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## RESEARCH ARTICLE

# The importance of calibration in policy mixes: Environmental policy integration in the implementation of the European Union's Common Agricultural Policy in Germany (2014–2022)

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**Abstract**

Environmental policy integration (EPI), that is, the incorporation of environmental concerns in non-environmental policy areas, has been widely adopted in public policies. However, EPI research has found much discrepancy between environmental objectives and actual implementation. This paper argues that analyzing EPI in the context of policy mixes with multiple objectives, multiple instruments and their calibrations helps to better understand unavoidable tensions and limitations. We develop a framework to assess EPI at these three levels of policy output, synthesizing the EPI and policy mix literatures. We further distinguish four analytical dimensions to assess calibrations: stringency, specificity, flexibility, and temporality. A case study of the national implementation of the European Union's Common Agricultural Policy (CAP) in Germany 2014–2022 is used to elaborate the conceptual argument. The CAP has saliently incorporated environmental objectives, while implementation, including the calibrations of most instruments within predetermined corridors, is left to member states. A systematic meta-review of 142 texts evaluating policy instruments and calibrations in the CAP 2014–2022, focusing on Germany, found that several CAP instruments link most farm income support to pro-environmental behavior. These instruments could potentially have high environmental effectiveness and efficiency. But actual policy calibrations delivered weak EPI due to low stringency and specificity, while high flexibility and temporal accommodation of farmers' needs might support EPI by increasing acceptance. Weak EPI resulted from instrument calibrations in the face of unavoidable trade-offs between competing objectives. Our results demonstrate that calibrations can significantly affect the strength of EPI adoption, and the priorities within policy mixes more generally.

**KEYWORDS**

CAP, policy calibration, policy design, policy implementation, policy instruments, policy mixes

## 1 | INTRODUCTION

Environmental policy integration (EPI) refers to the incorporation of environmental concerns into non-environmental policy areas (e.g., Lafferty & Hovden, 2003). The concept assumes that better

environmental protection cannot be achieved by dedicated environmental policy measures alone, but requires a holistic understanding of the sustainability challenges in order to address the driving forces of environmental degradation (Persson et al., 2018). Although EPI has played an important role in policy practice and attracted attention

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among scholars of public policy in the context of sustainable development (Jordan & Lenschow, 2010), understanding success and failure of EPI remains a challenge, in particular at the implementation stage (Persson & Runhaar, 2018). A recent review of the EPI literature found a general “discrepancy” between environmental objectives and actual implementation (Runhaar et al., 2020, p. 220). This paper argues that, first, analyzing EPI from a policy mix perspective helps to better understand unavoidable tensions and limitations of the integrative approach to environmental policy-making, and second, that special attention should be paid to the calibration of policy instruments. We use a case study of the national implementation of the European Union's (EU) Common Agricultural Policy (CAP) to elaborate this argument.

For logical and practical reasons, the integration of environmental aspects into other policy areas will always result in a policy mix, that is, a combination of multiple instruments aimed at (one or more) objectives (Bouma et al., 2019, p. 34), with competences often distributed over multiple levels of governance (Howlett et al., 2017). By definition, EPI never starts from a clean slate. There is always an existing policy (e.g., economic or energy policy) with its own objectives and instruments. EPI might modify these objectives (e.g., emphasizing “green” growth or renewable sources of energy) and introduce new instruments, but will never completely replace the existing policy, although EPI might aim to transform it over time (Jacob & Ekins, 2020). Policy mix analysis is therefore relevant for understanding EPI since it has addressed questions regarding the coherence of multiple goals, the consistency of multiple instruments, and the congruence of goals and instruments (Kern & Howlett, 2009). However, following Hall's (1993) seminal classification, public policies consist of three levels: *objectives* anchored in the ideational framework of a policy, *instruments* as the techniques used to pursue the goals, and *calibration* of the instruments as the concrete adjustment of the policy settings. So far, limited attention has been paid to the role of calibration in policy mixes, which remains a “missing link” (Howlett et al., 2022, p. 9) in understanding how policy mixes work.

Determining the policy settings has often been portrayed as a mostly technical and administrative routine activity (Hall, 1993). However, where multiple instruments address multiple goals, we have at least two reasons to expect that their calibration could effectively decide which objectives are prioritized in the actual implementation of policy: First, the calibration of an instrument regulates the intensity of the policy intervention (e.g., a tax or technical regulation). Second, the calibration affects the allocation of scarce resources between several instruments (e.g., budgets for implementation staff or for different types of state aids).

To elaborate this argument about the role of instrument calibration in the adoption of EPI, this study examines the implementation of the EU's CAP. From an EPI perspective, the CAP constitutes a puzzle. On the one hand, the CAP has gone through significant changes in its ideational framework and policy design, which were originally fixated on income support for farmers (Feindt, 2018). Since the late 1980s, environmental objectives have been increasingly integrated into the CAP, accompanied by new policy instruments to address

environmental issues. These changes indicate a significant degree of EPI (Alons, 2017; Feindt, 2010). The CAP 2014–2022 explicitly aimed to “improve the environmental performance of agriculture” by the “combined effects of various instruments” supporting more sustainable production methods (European Commission, 2013, p. 6). On the other hand, the ecological effectiveness and efficiency of the CAP's instruments has been assessed as rather low (Pe'er et al., 2019) and the CAP has long been considered an extreme case of an insulated policy that is quite resistant to change (Coleman, 1998; Daugbjerg & Feindt, 2022), using an environmental sheen to protect and legitimate income support for farmers (Daugbjerg & Swinbank, 2016). As a result of its historical development, the CAP is now a very complex policy mix which contains many objectives and a multitude of instruments. These are implemented by EU member states with significant discretion in instrument calibration. We therefore focus on national implementation of the CAP (2014–2022), using Germany as a case study. Against this background, we address the following research question: Whether and how has calibration affected EPI in the CAP 2014–2022 policy mix in Germany?

