04.2010
Schmölln	Thuringia	06.05.2010

Wildeck	Hesse	10.06.2010
Friesenheim	Baden-Wuerttemberg	28.06.2010
Münster	North Rhine-W.	07.07.2010
Magdeburg	Saxony-Anhalt	19.08.2010
Dettingen an der Erms	Baden-Wuerttemberg	23.09.2010
Osnabrück	Lower Saxony	28.09.2010
Neufraunhofen	Bavaria	26.10.2010
Gersthofen	Bavaria	24.11.2010
Murrhardt	Baden-Wuerttemberg	25.11.2010
Flecken Steyerberg	Lower Saxony	09.12.2010
Marbach am Neckar	Baden-Wuerttemberg	16.12.2010
Gessertshausen	Bavaria	10.01.2011
Kreuth am Tegernsee	Bavaria	13.01.2011
Mittelneufnach	Bavaria	24.01.2011
Scherstetten	Bavaria	02.02.2011
Mickhausen	Bavaria	14.02.2011
Walkertshofen	Bavaria	22.02.2011
Breitenbach am Herzberg	Hesse	28.02.2011
Cornberg	Hesse	07.03.2011
Ustersbach	Bavaria	22.03.2011
Markt Diedorf	Bavaria	29.03.2011
Markt Dinkelscherben	Bavaria	29.03.2011
Markt Welden	Bavaria	29.03.2011
Hansestadt Lübeck	Schleswig-Holstein	31.03.2011
Langenneufnach	Bavaria	05.04.2011
Hiltenfingen	Bavaria	07.04.2011
Langerringen	Bavaria	11.04.2011
Ettlingen	Baden-Wuerttemberg	13.04.2011
Kutzenhausen	Bavaria	18.04.2011
Bonstetten	Bavaria	09.05.2011
Emersacker	Bavaria	18.05.2011
Großaitingen	Bavaria	28.05.2011
Bobingen	Bavaria	31.05.2011
Markt Biberbach	Bavaria	31.05.2011
Gablingen	Bavaria	07.06.2011
Langweid am Lech	Bavaria	07.06.2011
Bindlach	Bavaria	27.06.2011
Graben (Lechfeld)	Bavaria	29.06.2011
Markt Meitingen	Bavaria	05.07.2011
Markt Thiersheim	Bavaria	07.07.2011
Allmannshofen	Bavaria	11.07.2011
Schwabmünchen	Bavaria	26.07.2011
Nordendorf	Bavaria	28.07.2011
Ellgau	Bavaria	03.08.2011
Höchstädt im Fichtelgebirge	Bavaria	18.08.2011
Steinen	Baden-Wuerttemberg	13.09.2011
Bad Berneck im Fichtelgebirge	Bavaria	15.09.2011
Rockenberg	Hesse	19.09.2011

Kühlenthal	Bavaria	11.10.2011
Markt Thierhaupten	Bavaria	25.10.2011
Immenstadt im Allgäu	Bavaria	17.11.2011
Jossgrund	Hesse	05.12.2011
Bebra	Hesse	15.12.2011
Weißenburg in Bayern	Bavaria	15.12.2011
Haslach im Kinzigtal	Baden-Wuerttemberg	14.02.2012
Markt Kreuzwertheim	Bavaria	14.02.2012
Waltershausen	Thuringia	28.02.2012
Berghaupten	Baden-Wuerttemberg	05.03.2012
Ebhausen	Baden-Wuerttemberg	18.06.2012
Lahnau	Hesse	28.06.2012
Kehl	Baden-Wuerttemberg	21.11.2012
Piding	Bavaria	16.01.2013
Rottendorf	Bavaria	21.02.2013
Buchen (Odenwald)	Baden-Wuerttemberg	07.05.2013
Gladbeck	North Rhine-W.	07.05.2013
Markt Zell am Main	Bavaria	14.05.2013
Weinstadt	Baden-Wuerttemberg	16.05.2013
Gerlingen	Baden-Wuerttemberg	10.07.2013
Fischerbach	Baden-Wuerttemberg	14.11.2013
Wandlitz	Brandenburg	17.01.2014
Mühlenbach (Schwarzwald)	Baden-Wuerttemberg	11.02.2014
Hofstetten (Baden)	Baden-Wuerttemberg	18.02.2014
Bielefeld	North Rhine-W.	20.03.2014
Hanstedt (Nordheide)	Lower Saxony	22.04.2014
Bad Reichenhall	Bavaria	24.06.2014
Heilbronn	Baden-Wuerttemberg	03.07.2014
Ratekau	Schleswig-Holstein	02.10.2014
Appenweier	Baden-Wuerttemberg	20.11.2014

Source: based on data taken from gentechnikfreie-regionen.de.

Table A2. Interdependencies between Reasons for Banning GMO Cultivation

	Risk 1	Risk 2	Eco-nomic 1	Eco-nomic 2	Eco-nomic 3	Eco-nomic 4	Eco-nomic 5	Eco-nomic 6	Eco-nomic 7	Cultiva-tion 1	Cultiva-tion 2	Rejection 1	Rejection 2	Diffu-sion 1	Diffu-sion 2
Risk 1	0	0.75	0.67	0.64	0.71	0.62	1.00	0.50	0.57	0.67	0.40	0.44	0.67	0.21	0.50
Risk 2	0.75	0	0.72	0.60	0.71	0.48	1.00	0.25	0.57	0.44	0.40	0.44	0.47	0.24	0.25
Economic 1	0.67	0.72	0	0.96	0.71	0.71	0.50	0.75	0.71	0.67	0.40	0.49	0.40	0.32	0.50
Economic 2	0.64	0.60	0.96	0	0.57	0.48	1.00	0.50	0.71	0.56	0.00	0.56	0.20	0.28	0.13
Economic 3	0.71	0.71	0.71	0.57	0	0.57	0.50	0.25	0.00	0.00	0.00	0.43	0.29	0.29	0.00
Economic 4	0.62	0.48	0.71	0.48	0.57	0	0.50	0.00	0.29	0.11	0.00	0.57	0.20	0.24	0.19
Economic 5	1.00	1.00	0.50	1.00	0.50	0.50	0	0.50	0.00	0.00	0.00	0.50	0.50	0.00	0.00
Economic 6	0.50	0.25	0.75	0.50	0.25	0.00	0.50	0	0.00	0.25	0.00	0.50	0.25	0.00	0.00
Economic 7	0.57	0.57	0.71	0.71	0.00	0.29	0.00	0.00	0	0.00	0.00	0.43	0.00	0.43	0.29
Cultivation 1	0.67	0.44	0.67	0.56	0.00	0.11	0.00	0.25	0.00	0	0.20	0.22	0.00	0.22	0.00
Cultivation 2	0.40	0.40	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0	0.40	0.40	0.00	0.00
Rejection 1	0.44	0.44	0.49	0.56	0.43	0.57	0.50	0.50	0.43	0.22	0.40	0	0.67	0.35	0.31
Rejection 2	0.67	0.47	0.40	0.20	0.29	0.20	0.50	0.25	0.00	0.00	0.40	0.67	0	0.07	0.07
Diffusion 1	0.21	0.24	0.32	0.28	0.29	0.24	0.00	0.00	0.43	0.22	0.00	0.35	0.07	0	0.19
Diffusion 2	0.50	0.25	0.50	0.13	0.00	0.19	0.00	0.00	0.29	0.00	0.00	0.31	0.07	0.19	0

Legend

Risk 1	Risk for the environment
Risk 2	Risk for human health
Economic 1	Impact on conventional agriculture
Economic 2	Impact on organic agriculture
Economic 3	No economic benefit
Economic 4	Dependency on multinationals
Economic 5	Surveillance costs
Economic 6	Low consumer demand
Economic 7	Land value conservation
Cultivation 1	Potential GMO cultivation
Cultivation 2	Planned GMO cultivation
Rejection 1	Rejection by the population
Rejection 2	Rejection by farmers
Diffusion 1	Horizontal diffusion (neighbouring municipalities)
Diffusion 2	Vertical diffusion (higher administrative units)

Table A3. Outcomes and Conditions and their Calibrations

Federal state	**GMO-Free Network**	**Ban around nature reserves**	**Ban on state-owned ground**	**Protein strategy**	**Regional quality label**	**Index score**	**CDU/CSU**	**CDU/CSU _cal.**	**SPD**	**SPD _cal.**
Baden-Wuerttemberg	1	1	1	1	1	1	0,18	0,33	0,37	0,33
Bavaria	1	1	0	1	1	1	0,9	1	0	0
Berlin	0	0	0	0	0	0	0,30	0,33	0,59	1
Brandenburg	0	1	0	0	0	0,6	0	0	0,56	1
Bremen	1	0	1	0	1	0,8	0	0	0,65	1
Hamburg	1	0	1	0	0	0,6	0,17	0,33	0,77	1
Hesse	1	0	1	0	1	0,8	072	1	0	0
Mecklenburg-West P.	0	0	0	1	1	0,8	0,42	0,67	0,58	1
Lower Saxony	1	0	0	0	0	0	0,44	0,67	0,33	0,33
North Rhine-Westphalia	1	0	1	1	0	0,8	0,31	0,33	0,45	0,67
Rhineland-Palatine	1	0	0	0	0	0	0	0	0,67	1
Saarland	1	0	0	0	0	0	0,59	1	0,3	0,33
Saxony	0	0	0	0	0	0	0,8	1	0,03	0,33
Saxony-Anhalt	0	0	0	0	0	0	0,70	1	0,29	0,33
Schleswig-Holstein	1	0	1	0	0	0,6	0,27	0,33	037	0,33
Thuringia	1	0	1	1	0	0,8	0,62	1	0,35	0,33
Unit	present/absent					Calibrated value	Aggregated vote share of all political parties of the governing coalition weight per days/ calibrated values			
Data source	GMO-free states in Germany (2016)	GMO-free states in Germany (2016), expert interviews, desktop research					Wahlrecht (2017)			
Period	2010-2015	2010-2015					2010-2015			

Table A3. (Continued)

