



## The subsidy-mosaic for agricultural weather insurance in Germany

Jonas Schmitt<sup>a,\*</sup>, Frank Offermann<sup>b</sup>, Robert Finger<sup>a</sup>

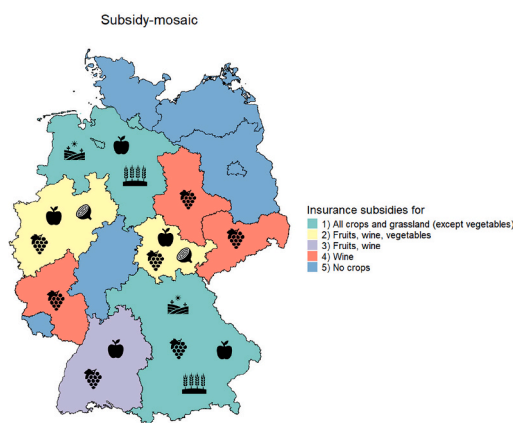
<sup>a</sup> Agricultural Economics and Policy Group, ETH Zurich, Zurich, Switzerland

<sup>b</sup> Johann Heinrich von Thünen Institute - Institute of Farm Economics, Braunschweig, Germany

### HIGHLIGHTS

- Subsidies for agricultural weather insurance in Germany vary by federal state, weather event and crop.
- This fragmentation of subsidy schemes can lead to both economic and political challenges.
- More harmonised approaches that incentivise on-farm risk management are needed.

### GRAPHICAL ABSTRACT



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### ABSTRACT

The subsidisation of agricultural weather insurance is gaining momentum in European agriculture, with the aim of increasing farmers' self-responsibility and eliminating the need for ad hoc disaster payments. The implementation and design of agricultural weather insurance subsidies vary considerably from country to country. We show here that in Germany there are even fundamental differences within the country due to the different weather insurance subsidy schemes of the federal states. For example, some federal states do not subsidise weather insurance, and other federal states that do subsidise weather insurance, differ in which crops or perils are supported. This insurance subsidy mosaic increases inequality across farms and is likely to increase the cost of insurance. In addition, small federal-state-specific insurance markets are less attractive to insurance companies, which has a negative impact on competition among insurance companies and innovation in insurance products. We conclude that harmonised approaches to insurance support that incentivise on-farm risk management and adaptation to climate change are needed.

\* Corresponding author.

E-mail address: [joschmitt@ethz.ch](mailto:joschmitt@ethz.ch) (J. Schmitt).

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## 1. Introduction

Agricultural insurance is one of several viable risk management options for farmers to cope with weather and climate risks (Smit and Skinner, 2002). In several countries, subsidising agricultural weather insurance premiums is an important policy instrument to support the establishment and uptake of insurance solutions (Mahul and Stutley, 2010). Reasons for subsidising insurances include market failures that inhibit the establishment of private and unsubsidised insurance markets, political/social objectives such as providing insurance options to poorer farmers and reducing or eliminating the need for ad hoc disaster payments by governments (e.g., Goodwin, 2001; Hazell and Varangis, 2020).

Insurance subsidies are also increasingly provided in many European countries (Dalhaus et al., 2023). The legal framework in the European Union (EU) allows different ways to provide insurance subsidies, for example through the first or second pillar of the Common Agricultural Policy<sup>1</sup> or fully financed by EU member states or regions (e.g., at the federal state level), independently from the EU (European Union, 2013a). At present, the landscape of how agricultural weather insurance solutions are offered and how these are supported by policy is very fragmented, i.e., differs largely across countries (e.g., Bucheli et al., 2023).

Such a mosaic of subsidies is now currently also emerging in Germany, the second largest crop producer in the European Union (World Bank, 2023). While at national level, there is no subsidy for agricultural weather insurance,<sup>2</sup> some individual federal states have started to develop their own subsidy schemes for agricultural weather insurance in the absence of a national subsidy for crop insurance (see Fig. 1 below). The result is a mosaic of subsidies for agricultural weather insurance for different crops and weather events, with implications for farmers, the insurance industry, and policymakers.

In this perspective paper, we discuss this mosaic and its implications. The remainder of this paper is structured as follows. In section 2, we provide a background describing recent developments in insurance subsidies in Germany. Section 3 describes the reasons for the emergence of the different insurance subsidy systems at the federal level. Section 4 discusses the implications of the subsidy mosaic for different stakeholders. Finally, we draw conclusions for further support of agricultural weather insurance in Germany and Europe.

## 2. Background and the developments in Germany

The discussion on agricultural weather insurance subsidies in Germany and their regional implementation was given new impetus by the extreme drought in 2018, which caused massive yield losses (e.g., De Brito et al., 2020) and was declared as a disaster of national scope. In response, the national and federal governments together provided ad hoc disaster payments of around 300 million Euro to German farmers. However, the ad hoc payments led to a considerable workload for the national and federal authorities (and farmers), controversial discussions on the eligibility and fairness of the payments, and unplanned budgetary burdens (Bundesrechnungshof, 2021).

According to many political representatives of the federal states, supporting agricultural insurance through subsidies should help to avoid

<sup>1</sup> The Common Agricultural Policy of the European Union consists of the first pillar, which includes direct payments granted per hectare, if certain conditions are met, and the second pillar, which includes funding for sustainable and environmentally friendly agricultural practices (see e.g., BMEL, 2022).

<sup>2</sup> However, the German government does levy a reduced tax on agricultural weather insurance products covering various weather anomalies such as hail, storm, waterlogging and drought. This tax has been reduced from the regular 19 % of the insurance premium to 0.03 % of the sum insured (Deutscher Bundestag, 2020).

being required paying ad hoc disaster payments and enable farmers to take more responsibility for coping with extreme weather events (see e.g., STMELF, 2023). Therefore, some political representatives of the federal states have tried to push the national government to subsidise weather insurance for Germany as a whole (see e.g., Agrarheute, 2019).