In the remainder of this paper, we first present an analytical framework that synthesizes key findings from the EPI and policy mix literatures. It allows to differentiate EPI along the three levels of policy mixes (goals, instruments, calibrations) and distinguishes four analytical dimensions of calibration: stringency, specificity, flexibility, and temporality (Section 2). We then apply the suggested framework to the implementation of the CAP 2014–2022 in Germany. The methodological approach, a systematic meta-review of the literature evaluating CAP policy instruments, is described in Section 3. Section 4 presents the case results, that is, the assessment of EPI adoption in the CAP (2014–2022) in Germany. Section 5 discusses the results in the broader context of current research on EPI, policy mixes and policy design.

## 2 | ANALYZING EPI IN COMPLEX POLICY MIXES

### 2.1 | Conceptualizing EPI

EPI comes in many shapes and shades. Several analytical distinctions have been established. First, vertical versus horizontal EPI: While vertical EPI refers to the uptake of environmental concerns in a particular policy area, horizontal EPI means coordination across different policy areas (Lafferty & Hovden, 2003). In this paper, we focus on the vertical dimension as we study environment-related instruments in a specific policy area, namely European agricultural policy. Second, EPI can be analyzed either from a process-centered perspective (Jacob & Volkery, 2004; Russel et al., 2018), or with a focus on policy outputs (Runhaar, 2016), that is, policies and programs adopted or implemented (for a combination of a process and output-oriented analysis, see: Baulenas et al., 2021), or focusing on policy outcomes, that is, actual changes in human behavior or natural conditions (Biesbroek, 2021; Knaap & Kim, 1998). The latter is a “difficult task” (Jordan &



Lenschow, 2010, p. 154) given the challenges to causal attribution and measurement. If we distinguish objectives, instruments and calibrations as three distinct levels of a policy mix, EPI should be analyzed for each of them as well as for their interaction. To focus on this task, this paper adopts a policy output perspective.

Previous studies on EPI have compared the CAP to other policy areas (Hogl et al., 2016; Persson et al., 2015) or investigated particular policy instruments (Buizer et al., 2015), initiatives and practices (Huttunen, 2015; Regina et al., 2016). The mere existence of agri-environmental policy instruments already indicates some level of EPI (Venghaus et al., 2019). However, a comprehensive look at the instruments and their interplay is still missing. Discursive-institutionalist studies found evidence of an increasing consideration of environmental concerns over several decades (Alons, 2017; Feindt, 2010), but despite their inclusion in policy processes and outputs, the ideational framework and the instrumentation of the CAP remained geared toward agricultural production and income support (Daugbjerg & Feindt, 2017; Daugbjerg & Swinbank, 2016). Institutionalist explanations point to the imbalance between the sectoral goals of the CAP (in particular farm income), which are stipulated in the European treaties as its purpose, and environmental goals, which are based on more generic cross-cutting objectives of the EU (Feindt, 2018). However, analysis of the policy mix as a whole has so far found little application in CAP research.

## 2.2 | Differentiating EPI across different levels of policy mixes

In recent years, the analysis of policy mixes has emerged as an important topic in environmental policy research (Barton et al., 2017; Rayner et al., 2017). Most classifications of the different levels of policy mixes correspond to Hall's (1993) distinction between the ideational framework of a policy (problematizations and goals), the instruments as the techniques of governing, and the calibration of these instruments (policy settings).

The first level refers to the *objectives*, which can be understood as manifestations of cognitive assumptions and normative beliefs underlying a policy as fundamental ideas linked to expectations, purposes and ends (Béland & Cox, 2011, p. 3). At a high level of abstraction, they are part of the overarching policy strategy providing general orientation toward aims and visions (Rogge & Reichardt, 2016, p. 1623) as they “can serve as important spots on the horizon for policy makers” (Candel, 2017, p. 534). At the level of formulated statements on purposes of governmental activities, two general types of objectives can be distinguished: sectoral objectives comprising “goals that are directly associated with desired outcomes of policymaking in a specific sector” and cross-cutting objectives “connected to the broad impacts of policymaking that cut across policy sectors” (Petek et al., 2021, p. 461).

The second level of a policy mix, *policy instruments*, comprises the tools and techniques used by governments to achieve the objectives

(Hood, 1983). They are typically grouped into regulatory, financial, informational and cooperative instruments (for an overview, see: Acciai & Capano, 2021). A higher number of instruments (density) which combines different types of instruments (balance) is expected to improve the effectiveness of policy mixes (Knill et al., 2012). However, looking at density and balance alone is not sufficient to assess the policy mix (Fernández-i-Marín et al., 2021; Wiedemann & Ingold, 2021); the interaction between instruments must also be considered (Rogge & Reichardt, 2016).

The third level of a policy mix is *calibration*. Calibrations “are those contextual decisions through which policymakers adjust the actual setting of policy instruments” (Capano & Howlett, 2020, p. 9). Often the adjustment of policy instruments takes place as an administrative activity, which has therefore been considered a routine activity in the implementation of a policy (Hall, 1993). However, calibrations may have significant effects on policy impacts.

## 2.3 | The importance of calibration for EPI

Calibration determines the degree to which a policy instrument contributes to the stated objectives and possibly affects other goals. A mere analysis of stated objectives and types of policy instruments is not sufficient to assess the policy mix. Successful policy design requires that the elements of a policy mix across levels are combined in a way that maximizes complementarity and minimizes counterproductive effects (Howlett & Rayner, 2013). Calibrations are important because they are the main lever to align a combination of policy instruments to achieve one or more objectives.

While calibration has been addressed in, inter alia, innovation studies, environmental policy and policy feedback research, no unified conceptualization has emerged yet (Rogge, 2018, p. 40). The existing operationalizations differ in their level of abstraction and scope, complicating their application to the analysis of public policy (for an overview, see Table A1). For example, the concepts of “characteristics” (Haščič et al., 2009), “design aspects” (Kemp & Pontoglio, 2011) or “design elements” (del Río, 2012) have been used to capture the influence of instrument calibrations on innovations. While these operationalizations and applications have generated insights in the field of innovation policy, they are very topic-specific, limited to particular instrument types, and contain dimensions that are difficult to transfer to other policy fields. The environmental policy and policy feedback literatures, on the other hand, have conceptualized concrete implementation decisions as “calibrations” or “settings” (Daugbjerg & Kay, 2020; Holzinger et al., 2011; Knill et al., 2012; Skogstad, 2020) and are characterized by a broader scope, but remain somewhat vague and limited in their analytical precision. With the exception of Howlett et al. (2022), a synthesis of existing conceptualizations has not yet been undertaken.