Federal state	Greens	Greens_cal.	Left	Left_cal.	FDP	FDP_cal.	CDU/CSU minister	CDU/CSU minister_cal.	SPD minister	SPD minister_cal.
Baden-Wuerttemberg	0,39	1	0	0	0,04	0,33	0,22	0,33	0	0
Bavaria	0	0	0	0	0,1	1	1	1	0	0
Berlin	0	0	0,09	1	0	0	0,68	0,67	0	0
Brandenburg	0	0	0,43	1	0	0	0	0	0	0
Bremen	0,35	1	0	0	0	0	0	0	1	1
Hamburg	0,05	0,33	0	0	0	0	0,19	0,33	0,68	0,67
Hesse	0,07	0,33	0	0	0,20	1	0,67	0,67	0	0
Mecklenburg-West P.	0	0	0	0	0	0	0	0	1	1
Lower Saxony	0,14	0,67	0	0	0,08	0,67	0	0	0	0
North Rhine-Westphalia	0,21	1	0	0	0,01	0,33	0,08	0,33	0	0
Rhineland-Palatine	0,23	1	0	0	0	0	0	0	0,23	0,33
Saarland	0,04	0,33	0	0	0,07	0,67	0	0	0,60	0,67
Saxony	0	0	0	0	0,17	1	1	1	0	0
Saxony-Anhalt	0	0	0	0	0	0	1	1	0	0
Schleswig-Holstein	0,16	0,67	0	0	0,13	0,67	0,40	0,33	0	0
Thuringia	0,02	0,33	0	0	0	0	0	0	0,82	0,67
Unit	Aggregated vote share of all political parties of the governing coalition weight per days/calibrated values						Relative period of incumbency of GMO-competent ministers/calibrated values			
Data source	Wahlrecht (2017)						Own data based on ministry websites and various online sources			
Period	2010-2015						2010-2015			

Table A3. (Continued)

Federal state	Green minister	Green minister_cal.	Left minister	Left minister_cal.	FDP minister	FDP minister_cal.	East Germany_cal.	GM crop plantings	GM crop plantings_ cal.
Baden-Wuerttemberg	0,77	0,67	0	0	0	0	0	183305,182	0,67
Bavaria	0	0	0	0	0	0	0	363511,727	0,67
Berlin	0	0	0,31	0,33	0	0	0,67	0	0
Brandenburg	0	0	1	1	0	0	1	31542318,9	1
Bremen	0	0	0	0	0	0	0	0	0
Hamburg	0,11	0,33	0	0	0	0	0	0	0
Hesse	0,325	0,33	0	0	0	0	0	2584,72727	0,33
Mecklenburg-West P.	0	0	0	0	0	0	1	17534422,2	1
Lower Saxony	0,47	0,33	0	0	0,52	0,67	0	505663,364	0,67
North Rhine-Westphalia	0,91	0,67	0	0	0	0	0	10218,6364	0,33
Rhineland-Palatine	0,77	0,67	0	0	0	0	0	15839,9091	0,33
Saarland	0,39	0,33	0	0	0	0	0	0	0
Saxony	0	0	0	0	0	0	1	18003967,5	1
Saxony-Anhalt	0	0	0	0	0	0	1	3551781,18	1
Schleswig-Holstein	0,59	0,67	0	0	0	0	0	999,636364	0,33
Thuringia	0,17	0,33	0	0	0	0	1	10990,3636	0,33
Unit	Relative period of incumbency of GMO-competent ministers/calibrated values						present/ absent as calibrated value	Commercial cultivation and field trials in m²	Calibrated value
Data source	Data based on ministry websites and various online sources							BVL (2017)	
Period	2010-2015							2005-2015	

Table A3. (Continued)

Federal state	Tourism	Tourism _cal.	NABU	NABU _cal.	BUND	BUND _cal.	Voter turnout	Voter turnout _cal.	Maize cultivation	Maize cultivation_ cal.
Baden-Wuerttemberg	4411,19228	0,33	7,83	0,67	4,70	0,67	66,2	1	191707,5	0,67
Bavaria	6614,28038	1	5,16	0,33	14,43	1	63,9	1	533626,833	1
Berlin	7385,09248	1	3,70	0	2,17	0,33	60,2	1	0	0
Brandenburg	4642,81194	0,33	4,28	0,33	1,48	0	47,9	0	191035,667	0,67
Bremen	3122,03929	0	5,73	0,33	8,01	1	52,85	0,33	0	0
Hamburg	6121,55527	0,67	12,16	1	4,63	0,67	56,9	0,33	0	0
Hesse	4955,44767	0,67	8,78	0,67	3,93	0,67	73,2	1	48146,1667	0,33
Mecklenburg-West P.	17393,7953	1	2,01	0	1,78	0	51,5	0,33	148769,667	0,67
Lower Saxony	5061,61592	0,67	10,37	1	2,71	0,67	59,4	0,67	590045,333	1
North Rhine-Westphalia	2574,8708	0	4,03	0,33	1,43	0	59,45	0,67	299993,5	1
Rhineland-Palatine	5285,11891	0,67	11,63	1	3,01	0,67	61,8	1	42471,3333	0,33
Saarland	2534,64648	0	18,38	1	4,01	0,67	61,6	1	4294	0,33
Saxony	4390,99481	0,33	3,63	0	0,92	0	49,2	0	96799,3333	0,33
Saxony-Anhalt	3155,03887	0	1,89	0	1,25	0	51,2	0	130442	0,67
Schleswig-Holstein	8924,69658	1	6,17	0,67	2,10	0,33	60,2	1	180092,667	0,67
Thuringia	4360,36821	0,33	3,96	0	1,76	0	52,7	0	59257,5	0,33
Unit	Overnight stays per 1000 inhabitants	Calibrated value	Members per 1000 inhabitants	Calibrated value	Members per 1000 inhabitants	Calibrated value	Turnout in %	Calibrated value	hectare	Calibrated value
Data source	Destatis (2015)		NABU (2015)		BUND (2017)		Wahlrecht (2017)		DMK (2016)	
Period	2010-2015		2014-2015		2014-2015		2010-2015		2010-2015	

Table A3. (Continued)

Federal state	GDP	GDP_cal.	Organic farming	Organic farming_cal.	Large-scale farming	Large-scale farming_cal.	Rural tourism	Rural tourism_cal.
Baden-Wuerttemberg	42.745	1	9,2	0,67	32,6	0	20,95	0,67
Bavaria	43.092	1	7,3	0,33	32,85	0	78,40	1
Berlin	35.627	0,67	0	1	0	0	0	0
Brandenburg	26.493	0	10,3	1	240,6	1	9,65	0,33
Bremen	47.603	1	0	1	0	0	0	0
Hamburg	61.729	1	0	1	0	0	0,55	0
Hesse	43.073	1	11,4	1	44,2	0,33	7,44	0,33
Mecklenburg-West P.	24.909	0	9,4	0,67	284,9	1	32,25	1
Lower Saxony	32.890	0,33	2,8	0	61,8	0,67	22,32	0,67
North Rhine-Westphalia	36.509	0,67	4,7	0	41,75	0,33	4,98	0,33
Rhineland-Palatine	32.814	0,33	8	0,33	35,7	0	14,55	0,67
Saarland	35.409	0,67	13	1	61,3	0,67	5,02	0,33
Saxony	27.776	0	4,1	0	144,85	1	8,32	0,33
Saxony-Anhalt	25.198	0	4,9	0	277,6	1	3,11	0,33
Schleswig-Holstein	30.134	0,33	4,1	0	72,4	0,67	73,80	1
Thuringia	26.364	0	4,2	0	221,65	1	9,21	0,33
Unit	€ per capita	Calibrated value	Share of organic agriculture	Calibrated value	Mean of 2010 and 2013 values for farm size in hectar	Calibrated value	Farmers offering holidays as share of population	Calibrated value
Data source	Destatis (2017)		BMEL (2017)		Destatis (2014)		Bauernhofurlaub (2017)	
Period	2015		2014		2010-2013		2017	

Table A4. Coding Decisions Taken for German Federal Parties, 1990-2017

	1990	1994	1998	2002
CDU	➔ **NST**	Wir brauchen einen neuen Forschungs- und Technologieschub. Durch klare Entscheidungen für die Anwendung von Spitzentechnologien wie die Gentechnologie, die Kernenergie und die Magnetschwebebahn Transrapid, durch die konsequente Umsetzung der Postreform mit dem Ziel der weitgehenden Liberalisierung im Post- und Telekommunikationsbereich sowie der Privatisierung von Telekom, Postdienst und Postbank, durch den forcierten Ausbau von Glasfaserverbundnetzen für den Aufbau von Datenautobahnen. ➔ **PRO**	Wir werden unsere Position als High-Tech-Land weiter ausbauen, indem wir Schlüsseltechnologien mit Vorrang fördern. Biotechnologie und Gentechnologie, Umwelttechnologien, Multimedia und die Telekommunikationstechnologien, Luft- und Raumfahrt mit ihren Schlüsseltechnologien - daraus entwickeln sich die Wachstumsmärkte der Zukunft, Topbranchen mit enormen Beschäftigungschancen -- Bio- und Gentechnologie sind Zukunftstechnologien. Sie leisten unverzichtbare Beiträge zur Bekämpfung von Krankheiten durch neue Medikamente sowie zur Ernährung einer wachsenden Weltbevölkerung. Wir haben eine Aufbruchstimmung für Existenzgründungen geschaffen: Die Zahl der Biotechnologie-Unternehmen hat sich in den letzten zwei Jahren jeweils verdoppelt. Wir werden diese Dynamik weiter fördern. ➔ **PRO**	Die neuen und noch zu erwartenden Möglichkeiten der Gentechnologie und Biomedizin stellen uns vor große Herausforderungen. Gerade bei diesen Zukunftstechnologien müssen wir Chancen und Risiken sorgfältig prüfen und abwägen, um die richtigen Weichen für nachfolgende Generationen zu stellen. Wir dürfen keinesfalls einem wissenschaftlichen Machbarkeitswahn verfallen. Nützlichkeitserwägungen dürfen nicht über den Schutz allen menschlichen Lebens gestellt werden. Deshalb halten wir an den strengen Grundsätzen des deutschen Embryonenschutzgesetzes fest und lehnen eine Legalisierung der aktiven Sterbehilfe ab. -- Wir werden die Möglichkeiten der Verbraucher verbessern, die Qualität eines Produkts erkennen und beurteilen zu können. Dazu gehören starke Verbrauchervertretungen, mehr Verbraucheraufklärung sowie praktikable und für den Laien verständliche Kennzeichnungsregelungen. Gentechnisch veränderte Lebensmittelmittel sind als solche kenntlich zu machen, denn ein verantwortungsvoller Gebrauch der Bio- und Gentechnologie in der Landwirtschaft erfordert objektive

				Verbraucherinformationen und eine optimale Verbrauchersicherheit. ➔ **MOD**
FDP	Würde, Leben, Freiheit und Gesundheit des Menschen und seiner Umwelt. Die Liberalen fordern eine Verstärkung und Intensivierung vorausschauender Technikfolgenabschätzung. Die technische Anwendung wissenschaftlicher Erkenntnisse darf nicht zu irreversiblen Gefahren für Mensch und Umwelt führen. Dies gilt besonders für die Gentechnologie. Sie ist Schlüsseltechnologie zur Förderung der Gesundheit, der Beherrschung der Probleme der Welternährung und Verstärkung des Umweltschutzes. Dauernde Technikfolgenabschätzung auf die ethischen, sozialen, ökologischen und ökonomischen Konsequenzen hin ist gerade für die Gentechnologie unabdingbar. Gefährdungen von Mensch und Umwelt durch die weitere Erforschung und bei der Anwendung der Gentechnologie müssen durch strenge Sicherheitsanforderungen ausgeschlossen werden. ➔ **MOD**	Die Chancen neuer Technologien, insbesondere der Bio- und Gentechnologie, für neue und zukunftssichere Arbeitsplätze müssen genutzt werden. -- Ein globaler sicherheitstechnischer Mindeststandard für kerntechnische Anlagen im Rahmen des Vertrages der Internationalen Atomenergieorganisation von 1957 sowie bei gentechnischen und großchemischen Anlagen ist festzulegen. -- Deshalb fordert die FDP es sind Forschungs- und Entwicklungsschwerpunkte zu setzen in Informations- und Kommunikationstechnik, neue Werkstoffe, Biotechnologie und Gentechnik, Software-Technik, Luft- und Raumfahrt sowie Umwelttechnologie. -- Die Gentechnik-Richtlinie der EU ist bislang nicht in allen Ländern vollständig umgesetzt worden. Die sich daraus ergebende unterschiedliche Vollzugspraxis führt zu Wettbewerbsverzerrungen innerhalb Europas. Unter Berücksichtigung des Internationalen Entwicklungs- und Kenntnisstandes auf dem Gebiet der gentechnischen Sicherheit sollten weiterreichende	Entwicklung und Anwendung von ethisch und ökologisch vertretbaren Maßnahmen der Bio- und Gentechnologie dürfen nicht behindert werden. ➔ **MOD**	Eine unternehmerische Landwirtschaft ist auf die Nutzung des technischen Fortschritts angewiesen. Daher ist es unverantwortlich, die Potentiale der Grünen Gentechnik in der Landwirtschaft aus ideologischen Gründen in Deutschland und Europa zu blockieren. ➔ **PRO**

		Verfahrensvereinfachungen insbesondere in den Unteren Sicherheitsstufen vorgenommen werden. Verbraucherschutz muss gewährleistet werden durch deutliche Informationspflicht gegenüber dem Bürger über genetisch veränderte wie auch bestrahlte und chemisch veränderte Lebensmittel. ➔ **MOD**		
Greens	Ökologisch und sozial bedenkliche Großtechnologien wie die Atomtechnologie, die zentral angelegten und gesteuerten IuK-Technologien, die Bio- und Gentechnologie sowie die Weltraumtechnik dürfen nicht länger gefördert und angewendet werden. -- Für einen Schutz vor irreversiblen Schäden – gegen Gentechnologie: Mit dem Gentechnik-Gesetz und einer Vielzahl von Rechtsverordnungen soll die industrielle Anwendung der Gentechnik störungsfrei sichergestellt werden. Insbesondere die Rechtsverordnungsentwürfe zeigen in aller Deutlichkeit, daß anerkannte Sicherheitsstandards im Bereich des technischen Sicherheitsrechts nunmehr ihre Gültigkeit verlieren sollen. Es handelt sich nicht um ein Gesetz zum Schutz Mensch und Umwelt vor den Risiken und Gefahren der Gentechnologie,	Die Bundesregierung verschärft mit Ihrer desolaten Politik die Probleme, die sie zu lösen vorgibt. Sie erleichtert Genehmigungsverfahren für Strassenbau und umweltgefährdende Risikotechnologien wie die Gentechnik und Die Giftmüllverbrennung. Sie vertut ihre Zeit mit Planspielen für den Bau neuer, angeblich sicherer Atomkraftwerke. -- Mit der Gentechnologie werden die Eingriffsmöglichkeiten des Menschen in Naturzusammenhänge um Dimensionen erweitert. Unter Umgehung natürlicher Fortpflanzungsmechanismen Und Evolutionsmechnismen wird Erbmaterial über alle vorfindlichen Artgrenzen hinweg übertragen. Das Wissen um die möglichen Wirkungen solcher Eingriffe hat damit aber nicht Schritt gehalten. Die langfristigen Folgen für Mensch und Natur über den unmittelbaren Erfolg (oder Misserfolg) eines gentechnischen Experimentes oder Produktes hinaus	Gesunde Umwelt - gesunde Tiere - gesunde Lebensmittel: Ausreichende Mengen an hochwertigen Lebensmitteln lassen sich auch ohne den heutigen Einsatz von Pestiziden, Mineraldüngern, importierten Futtermitteln und Gentechnik erzeugen. -- BÜNDNIS 90/DIE GRÜNEN lehnen die Gentechnologie in der Landwirtschaft und bei der Lebensmittelproduktion ab. Die Novel-Food-Verordnung der Europäischen Union dient allein der Vermarktung gentechnischer Produkte und nicht dem VerbraucherInnenschutz. Durch die Politik der EU-Kommission gelangen immer mehr Lebensmittel, bei deren Herstellung Gentechnik zum Einsatz kommt, ungekennzeichnet auf den Markt. Dieser Betrug an den VerbraucherInnen wird von den anderen Parteien mitgetragen. BÜNDNIS 90/DIE GRÜNEN fordern eine über die Novel-Food-Verordnung hinausgehende erweiterte Kennzeichnungspflicht (v.a. für Enzyme und andere Zusatzstoffe). Solange der Ausstieg aus der Gentechnik nicht vollzogen ist, müssen wenigstens	Die Verbraucherinnen und Verbraucher wollen wissen, was auf ihren Tisch kommt. Wir wollen einen gesundheitlich vorsorgenden Verbraucherschutz, der den Menschen garantiert, sichere Lebensmittel zu konsumieren. Chemie, Gentechnik und Antibiotika gehören nicht in Lebensmittel. -- Wir wenden uns gegen die schleichende Einführung der Gentechnik in die Ernährung und die Freisetzung von gentechnisch veränderten Pflanzen. Gentechnische Veränderungen sind in der Landwirtschaft und in Lebensmitteln nicht notwendig, stellen aber ein unkalkulierbares Risiko für Mensch und Umwelt dar. Für uns steht die Wahlfreiheit der Landwirte und Verbraucher an erster Stelle. Es muss künftig weiter möglich sein, gentechnikfreie Lebensmittel zu produzieren und zu kaufen. Wir fordern eine europaweit klare Kennzeichnung gentechnisch veränderter Lebens- und Futtermittel und von gentechnisch verändertem Saatgut.

	sondern um ein Gesetz zum "Schutz" der Gentechnik-Industrie vor Bevölkerungs- und Umweltinteressen. -- DIE GRÜNEN lehnen die Einführung dieser Technologie ab, die zum ersten Mal die von der Natur gesetzten Grenzen überschreitet und zu irreversiblen Schäden bei Lebewesen und ganzen Ökosystemen führen kann. -- DIE GRÜNEN setzen sich für ein fünfjähriges Moratorium für den gesamten Bereich der Anwendung der Gentechnik ein. Dieses Moratorium gilt für die Forschung und die Produktion, so dass die Herstellung, Anwendung, Verbreitung und Freisetzung von gentechnisch veränderten Organismen und deren Produkten innerhalb dieses Zeitraumes nicht möglich ist. -- DIE GRÜNEN beharren darauf, dass die Suche nach alternativen Problemlösungsstrategien Priorität hat. Es darf keine Entscheidung zugunsten der Gentechnologie erfolgen. -- DIE GRÜNEN fordern, daß immer nur die umweltund sozialverträglichste Technologie Anwend ung	sind nach wie vor kaum abschätzbar. In Anbetracht dieser Verantwortbarkeitslücke (Hans Jonas), die bei dieser Technologie besonders sichtbar wird und alle ihre Anwendungsfelder betrifft, lehnen Bündnis 90/Die Grünen die Gentechnologie grundsätzlich ab. Sie befürworten stattdessen die Entwicklung von Umwelt- und sozialverträglichen Technologien, Produkten und Verfahren, die auf die natürlichen Zusammenhänge und Kreisläufe Rücksichtnehmen und reversibel und Fehlerfreundlich sind. -- Bündnis 90/Die Grünen lehnen jegliche Freisetzung von gentechnisch veränderten Tieren, Pflanzen und anderen Organismen ab. Sie lehnen auch Nahrungsmittel, die mittels gentechnischer Verfahren hergestellt wurden oder sogar gentechnisch verändertes Material enthalten, ab. Die Risiken solcher Nahrungsmittel sind, insbesondere für Risikogruppen wie Allergiker, nicht abschätzbar. Sie nützen nur der Großindustriellen Nahrungsmittelherstellung und nicht den Menschen. In jedem Falle ist eine konsequente Kennzeichnungspflicht aller Produkte, die gentechnisch hergestellt wurden oder gentechnisch verändertes Material enthalten, gesetzlich Zu Verankern. […] --	ökologische und gesundheitliche Mindeststandards gewahrt werden. Alle genmanipulierten Lebensmittel und Zusatzstoffe müssen nach einem einheitlichen Verfahren auf ihren Bedarf und ihre Produktsicherheit geprüft werden. Gegen Geheimniskrämerei der EU-Gremien fordern wir eine Öffentlichkeitsbeteiligung bei den Zulassungsverfahren. Lebensmittel müssen sicher sein und dürfen kein Risiko für Mensch und Umwelt darstellen. Das Gentechnikrecht muß verschärft und das Vorsorgeprinzip durchgesetzt werden. Nicht alles, was beantragt wird, darf auch genehmigt werden. Wir wollen für Gentech-Betreiber wirksame Haftungsregelungen und eine Versicherungspflicht. Freisetzungen gentechnisch manipulierter Pflanzen, Tiere und Mikroorganismen sind unverantwortlich und in ihren Folgen nicht beherrschbar. Gentechnologie ist eine genetische Umweltverschmutzung. Sie ist in ihren Folgen unbeherrschbar und daher nicht zu verantworten. -- Fördermittel für die Atomforschung, Gentechnik und andere Risikotechnologien, -unsinnige Subventionen für einzelne Branchen (z.B. Steinkohle) sowie für eine verfehlte Landwirtschaftspolitik, -- BÜNDNIS 90/DIE GRÜNEN lehnen Gentechnik in der Medizin weiterhin im Grundsatz ab. Wir respektieren jedoch den Einsatz der Gentechnik bei Medikamenten, Diagnostik und	Abstands- und Haftungsregelungen sollen Nachbarn und Natur vor den Auswirkungen gentechnisch veränderter Organismen schützen und die Verursacher eventueller Schäden haftbar machen. ➔ **CON**