Building on the previous conceptualizations, we propose the following four analytical dimensions of calibrations as a synthesis for analyzing public policies:

**TABLE 1** Policy mix levels and dimensions for the analysis of EPI.

Level	Definition	Dimensions
Objectives	Manifestations of cognitive assumptions and normative beliefs regarding policy purposes	Sectoral Cross-cutting
Instruments	Tools and techniques used by governments to achieve the policy objectives	Density Balance
Calibration	Concrete adjustments of the policy instruments settings	Stringency Specificity Flexibility Temporality

Abbreviation: EPI, environmental policy integration.

1. *Stringency*: Describes the relative depth of intervention of an instrument through its calibration. Stringency can be analyzed – according to the different types of instruments – based on the level of ambition (e.g., regulatory standards, requirements for receiving financial incentives), the level of financial support or the level of information disseminated (Daugbjerg & Kay, 2020; Holzinger et al., 2011; Rogge, 2018).
2. *Specificity*: Refers to the precision of the instruments provided by calibration. Specificity indicates the tailoring and target orientation of the instrument settings that may affect the achievement of the desired objectives (Kemp & Pontoglio, 2011).
3. *Flexibility*: Addresses the discretion of the addressees in instrument implementation. Decisions about specific calibration affect the level to which target populations can accommodate the execution of an instrument to their particular circumstances (Haščič et al., 2009; Rogge, 2018).
4. *Temporality*: Captures temporal elements of policy instrument implementation. In order to assess the impact of an instrument, it is crucial to consider the timing of the entry into force, the phase-in and phase-out periods or, in case of financial instruments, the different payout periods of different instruments (Kemp & Pontoglio, 2011).

These four dimensions allow a detailed analysis of the concrete adjustments of instrument settings (calibration). Tensions between the four dimensions should be expected, for example, a higher degree of specificity is usually associated with lower flexibility. The content of each calibration decision depends on the specific historical, political and geographical circumstances in the policy field, its discourses, actors and institutions (Howlett et al., 2022).

On this basis, we suggest a framework that allows to differentiate EPI adoption along the three levels of a policy mix (for an overview, see Table 1). To assess EPI in a policy mix, it is necessary to identify sectoral and cross-cutting environmental policy objectives, and the combination of different types of policy instruments used to address them. However, the relative salience of environmental objectives or the number of environmental policy instruments in a sectoral policy mix provide only a first indication of EPI. The concrete adjustment of

the settings may affect whether and to what degree the instruments work together and contribute to the even or uneven achievement of the different objectives.

### 3 | METHODOLOGY

To address the research question, we conducted a meta-review of the literature evaluating CAP instruments (Adelle et al., 2012). The meta-review was conducted as part of the research project Improving the effectiveness and feasibility of the CAP from an environmental perspective (WuP-GAP). Meta-reviews can either be based on statistical analysis (Casse & Milhøj, 2011) or, as here, take a thematic approach that cumulates qualitative insights from existing studies in a pre-defined period of time on the basis of a unified set of criteria (Galik & Chelbi, 2021). The systematic review provides the opportunity to accumulate evidence, while making visible and limiting researcher bias through the use of a transparent procedure.

Our meta-review included three steps. We first determined the analytical scope for the literature search. To identify the relevant elements, we build on Ossenbrink et al.'s (2019) top-down approach for delineating policy mixes, which takes the strategic intent of the respective policy as a starting point – in our case the integration of environmental concerns into the CAP – and examines the related policy output accordingly. Our literature search was confined to publications that appeared between 2014 and 2020, corresponding to the implementation period of the CAP.<sup>1</sup> The geographical focus was on the implementation in Germany. Even though the CAP is a European policy, member states have significant implementation options, in particular regarding instrument calibration, which makes it necessary to approach the analysis of EPI implementation at member state level. Implementation in Germany is particularly interesting because, on the one hand, the societal expectations regarding agriculture to integrate environmental issues are comparatively high (European Commission, 2022). On the other hand, the implementation at the national level in Germany's federal system requires coordination between the federal government and the 16 federal states, making policy change more difficult.

The second step was the data collection, for which we used standard systematic review procedures such as the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement providing a transparent search strategy for the identification, screening, selection and inclusion of the records (Moher et al., 2009). An overview of the data collection approach is shown in Table A2. The instruments of the CAP served as key words in the databases Web of Science, Scopus, Google Scholar, and AgEcon Search. We first conducted a preliminary Boolean search using “CAP policy instruments” AND “environment\*” to identify the relevant instruments. With these results, we used the instruments themselves with different abbreviations, truncations and translations (English and German) as search terms. A search query on December 13, 2018 in the four databases identified a total of 622 publications. By manual screening of headings, abstracts and keywords, one of the authors selected the

publications containing evaluations of the environmental effectiveness, and removed duplicates. This reduced the text corpus to 415 publications. Subsequently, the headings, paragraphs and keywords were examined for their eligibility, selecting publications that fulfill defined criteria. We finally applied these inclusion and exclusion criteria to the whole texts, resulting in 127 records. The respective steps of data collection were discussed in various meetings with the team of the broader research project. The discussion of exemplary evaluations served to establish an intersubjective comprehensibility and guideline for the screening process. The text corpus was updated on December 16, 2020 to include an additional 15 publications that had been published in the meantime, using reference checking. Excel was used to compile the publications into a database, which contains 142 entries recorded according to the instruments analyzed and criteria applied. The database can be found in the Supporting Information.