	findet. Dies ist die Gentechnologie beim derzeitigen Stand von Wissenschaft und Technik nicht, denn es gibt bisher keine Beweise, daß eine Anwendung ohne Gefährdungspotentiale möglich wäre. ➔ **CON**	Der Einsatz von Gentechnik in der Lebensmittelproduktion kann nach der Abwägung von Kosten, Risiken, Nutzen und ethischen Erwägungen nicht zugelassen werden. (S. Teil Gentechnik) Wenn im Ackerbau und in der Fleischproduktion die Mengen auf ökologischem Wege dadurch reduziert werden, dass der Einsatz ertragssteigernder Mittel wie Pestizide, Nitrat, Gentechnik massiv begrenzt wird, kann sich ein Marktgleichgewicht wieder einstellen. ➔ **CON**	Grundlagenforschung, wenn die heutige Medizin den Betroffenen keine Alternative bietet. -- Das mit der Gentechnik verbundene Menschenbild gefährdet die Menschenwürde und das Recht auf körperliche Unversehrtheit. -- Das Festhalten an den riskanten und unproduktiven Technologien Atomenergie, Kernfusion, bemannte Raumfahrt, Gentechnik, Rüstung und Transrapid muß beendet werden. -- In einer Zeit, in der Wissenschaft den Bau von Massenvernichtungswaffen ermöglicht hat und mit Hilfe der Gentechnik, Klonen und Embryonenmanipulation alle natürlichen Grenzen eingerissen werden können, muß Wissenschaft gegenüber der Gesellschaft verantwortet werden. ➔ **CON**	
Left	➔ **NST**	➔ **NST**	➔ **NST**	Die PDS setzt sich für eine gesellschaftliche und demokratische Kontrolle der Forschung und Anwendung der grünen Gentechnik zum Schutz der Verbraucherinnen und Verbraucher und der Umwelt ein. ➔ **MOD**
SPD	➔ **NST**	Bei den Informations- und Kommunikationssystemen, der Bio- und Gentechnik, den neuen Werkstoffen und der Mikrosystemtechnik, werden wir Forschung und Entwicklung verstärken, vor allem die interdisziplinäre	Wir wollen eine Innovationsoffensive starten: In der Bio- und Gentechnologie, bei den neuen Materialien, in der Informationstechnologie, bei Umweltschutztechnologien, bei neuen Energiesystemen und in der Verkehrstechnologie soll Deutschland	Die Potentiale der Gentechnik im Bereich der Landwirtschaft müssen weiter erforscht werden. In Abstimmung mit den Unternehmen bringen wir ein sorgfältig ausgearbeitetes Forschungs- und Begleitprogramm zum Anbau von

		Zusammenarbeit fördern und auf eine sorgfältige Technikfolgenabschätzung achten. ➔ **MOD**	im internationalen Wettbewerb eine Spitzenposition einnehmen. ➔ **PRO**	gentechnisch veränderten Pflanzen auf den Weg. Chancen und Grenzen gentechnologischer Forschung müssen daher immer wieder neu bestimmt werden. Forschung im Dienste der Menschen beachtet die moralische und ethische Grenze. Die Debatte über wissenschaftliche und ethische Fragen begrüßen wir und wollen sie auch künftig fördern. ➔ **MOD**
	2005	**2009**	**2013**	**2017**
CDU	Technologiefeindlichkeit hat Spitzentechnologien und Industriebranchen (Chemie, Bio- und Gentechnologie, Kernforschung) mit zukunftsträchtigen, wohlstandssichernden Arbeitsplätzen ins Ausland vertrieben. Technologischer Stillstand führt aber zu wirtschaftlichem Abstieg. -- Wir eröffnen den technologischen Spitzenfeldern der Zukunft in Deutschland die besten Entwicklungschancen: Bio- und Gentechnologie, Materialforschung, Medizintechnik und Optik, Nanotechnologie, Mechatronik und Verkehrstechnologie, Luft- und Raumfahrttechnik, Informations- und Kommunikationstechnologie, Energie- und Umwelttechnik. --	Wissenschaft braucht klare ethische Einbettung und Orientierung. Das gilt gerade für die moderne Bio- und Gentechnologie. Die Auseinandersetzung über ethische Grenzen der Forschung muss sachlich und in der Überzeugung, dass Deutschland im internationalen Wettbewerb forschungsfreundliche Rahmenbedingungen braucht, geführt werden. So werden gesellschaftlich Vertrauen und Akzeptanz geschaffen. Deshalb brauchen wir Sicherheitsforschung in umstrittenen Forschungsbereichen, insbesondere in der grünen Gentechnik. -- Politik muss die Sorgen der Bürger bei grüner Gentechnik ernst nehmen und darf keine unnötigen Risiken eingehen. ➔ **MOD**	Für uns gilt: Lebensmittel müssen klar gekennzeichnet sein. Dazu gehört, dass alle Angaben gut lesbar sind und die Verpackung dem Inhalt entspricht. Verbraucher sollen auch wissen, ob Lebensmittel mit gentechnischen Verfahren erzeugt worden sind, aus welcher Region ein Produkt kommt und unter welchen Bedingungen Tiere gehalten werden. ➔ **MOD**	➔ **NST**

	Wir werden für die Entwicklung der Bio- und Gentechnologie den notwendigen und verantwortbaren Rechtsrahmen schaffen. ➔ **PRO**			
FDP	Das Gegenteil davon ist Fortschrittsfeindlichkeit und restriktive Gesetzgebung. Beides hat die Entwicklung von wachstumsträchtigen Zukunftsfeldern, wie die Bio- und Gentechnologie oder die Medizintechnik, massiv behindert. -- Ohne die Grüne Gentechnik werden wir an der züchterischen Weiterentwicklung unserer Kulturpflanzen nicht mitwirken können. Resistenzen gegen Schadorganismen, Verbesserungen der Inhaltsstoffe von Kulturpflanzen zur Nutzung als nachwachsende Rohstoffe, kostengünstige Arzneimittelproduktion in Pflanzen sind konkrete Vorteile für Mensch und Umwelt. Wir wollen das Gentechnikgesetz ändern, um die Wertschöpfung aus den Forschungsergebnissen und weitere Forschungen in Deutschland zu ermöglichen. Forschungsverbote für bereits genehmigte Projekte lehnt die FDP ab. -- Die FDP tritt für die verantwortbare Nutzung der Grünen	Freiheit für die Forschung – nein zu Ideologie und Bürokratie: Forscher wollen forschen. Sie wollen nicht mit überbordender Bürokratie die Zeit vergeuden. Die FDP lehnt Denkblockaden und ideologische Fixierung auf bestimmte Technologien ab. Fusionsforschung, kerntechnische Sicherheitsforschung, Stamm-zellforschung, grüne Gentechnik, Biotechnologie und Nanotechnologie und Raumfahrtprojekte dürfen nicht stigmatisiert, sondern müssen in wettbewerblichen Verfahren unter transparenten und verantwortungsvollen Rahmenbedingungen gefördert werden. ➔ **PRO**	Wir wollen dem mündigen Verbraucher die notwendigen Informationen für eine freie und fundierte Entscheidung für Einkauf und Ernährung zur Verfügung stellen. Deshalb möchten wir eine konsequente Prozesskennzeichnung für alle Lebensmittel und Konsumgüter, bei deren Produktion an irgendeiner Herstellungsstufe gentechnisch veränderte Organismen beteiligt sind. Nur so ist eine vollständige Aufklärung des Verbrauchers möglich. -- Gentechnisch veränderte Organismen werden heute bereits in vielen Herstellungsprozessen zum Vorteil der Verbraucher eingesetzt, beispielsweise in der Arzneimittelproduktion. Ob er diese Produkte nutzen will, darüber soll jeder Verbraucher aber – wie sonst auch –vollständig frei entscheiden können. Wir setzen uns daher für eine Kennzeichnung solcher Lebensmittel ein, damit diese Entscheidung überhaupt erst möglich ist. Gleichzeitig legen wir Wert auf eine wissenschaftliche und objektive Information und Verbraucherbildung über den Nutzen und Wert moderner Herstellungsmethoden. ➔ **MOD**	Mit neuen Forschungsrichtungen der Grünen Biotechnologie wie dem „Genome-Editing“ wollen wir offen und transparent umgehen. Wir lehnen pauschalisierende Verbote ab und fordern stattdessen eine faktenbasierte, ergebnisoffene Bewertung neuer Technologien. ➔ **PRO**

	Gentechnik in der Landwirtschaft ein. Die Potentiale der Grünen Gentechnik sind vielfältig. Sie betreffen viele Lebensbereiche und bieten Vorteile für Verbraucher, Umwelt und Landwirtschaft: Verminderung von Umweltbelastungen, Verbesserung der Nahrungsmittel, Optimierung nachwachsender Rohstoffe. Wir werden das Gentechnikrecht innovationsfreundlich korrigieren. Das gilt vorrangig für die Praxis untauglichen Regelungen für die Haftung und das unbeabsichtigte In-Verkehr-Bringen von gentechnisch veränderten Pflanzen Die FDP setzt sich für die Verbesserung der Rahmenbedingungen für die Erforschung, Entwicklung und Nutzung nachwachsender Rohstoffe ein. Dabei ist eine enge Zusammenarbeit von Wissenschaft und Wirtschaft anzustreben. Zu einem Förderschwerpunkt muss die Entwicklung von nachwachsenden Rohstoffen für industrielle Anwendungen mit Hilfe der Grünen Gentechnik entwickelt werden. Die im Rahmen der Europäischen Union vereinbarten Zielvorgaben zum Anteil erneuerbarer Energien am Gesamtverbrauch von Kraftstoff müssen in Deutschland erfüllt werden. ➔ **PRO**			

Greens	Die Weltbevölkerung wächst und damit die Herausforderung der Ernährungssicherheit. Es wäre verantwortungslos, darauf mit Agro-Gentechnik statt mit einer neuen gentechnikfreien Agrarpolitik zu reagieren, die auch den Interessen der Entwicklungsländer Rechnung trägt. Wir GRÜNE sind eine starke Stimme für Umwelt- und Naturschutz, für neue Landwirtschaft und Verbraucherschutz -- Schwarz-gelb will nicht mehr, sondern weniger Ökologie: Wiedereinstieg in die Atomkraft und Gefährdung von vielen Arbeitsplätzen im Bereich der Erneuerbaren Energien sowie Gentechnik in der Landwirtschaft und in Lebensmitteln. -- Gen-Food - Nein Danke! Die Lobby der Agro-Gentechnik fährt in einer großen Koalition mit Union, FDP, PDS und Teilen der SPD einen Generalangriff gegen die gentechnikfreie Landwirtschaft und die Mehrheit der Verbraucher. Agro-Gentechnik, Biopiraterie und Saatgutmonopole gefährden weltweit die Vielfalt und Sicherheit unserer Nahrungsgrundlage. Deshalb ist es richtig, dass sich die Mehrheit der Verbraucherinnen und Verbraucher	Gentechnikfreie Ernährung oder klimafreundliches Einkaufen wird zum Suchspiel für kritische VerbraucherInnen. -- Gesunde Lebensmittel - Kein Genfood auf unsere Teller: Wie die Mehrheit der Verbraucherinnen und Verbraucher lehnen auch wir Grünen Gentechnik auf unserem Teller ab. Wir stehen Seite an Seite mit Bauern, ImkerInnen und VerbraucherInnen, die an vielen Orten Gentechnikfreie Regionen ausrufen und sich gegen den Anbau von gentechnisch veränderten Pflanzen wenden. Agro-Gentechnik schafft Probleme und keine Lösungen. Sie befördert Monokulturen, gefährdet die Umwelt, gentechnikfreie Produktion und Arbeitsplätze. Sie bedroht die Wahlfreiheit der Verbraucher, sich für gentechnikfreie und auch ökologische Lebensmittel entscheiden zu können. Gentechnik macht Landwirte noch abhängiger von wenigen weltweit agierenden Konzernen. Monsanto darf nicht zum Microsoft der Landwirtschaft werden. Wir setzen uns deshalb für ein EU-weites Verbot von Gentech-Pflanzen ein, die Menschen, Umwelt und die gentechnikfreie Produktion gefährden. Wir setzen uns für eine weltweite Ächtung der „Terminatortechnologie“ ein, die die Keimfähigkeit von Samen abtötet. Wir wollen	Wir brauchen eine Landwirtschaft ohne Gentechnik und ohne industrielle Tierproduktion. Tiergerecht statt massenhaft – so schaffen wir Zukunft für Mensch, Tier und auch für das Klima. -- Dabei setzen wir auf das Leitbild des Ökolandbaus und eine naturverträgliche bäuerliche Landwirtschaft, auf gentechnikfreie Lebens- und Futtermittel, regionale Verarbeitung und Vermarktung und tiergerechte Tierhaltung sowie auf dezentrale Agrarstrukturen mit all ihren regionalen Unterschieden. -- Wir lehnen den Anbau und Import von gentechnisch veränderten Pflanzen ebenso ab wie gentechnisch veränderte oder geklonte Tiere. Die Agrogentechnik hat keines ihrer Versprechen eingelöst. Statt Erträge zu steigern, hat sie den Einsatz von Pestiziden und die Gefahren für Umwelt, Menschen und Tiere erhöht. Agrogentechnik macht unsere Ernährung und unser Saatgut abhängig von einer kleinen Zahl von Großkonzernen und beendet die freie Landwirtschaft und den Ökolandbau. Agrogentechnik reduziert die Vielfalt der Pflanzensorten, weil die Gentechnik-Konzerne immer mehr Züchter aufkaufen. Die Weiterentwicklung konventioneller Sorten wird vernachlässigt. Es gibt einen hohen Forschungsbedarf für eine tier- und umweltverträgliche Landwirtschaft, die die Herausforderungen des Klimawandels berücksichtigt. Patente auf Pflanzen, Tiere	Wir machen Schluss mit industrieller Massentierhaltung und landwirtschaftlichen Monokulturen. Mit uns gibt es gutes Essen ohne Gift und Gentechnik. -- Die Zulassung neuer chemischer Wirkstoffe in der EU wollen wir einschränken und aus dem Einflussbereich der Hersteller herausholen. Nur was wirklich unbedenklich ist, darf auf den Markt gelangen. Ein solcher Nachweis wird für gentechnisch veränderte Organismen jedoch bis heute nicht erbracht. Gen-Food braucht kein Mensch. Wir halten an unserem Standpunkt fest: Pflanzen aus den Laboren der Agroindustrie haben auf unseren Äckern in Deutschland und Europa nichts verloren. Dabei ist es egal, ob sie mit Verfahren der „alten“ oder der „neuen“ Gentechnik geschaffen wurden. Wir werden ein Gentechnikgesetz auflegen, das unsere Äcker und unsere Teller garantiert gentechnikfrei macht. Und wir setzen uns dafür ein, dass die Verbraucherinnen und Verbraucher dank einer umfassenden Kennzeichnung auch erkennen können, wenn ihr Fleisch, ihre Milch oder ihre Eier mit Hilfe von Gen-Futtermittel produziert wurden. ➔ **CON**

	und Landwirtinnen und Landwirte gegen Gentechnik auf dem Teller und auf dem Acker wehren. Wir GRÜNEN nehmen die Menschen ernst. Wir GRÜNE wollen keine gentechnisch-veränderten Lebensmittel. Landwirtschaft und Gentechnik - das bedeutet Monopole industrieller Großkonzerne, das bedroht gentechnikfreie Landwirtschaft und gefährdet Arbeitsplätze im ökologischen Landbau, und das bedeutet massive Subventionierung durch öffentliche Steuergelder und leere Arbeitsplatzversprechungen. Wir nehmen Angriffe auf die Wahlfreiheit der Verbraucherinnen und Verbraucher nicht hin und haben ein Gentechnikgesetz auf den Weg gebracht, das der schleichenden Einführung von Gen-Food auf unseren Feldern sowie in den Supermarktregalen Regeln setzt, Transparenz gewährleistet, eine klare Verursacherhaftung einführt und damit bislang erfolgreich Einhalt gebietet. ➔ **CON**	gentechnische Veränderungen klarer und deutlicher kennzeichnen. Jeder muss wissen, ob sein Fleisch, seine Milch oder sein Käse aus einer Produktion kommt, bei der gentechnisch veränderte Futtermittel eingesetzt werden. -- Wer Grün wählt, …stärkt die VerbraucherInnenrechte, … wählt Essen und Felder ohne Gentechnik… -- Traditionell ist der Osten geprägt durch einen überproportionalen Anteil der Land- und Ernährungswirtschaft. Wir setzen auf eine ökonomisch und ökologisch zukunftsfähige, gentechnikfreie Produktion: klimaschonend, umweltschonend und beschäftigungsintensiv. ➔ **CON**	und Menschen lehnen wir strikt ab, weil sie BäuerInnen und VerbraucherInnen in eine Abhängigkeit von Agrarkonzernen führen. -- Wir wollen im Interesse der großen Mehrheit der Verbraucherinnen und Verbraucher unsere gentechnikfreie Land- und Lebensmittelwirtschaft und die Imkerei vor gentechnischen Verunreinigungen wirksam schützen. -- […] ➔ **CON**	
Left	Wir lehnen die Patentierung von Lebewesen und Genen ab. Der verantwortungsbewusste Umgang mit den Möglichkeiten der Bio- und Gentechnologien muss gesichert werden. Wir unterstützen die Schaffung gentechnikfreier Zonen. Die	Agro-Gentechnik verbieten; Kennzeichnungspflicht von gentechnischen Bestandteilen in Nahrung und Futtermitteln bis zur Nachweisgrenze von 0,1 Prozent verschärfen; gentechnikfreie Regionen und auf sie hinführende Initiativen unterstützen ➔ **CON**	Von der neuerdings vielfach geforderten Freihandelszone zwischen der EU und den USA erwarten wir keine positive Entwicklung. Besonders im Bereich der Landwirtschaft ließe die unbeschränkte Einfuhr gentechnisch behandelter Produkte unüberschaubare Konsequenzen befürchten. --	Wir wollen den Anbau und den Handel mit gentechnisch veränderten Pflanzen sowie das Klonen von Tieren verbieten. Den Import von gentechnisch veränderten Pflanzen wollen wir verbieten. Die heimische Produktion von Eiweißfuttermitteln wollen wir stärken. ➔ **CON**