The third step was the data analysis: The coding of the text material was based on two criteria, environmental effectiveness and efficiency, which were operationalized by means of a guiding question and an evaluation score. Environmental effectiveness describes the impact of the policy instrument on environmental objectives (Question: Is the instrument effective in achieving the set environmental objectives? Coding: 1 = not effective, 2 = rather not effective, 3 = partly effective, 4 = rather effective, 5 = effective). Environmental efficiency is defined as the benefit-effort ratio of the instrument in relation to its environmental impact (Question: Is the instrument efficient in terms of the benefit-effort ratio? Coding: 1 = inefficient, 2 = rather inefficient, 3 = partially efficient, 4 = rather efficient, 5 = efficient). A first round of coding, conducted by one of the authors with results discussed among the team, identified all statements in the text corpus made with regard to one of the criteria and assigned and coded an evaluation score for the respective instrument and criterion. This procedure allowed us to create assessment profiles for each instrument, calculating average and deviation scores of all coded statements for each combination of instruments and criteria. In a second round of coding, we analyzed the entire text corpus again for statements about calibrations of CAP policy instruments in Germany. The analytical dimensions presented earlier (stringency, specificity, flexibility, temporality) were used as codes by one of the authors. Results were iteratively discussed in the research team. The selection of the instruments coded under the categories resulted inductively from the evaluations and the explanations provided there for assessing the environmental effectiveness of the particular instruments.

## 4 | EPI ADOPTION IN THE IMPLEMENTATION OF THE CAP (2014–2022) IN GERMANY

### 4.1 | EPI at the level of objectives

The CAP is aimed at contributing to the achievement of both sectoral and cross-cutting policy objectives. The sectoral objectives have been instituted in 1957 in article 33 of the Treaty establishing the European Economic Community (EEC), now article 39 of the Treaty

on the Functioning of the European Union (TFEU): “The objectives of the Common Agricultural Policy shall be:

1. to increase agricultural productivity by promoting technical progress and by ensuring the rational development of agricultural production and the optimum utilization of the factors of production, in particular labor;
2. thus, to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture;
3. to stabilize markets;
4. to assure the availability of supplies;
5. ensure that supplies reach consumers at reasonable prices.”

Cross-cutting objectives are established through the horizontal objectives provided by article 11 TFEU (obligation to include environmental protection in all Union policies) and article 111 (3) TFEU, which requires a high level of health, safety, environmental and consumer protection.

Accordingly, the policy mix of the CAP 2014–2022 contains a combination of sector-specific and cross-sectoral objectives. Article 110 (2) of Regulation (EU) 1306/2013 sets out three overarching objectives: “The performance of the CAP [...] shall be measured in relation to the following objectives

1. viable food production, with a focus on agricultural income, agricultural productivity and price stability;
2. sustainable management of natural resources and climate action, with a focus on greenhouse gas emissions, biodiversity, soil and water;
3. balanced territorial development, with a focus on rural employment, growth and poverty in rural areas.”

One of the three objectives explicitly addresses environmental concerns, besides income support and rural development. Hence, EPI adoption is manifest at the level of overarching objectives. However, the strength of EPI and its relation to the other policy objectives is determined by the choice of instruments and their calibration.

### 4.2 | EPI at the level of instruments

In our meta-review, we included seven CAP instruments of relevance to EPI: Direct payments (DP), cross compliance (CC), greening, agri-environmental and climate measures (AECM), measures to support organic farming, LEADER and EIP-Agri. For each of these instruments we analyzed the text corpus for evaluations of their environmental effectiveness and efficiency. Although attention to the different instruments has been uneven, we found at least two assessment of each criterion for each instrument (Table A3).

Below, we describe the instruments and their implementation in Germany and present a synthesis of their assessed environmental effectiveness and efficiency. Table 2 provides an overview of the

**TABLE 2** EPI performance of the CAP 2014–2022 policy instruments.

		Effectiveness	Efficiency
Direct payments (28)	M	2.1	1.8
	$\sigma$	.73	.64
Cross compliance (17)	M	2.5	2.3
	$\sigma$	1.1	1.1
Greening (39)	M	1.9	1.8
	$\sigma$	.48	.83
AECM (41)	M	3.3	2.4
	$\sigma$	.90	.77
Organic farming (25)	M	4.2	3.0
	$\sigma$	.75	1.0
LEADER (12)	M	4.0	2.8
	$\sigma$	.00	.63
EIP-Agri (6)	M	4.0	2.0
	$\sigma$	.00	.00

Note: The value in parentheses shows the number of publications analyzed per instrument. The value in the upper cell indicates the mean (M) of the assigned scores. The value in the lower cell shows the spread of the assigned scores as standard deviation ( $\sigma$ ). Higher numbers represent better performance on 5-step scales.

Abbreviations: AECM, agri-environmental and climate measures; CAP, Common Agricultural Policy; EIP, European Innovation Partnership; EPI, environmental policy integration.

instrument assessments based on the assigned scores for each instrument along the two criteria.

#### 4.2.1 | Direct payments

DP are a financial instrument to provide income support for farmers. DP in the CAP 2014–2022 were mostly linked to the farmed land area. They did not address environmental concerns but had a significant impact on land use practices in Europe due to their high budget share (71% of the total CAP budget). Article 1 of Regulation (EU) 1307/2013 set out different components of DP. Member states were required to provide a “basic payment scheme,” a “greening payment” (30% of DP) and a “payment for young farmers” (2% of national DP budget). Further design options for DP included coupling support schemes to specific products and payments for farmers in “areas with natural constraints” as well as a simplified scheme for small farmers and a “redistributive payment” that benefits smaller at the expense of larger farms. Germany adopted the latter two options (BMEL, 2015). The amount that farmers received under DP varied widely between member states (European Commission, 2019). The average was 257 €/ha EU-wide and 293 €/ha in Germany. In addition, up to 15% of budgets could be shifted between market and producer support (first pillar, mostly DP) and Integrated Rural Development (second pillar). This “modulation” mechanism was used in Germany to shift 4.5% of pillar one to pillar two from 2015 to 2019, and 6% from 2020 to

2022. The environmental effectiveness of the DP in the CAP has been evaluated as rather poor (Pe'er, Lakner, et al., 2017, p. 76), which is not surprising given that their purpose was farm income support rather than environmental objectives (Volkov & Melnikiene, 2017).