	Kennzeichnungspflicht von gentechnischen Bestandteilen ist bis auf die Nachweisbarkeitsgrenze durchzusetzen. ➔ **CON**		Agro-Gentechnik, Biopatente und Biopiraterie wollen wir verbieten. Sofort müssen das Gentechnikgesetz, das EU-Zulassungsverfahren und die Kennzeichnungsvorschriften verschärft werden. Wir halten an der Nulltoleranz bei Saatgut und Lebensmitteln fest und unterstützen die gentechnikfreie Land- und Lebensmittelwirtschaft. -- Wir wollen das Recht auf freien Nachbau von Saatgut sichern und treten der Marktmacht von Saatgut- und Gentech-Konzernen entgegen. -- Wir wollen eine bienenfreundliche Landnutzung. Bienen und andere Insekten wollen wir vor Pestiziden und Gentech-Pflanzen schützen. ➔ **CON**	
SPD	In den letzten zwei Jahrzehnten waren die Informationstechnologien der Motor für wirtschaftliches Wachstum. Wir wollen sie in Verbindung mit der Nano- und Opto-Technik sowie der Bio- und Gentechnologie nutzen, um bei der ökologischen Modernisierung unsere weltweite Vorreiterrolle auszubauen. ➔ **PRO**	Wahlfreiheit in Sachen Gentechnik. Die große Mehrheit der Verbraucherinnen und Verbraucher lehnt Gentechnik in Lebensmitteln ab. Um Transparenz im gesamten Europäischen Binnenmarkt herzustellen, setzen wir uns für die Ausweitung der Kennzeichnung für gentechnisch veränderte Futter- und Lebensmittel auf Erzeugnisse ein, die von mit gentechnisch veränderten Pflanzen gefütterten Tieren stammen. Die von der SPD durchgesetzte „ohne Gentechnik"-Kennzeichnung wollen wir mit einem einheitlichen Label vorantreiben. Wir werden auf eine Änderung des	Wir lehnen – wie 80 Prozent der deutschen Bevölkerung – den Anbau von gentechnisch veränderten Pflanzen ab, denn die Grüne Gentechnik darf den Menschen nicht aufgezwungen werden. Damit sie wirklich die Wahl haben, fordern wir eine EU-Kennzeichnungspflicht für Produkte von Tieren, die mit genveränderten Pflanzen gefüttert wurden. An der Nulltoleranz gegenüber nicht zugelassenen gentechnisch veränderten Bestandteilen in Lebensmitteln halten wir fest – ebenso wie an der Saatgutreinheit. Das entspricht dem Vorsorgeprinzip und ist zudem Voraussetzung dafür, dass auch künftig Lebensmittel erzeugt werden können, die den	Weiterhin setzen wir uns für gentechnikfreie Landwirtschaft und Lebensmittel ein. Wir werden sicherstellen, dass auch bei den sogenannten neuen Gentechnikverfahren das Vorsorgeprinzip und die Wahlfreiheit gewährleistet sind und damit erzeugte Pflanzen und Tiere nicht unreguliert in den Markt gelangen. -- Gentechnisch veränderte Organismen in der Landwirtschaft und Patente auf Leben lehnen wir ab. An der Saatgutreinheit und der Nulltoleranz für nicht zugelassene gentechnisch veränderte Organismen in Lebensmitteln halten

		europäischen Rechts hinarbeiten, die die verbindliche Einrichtung gentechnikfreier Regionen ermöglicht. ➔ **CON**	Bedürfnissen der Verbraucherinnen und Verbraucher entsprechen: ohne Gentechnik. ➔ **CON**	wir fest. Tierische Produkte, die auf Fütterung mit gentechnisch veränderten Pflanzen beruhen, müssen europaweit verpflichtend gekennzeichnet werden. ➔ **CON**

Table A5. Coding Decisions Taken for the Thuringian Parties, 1990-2014

	1990	1994	1999
CDU	➔ **NST**	Neue Mikrotechnologien, die Informationstechnik, die Bio- und Gentechnologie sowie neue Materialwissenschaften orientieren sich an dieser neuen von Wachstum. Die CDU Thüringer befürwortet den verantwortlichen Umgang mit diesen neuen Technologien in Wissenschaft und Forschung. Die CDU Thüringen setzt sich dafür ein, mit Wissenschaft und Wirtschaft die Voraussetzungen zu schaffen, die in Forschung lind Entwicklung erzielten Ergebnisse beschleunigt in marktfähige Produkte umzusetzen. ➔ **PRO**	➔ **NST**
FDP	➔ **NST**	Besondere Förderung moderner zukunftsträchtiger Technologien und Forschungsdisziplinen, wie Biotechnologie, Gentechnologie, Kommunikationstechnologie und Materialforschung ➔ **PRO**	➔ **NST**
Greens	➔ **NST**	Gentechnik: Gefährdungen und Risiken der Gentechnikforschung minimieren. Wir wollen den Rückzug aus gentechnischen Forschungen in Thüringen. Die Nutzen-Risiko-Analysen beschreiben komplexe Gefährdungspotentiale, denen nur ein geringer Nutzen gegenübersteht. Der Verlust zahlreicher Arbeitsplätze wird dabei noch außer Acht gelassen. Wir lehnen Forschungen zur Patentierung von Lebewesen und von gentechnisch erzeugten Stoffen ab. Wir treten ein für eine Umstrukturierung gentechnisch arbeitender Institute in Richtung. einer	Allumfassende Kennzeichnung gentechnisch veränderten Saatgutes und von Lebensmitteln, die selbst gentechnisch verändert bzw. unter Zuhilfenahme gentechnischer Verfahren entstanden sind -- Verzicht auf gentechnische Verfahren in der Tier- und Pflanzenzucht -- Der Wert einer gesunden Ernährung ist unumstritten. Umstritten jedoch sind der Nutzen und die Gefährlichkeit gentechnisch veränderter Lebensmittel beispielsweise in

		ökologisch verträglichen Forschung (vgl. Abschnitt "Bildung und Kultur"). Die Anwendung gentechnisch erzeugter Medikamente, Impfstoffe und Diagnostika, für die es bisher keine Alternativen gibt, wollen wir kritisch begleiten. Wir setzen uns gleichfalls dafür ein, dass Alternativmethoden, die nicht auf Gentechnik basieren, vorrangig entwickelt werden. Wir lehnen jegliche Freilandversuche und andere Experimente mit gentechnisch veränderten Pflanzen und Tieren in Thüringen ab. -- Die Ergebnisse universitärer und außeruniversitärer Forschung wirken sich in Form neuer Technologien in immer kürzer werdenden Abständen auf den Alltag der Menschen, ihre Lebens- und Arbeitsbedingungen aus. Dass es sich dabei häufig um Risikotechnologien und Fehlentwicklungen handelt, die mit hohen Summen öffentlich finanziert werden, haben die Diskurse um Atomenergie, Gentechnologie und die Verkehrsentwicklung exemplarisch deutlich gemacht. Wir wollen deshalb eine offene und öffentliche Diskussion über die gesellschaftspolitischen Dimensionen der Wissenschaft. -- Die Freiheit der Forschung endet da, wo sie ethisch nicht mehr zu vertreten ist. Das schließt die Durchführung von rüstungsrelevanter Forschung, auch auf dem Wege der Drittmittelfinanzierung, aus. Risikoforschung, wie etwa die Weiterentwicklung der Gentechnologie soll nicht länger gefördert werden. Neben dem Gefahrenaspekt halten	Bezug auf Allergien. Eine Kennzeichnungspflicht für gentechnisch veränderte Lebensmittel ist deshalb das Recht eines jeden Menschen. -- BÜNDNIS 90 / DIE GRÜNEN treten für die Freiheit von Wissenschaft, Lehre und Forschung ein. Die Forschungsfreiheit findet dort ihre Grenze, wo die Menschenwürde verletzt oder unüberschaubare Risiken eingegangen werden. Insbesondere die gentechnische Forschung an den Thüringer Hochschulen sowie die aus dem Landeshaushalt geförderte gentechnische Forschung soll in dieser Hinsicht stärker öffentlich diskutiert werden. -- Gentechnik - mögliche Risiken ernst nehmen Wir unterstützen alle technologischen Entwicklungen, die zu einer in unserem Sinne zukunftsfähigen Entwicklung beitragen. Im Gegensatz zur Biotechnologie sehen wir in der durch die Gentechnik möglichen Manipulation der Erbanlagen diese Zukunftsfähigkeit gefährdet. Auf kurzfristigen Gewinn ausgerichtete Unternehmensstrategien, unzureichende Sicherheits- und Begleitforschung und eine sich im Sinne des Verbraucherinnenschutzes immer weiter verschlechternde Gesetzgebung lassen keinen anderen Schluss zu. In der Humanmedizin erkennen wir die Erfolge der Gentechnologie an, warnen angesichts der Aufweichung der Embryonenschutzgesetzgebung, den beginnenden routinemäßigen Eingriffen in die menschliche

		wir es auch aus Gründen der zu erwartenden Ergebnisse etwa im Bereich der Medizin und Landwirtschaft für sinnvoller, die zur Verfügung stehenden Mittel in die Weiterentwicklung einer sich ganzheitlich verstehenden Medizin und der Entwicklung ökologischer Landwirtschaftsverfahren zu investieren. Wir treten daher für eine Umstrukturierung gentechnisch arbeitender Institute in Richtung einer ökologisch verträglichen Forschung und für eine Aufklärung über die Gefahrenpotentiale der Gentechnik ein. ➔ **CON**	Keimbahn und der damit drohenden Zweiklassenmedizin und der Forcierung der Diskriminierung "Andersfähiger" aber vor der gegenwärtigen Euphorie. Wir fordern in allen Bereichen für die gegenwärtig stark vernachlässigten Alternativen mindestens eine Gleichstellung bei der Förderung durch Bund und Länder. Darüber hinaus ist der besondere Schutz von Frauen vor gentechnischen "Experimenten" zu gewährleisten. Wir lehnen den Einsatz der Gentechnik in den Bereichen Landwirtschaft, Lebensmittelproduktion und Umweltsanierung ab, weil die hohen Gewinnerwartungen für Einzelne in keinem Verhältnis zu den ungeklärten Langzeitauswirkungen auf die menschliche Gesundheit und die Umwelt stehen. Aus diesem Grund wenden wir uns gegen die aktuellen und geplanten Freisetzungsvorhaben im landwirtschaftlichen Bereich. Sollte es aufgrund der europäischen Gesetzgebung in Thüringen dennoch zu Freisetzungen kommen, so dürfen keine Landesflächen zur Verfügung gestellt werden. Für die Genehmigungsphase ist die Bürgerinnenbeteiligung zu gewährleisten. Die Freisetzungen selbst müssen in weit stärkerem Maße von Sicherheitsforschungen vor allem über mögliche Langzeitwirkungen begleitet werden. -- Die Prüfkapazitäten des Landes Thüringen für Untersuchungen von Lebensmittel auf Bestandteile von gentechnisch veränderten Organismen sind zu erweitern und ständig den neuesten Analysemethoden anzupassen. Diese mit öffentlichen Geldern

			ausgestatteten Labors müssen auch Privatpersonen kostenlos zur Verfügung stehen, wenn ein begründeter Verdacht auf das Nichteinhalten der Kennzeichnungsverordnung gegeben ist. Der 1994 gegründete und seit 1996 nicht mehr arbeitende Gentechnische Beirat beim Thüringer Sozialministerium ist angesichts der öffentlichen Diskussion nach einer ausgewogenen Neubesetzung zu reaktivieren. Das Regionalzeichen "Original Thüringer Qualität" ist um das Kriterium "gentechnikfrei hergestellt" zu erweitern. Der Absatz von Produkten aus dem ökologischen Landbau, bei dem der Einsatz von Gentechnik untersagt ist, soll durch die öffentliche Hand stärker gefördert werden. -- Das Land Thüringen hat Einfluss darauf zu nehmen, dass das BioRegio-Zentrum Jena im Bereich der Forschung seinen Schwerpunkt auf biotechnologische Verfahren legt und gentechnologische Vorhaben auf ihre Ersetzbarkeit durch biotechnische oder andere alternative Möglichkeiten prüft. ➔ **CON**
Left	➔ **NST**	Für das Verbot gentechnologischer Manipulationen in der Nahrungsmittelproduktion. ➔ **CON**	Gentechnische Forschung durch die Arbeit einer ständigen Ethikkommission begleiten und kontrollieren. ➔ **CON**
SPD	➔ **NST**	➔ **NST**	Methoden der Bio- und Gentechnologie in der Landwirtschaft werden unter kritischer Abwägung ihrer Umweltverträglichkeit sowie ihrer ethischen Grenzen und

			Konsequenzen angewendet sowie die Forschung gefördert ➔ **PRO**
	2004	**2009**	**2014**
CDU	➔ **NST**	➔ **NST**	➔ **NST**
FDP	Die FDP Thüringen tritt für eine Nutzung der Chancen der "grünen Gentechnik" ein. Die grüne Gentechnik ist ein neuartiges Werkzeug für die Züchtung von Kulturpflanzen. Die Entwicklung von Biotechnologien schafft neue und sichert vorhandene innovative Arbeitsplätze. Hier gilt es wissenschaftlichen Vorlauf zu schaffen, um die Möglichkeiten und Risiken objektiv abwägen zu können. ➔ **PRO**	-Für die Schaffung eines wirklich ausreichenden wissenschaftlichen Vorlaufes zur Feststellung und Abwägung von Chancen und Risiken der Gentechnik. ➔ **MOD**	Innovationen und Agrarforschung fördern – Chancen und Risiken ideologiefrei abwägen! Eine moderne Landwirtschaft orientiert sich aus Sicht liberaler Agrarpolitik stets an neuen Entwicklungen der Produktionsmethodik sowie am technischen Fortschritt und wissenschaftlichen Erkenntnissen. Unter dem Grundsatz, dass für uns Liberale die Sicherheit für Mensch und Umwelt oberste Priorität besitzt, befürwortet liberale Politik eine verantwortungsvolle Nutzung und eine weitere Erforschung der modernen Biotechnologie. Für die FDP Thüringen sind die Anwendungen der Biotechnologie stets eine objektive Abwägung der Chancen und Risiken dieser Lebenswissenschaft. Für deren gesellschaftliche Akzeptanz und Entscheidung wollen Liberale den mündigen Verbraucher durch Informationstransparenz sensibilisieren und stärken sowie das Forschungsklima technologiefreundlich gestalten. Die FDP Thüringen will: die Forschungen in den Bereichen der Pharmazeutischen-, der Industriellen- und der Agrar-Biotechnologie intensivieren und die gesellschaftliche Debatte frei von Ideologie und Denkverboten führen. Einen verbesserten Wissenstransfer zur Abwägung von Chancen und Risiken der

			Grünen Gentechnik durch die Schaffung eines Netzwerkes zwischen Agrarforschung und Praxis. Fie vollständige und konsequente Prozesskennzeichnung für alle Lebensmittel und Konsumgüter bei deren Produktion an irgendeiner Wertschöpfungsstufe gentechnisch veränderte Organismen beteiligt waren. ➔ **MOD**
Greens	Wir wollen, dass zum Beispiel Allergikerinnen und Allergiker erkennen können, welche Nahrungsmittel sie unbedenklich essen und welche Produkte sie gefahrlos verwenden können. Das gilt ebenso für den Wunsch eines Großteils der VerbraucherInnen nach gentechnikfreien Lebensmitteln. -- Den Einsatz der Gentechnik in der Land-, Forst- und Lebensmittelwirtschaft lehnen wir auf Grund der ungeklärten Risiken für die menschliche Gesundheit und die Umwelt ab. -- Gentechnik Wir lehnen den Einsatz der Gentechnologie in der Landwirtschaft und in der Lebensmittelverarbeitung ab, weil die möglichen Risiken für Mensch und Natur nicht geklärt sind. Einmal in die Umwelt freigesetzt, wären negative Auswirkungen nicht rückholbar und würden sich verselbstständigen. Angesichts der gegenwärtigen Entwicklungen fordern wir geringst mögliche Grenzwerte für gentechnische Verunreinigungen und eine verbraucherfreundliche Kennzeichnung gentechnisch veränderter	Wir stehen für direkte und repräsentative Demokratie auf Augenhöhe und damit diametral zur Landesregierung. Wir engagieren uns in und mit BürgerInneninitiativen für mehr Demokratie, für den Erhalt der Kultur gegen die Zerschlagung durch die Landespolitik, gegen die Werraversalzung und für eine gentechnikfreie Landwirtschaft. -- Dabei sind das Nachhaltigkeitsprinzip und der gentechnikfreie Anbau von Energiepflanzen Grundvoraussetzungen einer umweltfreundlichen Biomasseerzeugung -- Agrogentechnik Nein danke! Die Bilanz nach 20 Jahren Agro-Gentechnik ist ernüchternd: Herbizidresistente Superunkräuter, Insektizid-resistente Schädlinge, unfruchtbare Tierherden, hunderttausende Bauern mit Knebelverträgen und immer mehr Menschen auf der Erde, die Hunger leiden. Es zeigt sich ganz deutlich: Die Gentechnik in der Landwirtschaft hat keines der Probleme gelöst, sie hat diese noch verstärkt. Tierversuche zeigen darüber hinaus, dass gentechnisch veränderte Lebensmittel alles andere als harmlos sind und die lebensmittelrechtlichen	Agro-Gentechnik braucht niemand Wir GRÜNE sagen ganz klar Nein zum Einsatz von gentechnisch veränderten Organismen in der Thüringer Landwirtschaft. Die Bilanz nach 25 Jahren Agro-Gentechnik ist ernüchternd: herbizidresistente Superunkräuter, insektizidresistente Schädlinge, unfruchtbare Tierherden hunderttausende Bäuerinnen und Bauern mit Knebelverträgen und immer mehr Menschen, die auf unserer Erde Hunger leiden. Die Gentechnik hat in der Landwirtschaft keine Probleme gelöst, sie hat viele noch weiter verschärft. Dabei gibt es genug Möglichkeiten, die Menschheit zu ernähren – z. B. durch ökologische Landwirtschaft, Sortenzüchtung und vor allem eine gerechte Bodenpolitik. Wir wollen deshalb das „Aktionsbündnis für eine gentechnikfreie Landwirtschaft in Thüringen“ ideell und finanziell unterstützen. Der Freistaat Thüringen hat die Gefahren der Agro-Gentechnik erkannt und ist dem „Europäischen Netzwerk gentechnikfreier Regionen“ beigetreten. Wir werden uns dementsprechend für eine umfassende Kennzeichnungspflicht auch für Produkte von Tieren, die mit gentechnisch veränderten Stoff en gefüttert