#### 4.2.2 | Cross compliance

CC is a quasi-regulatory instrument to address cross-sectoral policy objectives. According to Regulation (EU) 1306/2013, Art. 93, CC made receipt of DP (and some other payments in the second pillar) conditional to compliance with EU regulations in the areas of environmental protection, animal welfare as well as human, animal and plant health. In the case of documented non-compliance, payments were reduced in proportion to the severity of the violation (ECA, 2016). The requirements were defined in the form of 13 statutory management requirements (SMR) and seven standards for maintaining agricultural land in good agricultural and environmental condition (GAEC).<sup>2</sup> The SMR contained a translation of European law, for example, the Nitrates Directive or the Habitats Directive, into national law. The specific requirements of the GAEC were regulated at national level. The inclusion of multiple regulations and different conservation targets make an overall assessment of the environmental effectiveness difficult (ECA, 2016). The meta-review shows that CC has been evaluated as moderately effective in achieving environmental objectives (e.g., Milieu et al., 2016; Panagos et al., 2015).

#### 4.2.3 | Greening

Greening was a newly introduced component of the DP in the 2013 CAP reform, thus representing a financial instrument (Hart et al., 2017). It made the receipt of 30% of DP conditional to three farming practices that were considered beneficial for environmental objectives: (i) crop diversification, requiring farms to cultivate at least two crops (farms with 10–30 hectares of arable land) or three crops (farms with more than 30 hectares of arable land); (ii) maintaining permanent grassland, still allowing a loss of 5% per region by 2022; (iii) promotion of ecological focus areas (EFA), requiring farms with arable land exceeding 15 hectares to dedicate 5% of their arable land to ecologically beneficial elements as defined by the European Commission (Art. 43–46, Regulation (EU) 1307/2013). The environmental effectiveness of Greening has been rated poor (ECA, 2017; Gocht et al., 2017; Pe'er, Zingrebe, et al., 2017) as the requirements were largely consistent with existing land management practices (European Commission, 2017a). Greening therefore mainly an attempt to legitimize income support for farmers through DP.

#### 4.2.4 | Agri-environmental and climate measures

According to Article 28 of Regulation (EU) 1305/2013, under the rural development programs (RDP), farmers could voluntarily commit for normally 5–7 years to adopt ecologically beneficial land-management practices, and receive a premium in return. AECM are thus a financial



instrument. With 19% of EAFRD funding, they received the largest budget among all instruments in the second pillar in Germany. Eligible measures could be tailored regionally and therefore varied significantly. In total, 13 federal states in Germany (with the exception of the city-states of Berlin, Hamburg and Bremen) compiled their own RDPs, including a respective list of eligible measures. In the CAP 2014–2022, the scope of AECM was extended to include climate change adaptation measures. Because AECM comprise many different measures in diverse landscape types with variegated conservation objectives, an overall assessment of their effectiveness is difficult (Desjeux et al., 2015). AECM have been generally assessed as effective in improving the environmental impact of agriculture at a local level or for particular species (Batáry et al., 2015). However, at the European level, the effect of AECM has been limited due to insufficient budget allocations (Pe'er, Lakner, et al., 2017, p. 115). In addition, in their implementation in Germany, certain design aspects have limited their effectiveness (Früh-Müller et al., 2018; Meyer et al., 2015), and high administrative transaction costs have constrained their efficiency (Weber, 2015).

#### 4.2.5 | Organic farming

Support of organic farming, regulated in Article 29 of the Regulation (EU) 1305/2013 and defined in Regulation (EU) 834/2007, is another financial instrument to address environmental objectives (Schader et al., 2014). It describes a voluntary commitment of farmers to manage their farms according to the rules of organic farming and receive a payment in return. In contrast to AECM, this instrument is a whole-farm approach and does not address isolated schemes. For this reason, the support of organic farming was programmed as a separate measure in the CAP 2014–2022. A higher “conversion premium” was provided for the first 2 years when products cannot yet be marketed as organic. In Germany, the share of land on which organic farming is supported varied widely between the federal states, from 18.1% in Saarland to 4.7% in Lower Saxony in 2019 (BMEL, 2021). The premium differed both between federal states and between production systems—the average was 180 €/ha. Overall, support of organic farming has been evaluated as an effective instrument to reduce pressure on natural resources (Seufert & Ramankutty, 2017). Positive effects were registered in particular with regard to biodiversity (due to lower fertilizer intensity and no herbicides) and water and soil quality (through low nitrate emissions and wider crop rotations). The effectiveness of the instrument was limited by the relatively low budget. Moreover, organic farms have on average 20% lower yields, which reduces environmental effectiveness if calculated on a product-unit rather than an area base (Lakner & Breustedt, 2017).

#### 4.2.6 | LEADER

LEADER<sup>3</sup> is a second pillar instrument for promoting cooperative approaches in regional development. It provides funding for local action

groups (LAG) which jointly develop and implement regional development concepts as part of a bottom-up process (Van De Poele, 2015). LEADER had to be programmed in each RDP with a share of at least 5% of the EAFRD funds. Three hundred twenty-one LAGs operated in Germany in 2019—with a 31.5% increase in the proportion of territory covered by LEADER during the CAP 2014–2022. The instrument allocated overall 1.63 billion euros through the 13 regional RDPs. LEADER has been evaluated as a rather effective instrument (Dwyer et al., 2016). However, there are no direct assessments of the ecological effectiveness. Nevertheless, the instrument is considered highly relevant for sustainable development, given its high degree of flexibility and its community-based approach (European Commission, 2017b, p. 276).

#### 4.2.7 | EIP-Agri

The European Innovation Partnership “Agricultural Productivity and Sustainability” (EIP-Agri) was a new instrument in the CAP 2014–2022 to support the collaboration of different actors with the aim of fostering sustainable farming (Fotheringham et al., 2017). In the framework of EIP-Agri, operational groups (OG) were provided with financial and administrative support from CAP resources. In Germany, EIP-Agri was implemented in the 2014–2022 CAP in all federal states except Saarland. Implementation practices differed between federal states; while some established dedicated agencies outside the administration (e.g., Hesse, Schleswig-Holstein or Thuringia), others increased their administrative staff (e.g., Baden-Württemberg or Saxony). The environmental effectiveness of EIP-Agri has been rated rather high where explicitly environment-friendly innovations were incentivized through customized project funding (Dwyer et al., 2016).

### 4.3 | Calibrations

Our analysis so far has shown that the CAP 2014–2022 contained prominent environmental objectives which were addressed by various instruments. Assessments of the environmental performance of these instruments were mostly poor (for DP and Greening) or moderate (for CC, AECM). They varied particularly widely for CC, support of organic farming and AECM (see Table 2). Strikingly, instruments that could generally be suitable for effective EPI – AECM and support for organic farming, but also CC and Greening – were often assessed as limited in their environmental effectiveness and efficiency. This observation points to problems in policy design, at least from an EPI perspective.

At this point, tensions between sectoral and environmental policy objectives come into play. Most EPI-relevant instruments in the CAP are financial instruments that offer payments to farms under different conditions of pro-environmental behavior. They can thus be interpreted as instruments both for providing farm income support or for remunerating environment-friendly farming practices. This has often been presented as a win-win solution (European Commission, 2013, p. 5). But at the level of policy calibration, trade-offs between sectoral income and environmental objectives become manifest.



The two main levers in the calibration of financial instruments are the amount of the payment and the specification of the conditions. The latter influence the opportunity costs incurred by recipients for compliance, which consist of the costs for meeting the specific requirements and the income foregone from, for example, lower yields, the value of which depends on market conditions. At the instrument level, higher premiums and less costly conditions shift the balance toward sectoral income policy objectives. At the level of the policy mix, the balance between sectoral income and environmental objectives depends also on the budget allocation between payments with different levels of requirements. High budget shares for payment schemes with “cheap” conditions, such as DP and Greening, imply a priority for sectoral income policy objectives, while a higher budget share for environmentally “ambitious” payment schemes means stronger EPI.

To explain the extent to which the instruments in the CAP contribute to EPI, we therefore analyze calibration effects on EPI adoption along the analytical dimensions of stringency, specificity, flexibility and temporality. We summarize the coded statements in the instrument evaluations included in our meta-review that explain the strength of EPI.

#### 4.3.1 | Stringency

Stringency describes the relative depth of intervention, for example, the requirements for receiving financial incentives. In the CAP, the requirements to receive the basic premium or the Greening payments are considered low (European Commission, 2017a). Studies of the reform process demonstrate that the Commission's originally more ambitious proposals were watered down during the negotiations with the European Parliament and the Council (Gravey & Buzogány, 2021) and further during the implementation of delegated acts by national payment agencies (Polman & Alons, 2021). The required share of EFA became 5% instead of 7% as originally proposed – only half of the 10% recommended by ecologists (Pe'er et al., 2014). The list of eligible EFA types was expanded to include measures with little ecological benefit such as nitrogen-fixing crops and catch crops. The permanent grassland measure does not address degradation issues due to a lack of criteria for habitat quality and management (Pe'er et al., 2014). Finally, the crop diversification requirements are considered too weak to create any effect on most farms, much less positive ecological outcomes. Due to several exemptions (size thresholds for farms and classification of “green by definition” for organic farms), much arable land was not covered by the measure at all.

#### 4.3.2 | Specificity

Specificity captures the precision of an instrument. DP have a very low degree of specificity as they are neither aligned with the needs of the recipients nor specific qualities of the land, resulting in much-criticized cumulative distribution effects (WBAE, 2018). The

redistribution payment, which Germany opted to introduce, moderates the cumulative effect only slightly, so that still about 20% of farmers receive about 70% of the direct payments (Hansen & Offermann, 2016). However, the redistribution payment is not systematically linked to environmental outcomes despite public images of smaller farms being more environment-friendly. In the second pillar, most budget was spent on the less specific measures. Although the share of the EAFRD budget ringfenced for environmental measures was increased from 25% to 30% in the CAP 2014–2022, the total budget for AECM, which are considered particularly targeted to address environmental concerns, decreased by almost 9% compared to the previous funding period. The most specific instruments, LEADER and EIP-Agri, which are intended to support regionally specific or tailored projects and innovations, account for only 11.91% and 1.46% of EAFRD funds in Germany in 2015 (Dwyer et al., 2016).

#### 4.3.3 | Flexibility

Flexibility denotes the discretion of the addressees in instrument implementation. In the CAP, great flexibility is generally provided with regard to on-farm production decisions (which directly affect the farm income objective). The general decoupling of DP from production has maximized flexibility to recipients in this regard. The calibration of the Greening payment schemes also provides great temporal and spatial flexibility to farmers how to meet the requirements. In contrast, measures to ensure eligibility of recipients and proper handling of financial flows, in particular documentation obligations, are very inflexible. The same holds for several CC measures, in particular traceability rules. Flexibility is also surprisingly low where it would enhance environmental efficiency, in particular in AECM calibration. Generally, AECM can be designed to link payments either to managements practices (action-based) or environmental outcome (results-based) (Russi et al., 2016). Results-based payment schemes would give farmers broad leeway how to achieve the required result. However, administrators prefer action-based AECMs which are easier to handle and control, and many farmers dislike results-based payments since factors beyond their control, for example, weather events or diseases, can affect the result. Finally, the CAP gives member states the option of cooperative implementation of AECM at regional level (van Dijk et al., 2015). This flexibility-enhancing calibration has so far only been implemented in the Netherlands. In Germany, this option was rejected for lack of institutional fit with the payment administration and control system.