	Lebens- und Futtermittel. In der Humanmedizin leistet die Gentechnologie einen wichtigen Beitrag zur Entwicklung neuer Medikamente und Therapien. Wir warnen jedoch vor unseriösen Versprechungen und dem Missbrauch von Gentests zum Beispiel durch Versicherungen und Arbeitgeber. Die Forschung an Embryonen lehnen wir genauso ab wie jede Form des Klonens sowie die Patentierung von Menschen, Pflanzen und Tieren. ➔ **CON**	Zulassungsverfahren angesichts der gesundheitlichen Risiken nicht ausreichen. Gentechnisch veränderte Organismen sind Konkurrenten für die große Vielfalt an über Jahrhunderte entstandenen, optimal an verschiedene Standort- und Klimabedingungen angepasste Pflanzen und Tiere. Ihre Wechselwirkungen mit den Ökosystemen lassen sich nicht vorhersehen. Wir wollen, dass sich der Freistaat Thüringen nach dem Vorbild der Stadt Weimar und anderer gentechnikfreien Regionen zur gentechnikfreien Landwirtschaft bekennt. Im Gegensatz zu inzwischen verbotenen Giften wie DDT, FCKW und Dioxin, die allmählich aus der Umwelt verschwinden, können wir uns einen Fehlversuch bei der Gentechnik nicht leisten. Einmal in die freie Natur ausgebracht, können die gentechnisch veränderten Organismen nicht wieder eingefangen werden. Das Aktionsbündnis für eine gentechnikfreie Landwirtschaft in Thüringen ist deshalb ideell und finanziell zu unterstützen. Thüringen soll darüber hinaus eine Initiative ergreifen, um die verbraucherfeindliche EU-Regelung aufzuheben, wonach Produkte von Tieren, die mit gentechnisch veränderten Stoffen gefüttert wurden, nicht gekennzeichnet werden müssen. ➔ **CON**	wurden, und klare Haftungsregeln für Schäden durch den Anbau von gentechnisch veränderten Organismen einsetzen. -- Wir wollen einen Schulgartenunterricht, der den biologischen, gentechnikfreien und nachhaltigen Anbau erfahrbar macht. ➔ **CON**
Left	➔ **NST**	Den Einsatz und die Verbreitung gentechnisch veränderter, transgener Organismen lehnen wir ab. ➔ **CON**	➔ **NST**
SPD	➔ **NST**	Wir unterstützen Initiativen und Zusammenschlüsse für gentechnikfreien Anbau.	Wir lehnen weiterhin den Anbau jeglicher gentechnisch veränderten Pflanzen in

		Wir werden uns dafür einsetzen, dass den Regionen dabei Mitspracherechte eingeräumt werden. ➔ **CON**	Thüringen strikt ab. Wir wollen eine deutschlandweite Kennzeichnungspflicht von Tierprodukten einführen, die mit genveränderten Pflanzen gefüttert wurden. -- Lebensmittelskandale, unübersichtliche Finanzierungsmodelle oder die Diskussion über die Gefahren der Grünen Gentechnik: Diese Beispiele zeigen, dass Verbraucherschutz vielschichtig ist und Menschen bewegt -- Wir haben Thüringen als gentechnikfreie Region etabliert: Der Freistaat Thüringen ist dem Europäischen Netzwerk „Gentechnikfreie Regionen“ beigetreten und auf landeseigenen bzw. vom Land verpachteten Flächen dürfen keine gentechnisch veränderten Pflanzen angebaut werden. -- Wir lehnen den Anbau von gentechnisch veränderten Pflanzen ab. Wir wollen Bürger und Natur im Freistaat vor den Gefahren der sogenannten grünen Gentechnik schützen. Die Nutzung gentechnisch veränderter Pflanzen im Freistaat schadet nicht nur dem Image „Thüringer Qualität“ sondern birgt auch unabschätzbare Risiken. Wir setzen daher unsere Mitarbeit im Europäischen Netzwerk gentechnikfreier Regionen engagiert fort. Um das Thüringer Engagement weiter zu unterstreichen, streben wir in der kommenden Legislatur den Vorsitz im Netzwerk an. ➔ **CON**

Table A6. Positions of the Regional CDU Branches on Agribiotech, 1990-2017

CDU	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
Western states																												
Baden-Wuerttemberg			NST				PRO					NST					NST					CON					CON	
Bavaria	NST				PRO				PRO					PRO					CON					CON				
Hesse		NST				PRO				PRO				PRO					NST	NST					NST			
Lower Saxony	NST				PRO				PRO					NST					MOD					NST				NST
North Rhine-W.	NST					NST					NST					PRO					PRO		NST					NST
Rhineland-Palatine		NST					NST					NST					PRO					NST				NST		
Saarland	NST				NST					PRO					NST					NST			NST					NST
Schleswig-Holstein			NST				PRO				PRO					PRO				MOD			NST					NST
Eastern states																												
Brandenburg	NST				NST					PRO					PRO					NST					NST			
Mecklenburg-West P.	NST				NST				PRO				NST				PRO					PRO					NST	
Saxony	NST				NST					PRO					NST					NST					NST			
Saxony-Anhalt	NST				NST				PRO				NST				PRO					MOD					NST	
Thuringia	NST				PRO					NST					NST					NST					NST			
City-states																												
Berlin	NST					NST				NST		NST					NST					NST					NST	
Bremen		NST				NST				PRO				NST				NST				NST				NST		
Hamburg		NST		NST				NST				NST			NST				NST			NST				NST		

Source: based on the coding of the parties' election manifestos.

Table A7. Positions of the Regional SPD Branches on Agribiotech, 1990-2017

SPD	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
Western states																												
Baden-Wuerttemberg			NST				NST					NST					CON					CON					CON	
Bavaria	CON				NST				CON					PRO					CON					CON				
Hesse		CON				NST				PRO				NST					CON	CON					CON			
Lower Saxony	NST				NST				NST					NST					CON					CON				CON
North Rhine-W.	NST					PRO					NST					NST					CON		NST					CON
Rhineland-Palatine		CON					CON					PRO					NST					MOD				CON		
Saarland	NST				NST					NST					NST					CON			CON					CON
Schleswig-Holstein			NST				CON				CON					CON				CON			CON					CON
Eastern states																												
Brandenburg	NST				NST					PRO					NST					NST					CON			
Mecklenburg-West P.	NST				NST				NST				NST				PRO					CON					NST	
Saxony	NST				NST					NST					NST					NST					CON			
Saxony-Anhalt	NST				NST				PRO				NST				NST					MOD					CON	
Thuringia	NST				NST					MOD					NST					CON					CON			
City-states																												
Berlin	NST					PRO				NST		NST					NST					NST					NST	
Bremen		NST				CON				NST				NST				NST			NST					NST		
Hamburg		NST		NST				PRO				CON			NST				NST				NST				CON	

Source: based on the coding of the parties' election manifestos.

Table A8. Positions of the Regional Greens Branches on Agribiotech, 1990-2017

GREENS	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
Western states																												
Baden-Wuerttemberg			CON				CON					CON					CON					CON					CON	
Bavaria	CON				CON				CON					CON					CON					CON				
Hesse		CON				CON				CON				CON					CON	CON					CON			
Lower Saxony	CON				CON				CON					CON					CON					CON				CON
North Rhine-W.	CON					CON					CON					CON					CON		CON					CON
Rhineland-Palatine		CON					CON					CON					CON					CON				CON		
Saarland	NST				NST					NST					CON					CON			CON					CON
Schleswig-Holstein			CON				CON				CON					CON				CON			CON					CON
Eastern states																												
Brandenburg	NST				NST					CON					CON					CON					CON			
Mecklenburg-West P.	NST				NST				CON				CON				CON					CON					CON	
Saxony	NST				NST					CON					CON					CON					CON			
Saxony-Anhalt	CON				CON				CON				NST				CON					CON					CON	
Thuringia	NST				CON					CON					CON					CON					CON			
City-states																												
Berlin	CON					CON				CON		NST					CON					CON					CON	
Bremen	NST					NST				CON				CON				CON				CON				CON		
Hamburg		CON		NST				CON				CON			NST				CON			CON				CON		

Source: based on the coding of the parties' election manifestos.

Table A9. Positions of the Regional FDP Branches on Agribiotech, 1990-2017

FDP	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
Western states																												
Baden-Wuerttemberg			NST				NST					NST					PRO					NST					CON	
Bavaria	NST				NST				NST					PRO					CON					CON				
Hesse		PRO				PRO				PRO				PRO					PRO	PRO						PRO		
Lower Saxony	NST				NST				PRO					NST					PRO					PRO				PRO
North Rhine-W.	PRO					PRO					NST					PRO					PRO							PRO
Rhineland-Palatine		PRO					PRO					PRO					PRO					PRO					PRO	
Saarland	NST				NST					NST					NST					NST			PRO					NST
Schleswig-Holstein			NST				PRO				PRO					PRO				PRO			NST					NST
Eastern states																												
Brandenburg	NST				NST					NST					PRO					PRO					PRO			
Mecklenburg-West P.	NST				PRO				PRO				NST				PRO					PRO					PRO	
Saxony	NST				NST					PRO					NST					PRO					PRO			
Saxony-Anhalt	NST				NST				PRO				PRO				PRO					PRO					NST	
Thuringia	NST				PRO					NST					PRO					MOD					MOD			
City-states																												
Berlin	NST					NST				NST			NST				PRO					NST					NST	
Bremen		NST				NST				NST				NST				NST				PRO				NST		
Hamburg		NST		MOD				NST				NST			NST				PRO			PRO				NST		

Source: based on the coding of the parties' election manifestos.

Table A10. Positions of the Regional Left Branches on Agribiotech, 1990-2017

LEFT	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
Western states																												
Baden-Wuerttemberg			NEM				NEM					NEM					NEM					CON					NST	
Bavaria	NEM				NEM				NEM					NEM					CON					CON			
Hesse		NEM				NEM				NEM				NEM					CON	CON					CON			
Lower Saxony	NEM				NEM				NEM					NEM					CON					CON			CON
North Rhine-W.	NEM					NEM					NEM					NEM					NST		CON					CON
Rhineland-Palatine		NEM					NEM					NEM					CON					NST				NEM		
Saarland	NEM				NEM					NEM					NEM					CON			CON					CON
Schleswig-Holstein			NEM				NEM				NEM					NST				NST			CON					NST
Eastern states																												
Brandenburg	NST				NST					MOD					NST					CON					CON			
Mecklenburg-West P.	NST				NST				NST				NST				CON					CON					CON	
Saxony	NST				NST					NST					NST					CON					CON			
Saxony-Anhalt	NST				NST				NST				NST				NST					CON					CON	
Thuringia	NST				CON					NST					NST					CON					CON			
City-states																												
Berlin	NST					CON				CON		NST					NST					NST					NST	
Bremen		NEM				NEM				NEM				NEM				NST				CON				NST		
Hamburg		NEM		NEM				NEM				NEM			NEM				NST			CON				CON		

Source: based on the coding of the parties' election manifestos.