#### 4.3.4 | Temporality

Regarding the temporal component of calibrations, three aspects emerge from the evaluation literature. First, commitment periods influence the uptake and thus the effect of CAP instruments. For example, when cultivating a flower strip, it makes a difference for farmers whether it is supported either under the EFA measure of



Greening (annual commitment) or as an AECM (multi-annual commitment). Second, the use of phase-in or phase-out periods plays an important role. For example, the provision of a higher premium in the first 2 years increases the willingness to convert toward organic farming, which nevertheless remains a cost-intensive process. Third, the implementation period of the overall policy mix affects EPI adoption. The 2013 CAP reform was originally intended to apply from 2014 to 2020. However, Greening came into effect only from 2015, after a transition year. As a result of delays in the reform of the post-2020 CAP, the 2013 CAP was later extended until 2022, delaying more environmentally ambitious requirements to farmers in the new regulation. In sum, temporal design options were mostly used to prioritize farm income support over or even at the expense of environmental objectives, hence further weakening EPI in the CAP. Only in some cases were they used to reduce barriers to the adoption of sustainable farming practices.

## 5 | DISCUSSION

The analysis of the implementation of the CAP in Germany (2014–2022) served as a case to elaborate the claim that tensions and limitations of EPI can be better understood from a policy mix perspective that differentiates policy output into policy objectives, instruments and calibrations, and pays special attention to the latter. Four key points emerge from our analysis.

First, the assessment of the strength of EPI in the CAP 2014–2022 differs significantly between policy objectives, instruments and calibrations: Environmental protection is stated as one of the three overarching objectives of the CAP, besides sector-specific income support and rural development, indicating substantial integration of environmental concerns. At the instrument level, our meta-review found that the environmental effectiveness of most CAP instruments has been assessed as rather poor. This helps to explain that despite a large number of instruments (high density) and inclusion of different types of instruments (high balance), the overall environmental performance of the CAP has been evaluated as low (e.g., Pe'er, Lakner, et al., 2017). At the level of calibrations, the analysis found that most CAP instruments addressing environmental issues lacked stringency and specificity. Flexibility was generally high for conditions referring to land use for the broadly used direct payments (CC and Greening). While conditions for voluntary AECM and organic farming payments were very strict, flexibility was provided by their design as voluntary measures. Temporal elements of policy design were used in various ways to accommodate the needs of farmers and to increase flexibility, for example, through phasing-in periods and annual rather than multi-annual obligations, or to enhance long-term planning, for example, through 5-year contracts under AECM. Flexibility and temporal accommodation can increase acceptance and uptake of voluntary measures, but can also reduce stringency and specificity.

Second, the calibration analysis provides an explanation why the environmental effectiveness and efficiency of instruments that are generally suitable for addressing environmental policy objectives, that

is, linking different types of CAP payments to different environmental requirements, have been assessed as low. The two main design components—the level of payments and the specific requirements—are determined at the level of policy calibration. Here, greater environmental stringency and specificity of the measures generally increase opportunity costs for farmers. As a result, policy designers face unavoidable trade-offs between sectoral income and cross-cutting environmental objectives. This observation leads us to a more specific explanation of earlier findings in CAP research that requirements for receiving payments lack in ambition and specificity, and that environmental concerns remain marginal and mainly serve to legitimize and protect farm income support (Daugbjerg & Feindt, 2017; Daugbjerg & Swinbank, 2016). The difference between the stated importance of environmental objectives and the priority for income support over environmental concerns in policy implementation cannot be explained by instrument choice alone, but can and must be attributed to policy design decisions at the level of policy calibrations.

Third, consideration of policy calibration helps to explain the puzzle that the CAP has undergone significant change to include environmental concerns in its ideational framework (Erjavec & Erjavec, 2015; Feindt, 2010, 2018) but has remained ineffective in addressing environmental issues (Alons, 2017; Pe'er et al., 2020). This gap between stated environmental ambition and environmental performance is located not just between policy output and policy impact, but within different levels of policy output. Analysis of policy calibrations therefore also helps to explain the “discrepancy” between environmental objectives and actual implementation (Runhaar et al., 2020, p. 220).

Fourth, if policy calibration must unavoidably deal with trade-offs between several policy objectives, it is by no means a purely technical but also a political activity. The importance of calibration for the overall effect of public policy in general, and on the strength of EPI adoption in particular, sheds new light on Hall's (1993) characterization of calibration as routine mode of policy-making dominated by “puzzling” among experts and technocrats. Emphasizing the political character of calibration may help to avoid a functionalist and depoliticized understanding of this essential part of policy design, and of the policy design perspective more generally (Turnbull, 2017).

## 6 | CONCLUSION

Incorporating environmental concerns into non-environmental policy areas to address the drivers of environmental problems remains a plausible proposition. In practice, however, EPI has often delivered disappointing results. EPI research has therefore paid more attention to policy implementation (Persson & Runhaar, 2018; Runhaar et al., 2020, p. 220). By definition, EPI unavoidably leads to policy mixes that comprise sector-specific and cross-cutting environmental objectives addressed by multiple instruments of different types and with a range of possible calibrations. Recent developments in the policy mix literature (Howlett et al., 2022; Rayner et al., 2017) can thus be harnessed to better understand success and failure of EPI. Our case study of the national implementation of the CAP in Germany

found that a view to policy calibrations was essential to explain the discrepancy between quite strong EPI at the level of policy objectives and mostly critical assessments of the environmental performance of the overall CAP and its policy instruments. Policy designers faced unavoidable trade-offs between non-environmental and environmental policy goals when determining the specific calibrations of the CAP instruments, which mostly link different types of government payments to different requirements of pro-environmental behavior. Agricultural policy-makers in Germany mostly opted for policy calibrations with low environmental stringency and specificity, much flexibility, and accommodation of temporal needs of farmers. Furthermore, most of the budget was allocated to the least stringent and specific measures, which also provided the highest flexibility to farmers. Each of the four analytical dimensions of calibration thus helped to explain the critical assessment of EPI in the implementation of the CAP.

The findings suggest that an analysis of calibrations is generally needed to assess the adoption, success and failure of EPI. Often the degree to which environmental objectives are supported is not determined by the general characteristics of a policy instrument, but by the specific policy settings. The focus on calibrations resonates with calls for “paying more attention to the nexus of micro-management tools and their effects on macro-regime characteristics and vice versa” (Tosun & Lang, 2017, p. 10). Contributing to the literature on policy change in the CAP, our study helps to understand how details in policy design reinforced the CAP’s predominant function to provide income support for the agricultural sector. Its detailed focus on policy output complements studies that have focused on changes in the CAP’s discourse (Buitenhuis et al., 2022; Erjavec & Erjavec, 2015) or ideational and institutional framework (Daugbjerg & Feindt, 2017; Greer, 2017).

The results of this study are limited in several regards, from which directions for further research can be derived. First, while our study was limited to one case, we are confident that the key finding—the importance of policy calibrations for EPI—holds for other cases. Of course, as for policy integration in general (Trein et al., 2021), comparative research on EPI adoption is needed, both across countries (here: national CAP implementation in other EU countries) and across policy areas, to understand better how policy calibrations affect EPI. Second, our analysis was confined to a case of vertical EPI. Further research is needed to assess whether policy calibrations are similarly important for horizontal EPI. Third, our analysis has focused on policy output. Policy impacts were only indirectly addressed through some of the assessments included in the meta-review, and a more systematic inclusion of policy outcome would be desirable. Fourth, a consideration of the institutional and process dimension, in particular power relations, is needed to explain the policy choices and hence the level of EPI in a specific case (Baulenas et al., 2021). The concept of policy design spaces (Howlett & Mukherjee, 2018) could be useful to understand limitations of EPI, in particular in policy areas with strong incumbents and entrenched vested interests in maintaining the status quo, such as the CAP. Finally, by deploying a top-down approach to delineating policy mix levels, this paper did not consider the combined effects of several policy areas on addressees (here: farms and

farmers). A bottom-up approach should therefore complement the top-down analysis of EPI adoption (Ossenbrink et al., 2019).

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## CONFLICT OF INTEREST STATEMENT

All authors declare no conflicts of interest.

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## ENDNOTES

- <sup>1</sup> The CAP 2014–2022 was adopted in December 2013. After a transitional period, it was fully implemented since January 2015. Originally set to end in 2020, it was extended by transitional regulation until December 2022 following delays in the legislative process for the CAP post-2020, to ensure the continuation of payments to farmers and other beneficiaries (Feindt et al., 2022).
- <sup>2</sup> For EPI, SMR 1, and GAECs 1, 2, 3 (water), GAECs 4, 5, and 6 (soil), GAECs 2 and 3 (biodiversity), and GAEC 7 (landscape) are particularly relevant. The other SMRs and GAEC relate, for example, to animal health and welfare.
- <sup>3</sup> English-associated acronym of French “Liaison entre actions de développement de l’économie rurale.”

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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## APPENDIX

TABLE A1 Conceptualizations of calibration.

Conceptualization	Operationalization	Author(s)
Characteristics	Stringency, Certainty, Incidence, Depth, Flexibility	Haščič et al. (2009)
Design aspects	Stringency, Predictability, Differentiation, Timing, Credibility, Monitoring and compliance, Enforcement, Combination with other instruments	Kemp and Pontoglio (2011)
Design elements	State aid types and designs: <ul style="list-style-type: none"> <li>• fixed,</li> <li>• tied to prices,</li> <li>• technology-specific,</li> <li>• capped,</li> <li>• floored,</li> <li>• reduced,</li> <li>• duration,</li> <li>• limited per technology</li> </ul>	del Río (2012)
Design features	Stringency, Level of support, Predictability, Flexibility, Differentiation, Depth	Rogge and Reichardt (2016)
Design features	Intensity, Technology-specificity	Schmidt and Sewerin (2019)
Calibration	Stringency	Holzinger et al. (2011)
Calibrations or settings	Integration, Scope, Targets, Budget, Implementation, Monitoring	Schaffrin et al. (2014)
Calibrations or settings	Intensity (level and scope)	Knill et al. (2012)
Calibrations or settings	Degree of legal force, Level of financial incentive, Information disseminated, Extent of changes in structure, Organization of government	Daugbjerg and Kay (2020)
Calibration	Level of ambition	Skogstad (2020)

(Continues)

TABLE A1 (Continued)

Conceptualization	Operationalization	Author(s)
Calibration	Precise mode of delivery, Publicness, Intrusiveness, Resource intensiveness, Administering Agency, Monitoring and Auditing	Howlett et al. (2022)

**TABLE A2** Overview of the data collection approach.

	<b>Step 1</b> <b>Identification</b>	<b>Step 2</b> <b>Screening</b>	<b>Step 3</b> <b>Eligibility</b>	<b>Step 4</b> <b>Included</b>
Total	622	415	201	142
Direct payments	117	98	35	28
Cross compliance	41	31	27	17
Greening	146	102	46	39
AECM	232	115	52	41
Organic farming	47	39	27	25
LEADER	29	21	17	12
EIP-Agri	10	10	9	6

Note: Number of publications. The sum of publications for each instrument can differ from the total number of publications in each column because of publications that include evaluations of more than one instrument.

Abbreviations: AECM, agri-environmental and climate measures; EIP, European Innovation Partnership; EPI, environmental policy integration.

**TABLE A3** Number of publications included in the meta-review per instrument analyzed and criteria applied.

	<b>Effectiveness (99)</b>	<b>Efficiency (54)</b>
Direct payments (28)	22	10
Cross compliance (17)	11	9
Greening (39)	33	25
AECM (41)	26	22
Organic farming (25)	18	7
LEADER (12)	5	5
EIP-Agri (6)	3	2

Note: Values in parentheses denote the number of publications included in the review that analyze the respective instrument or apply the respective criterion. The sum of publications for each instrument or criterion can differ from the total number of publications in each column or row because of publications that include evaluations of more than one instrument or criterion.

Abbreviations: AECM, agri-environmental and climate measures; EIP, European Innovation Partnership; EPI, environmental policy integration.