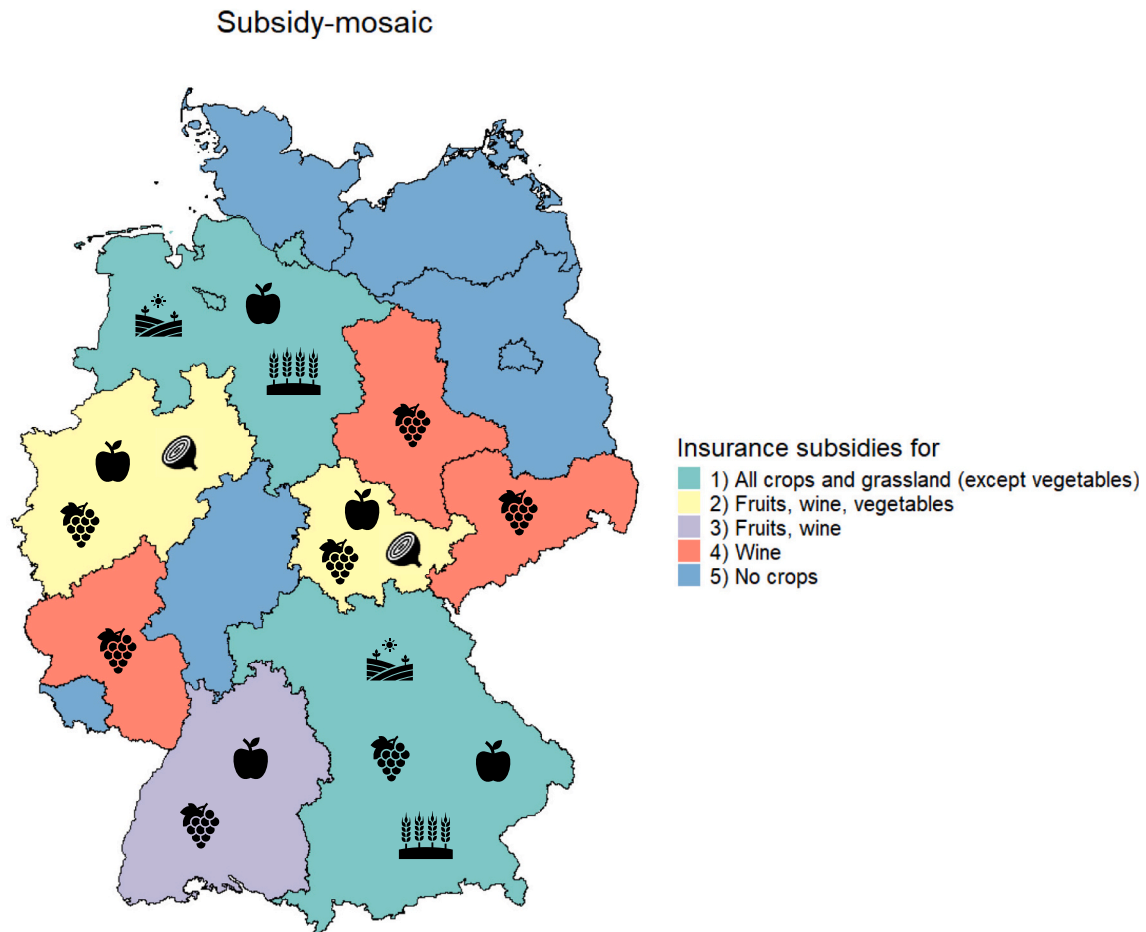
However, the former national government of Germany consisting of SPD, Bündnis 90/Die Grünen and FDP was not prepared to take this step (Bundesregierung, 2021). The main arguments put forward by the national government were that (1) agricultural risk management and support is the responsibility of the federal states, (2) farmers should rather focus on preventive risk management and adaptation to climate change, which could be weakened by weather insurance subsidies, and (3) there is a tight budget situation (Deutscher Bundestag, 2023). In response, some federal states have acted and developed their own solutions, which are described in the next section.

There are several political and economic reasons for the lack of a national strategy and the initiative of some federal states to launch their own subsidy programs, contributing to the emergence of the subsidy mosaic. We highlight four here. First, the vulnerability of agriculture, e.g., which crops, which extreme weather events dominate and the economic relevance of weather-related crop losses, varies from one federal state to the other (see e.g., Webber et al., 2020; Schmitt et al., 2022). Second, the economic power and financial capacity to provide subsidies varies widely among the German federal states. Third, Germany is a country which is characterised by a strong separation of powers between the national and federal governments, as reflected in the national government's arguments above. Fourth, heterogeneous political attitudes and rent-seeking may also contribute to the emergence of the subsidy mosaic. National policymakers may often be less inclined to subsidise without influence over implementation details, especially when voter approval primarily benefits federal-state policymakers. Conversely, federal-state governments may see subsidies as a popular tool to address climate-related extreme weather events and may be reluctant to cede control to the national government as this would reduce their political power.

## 3. Insurance subsidies of the federal states and legal framework

Fig. 1 provides an overview of the mosaic of agricultural weather insurance subsidies across the German federal states, considering five categories. The first category (green) represents those federal states which provide insurance subsidies for all cultivated crops except vegetables, i.e. Lower Saxony/Bremen/Hamburg and Bavaria (note: in Lower Saxony/Bremen/Hamburg, there is very little commercial wine production) (STMELF, 2022; ML, 2024). The second category (yellow) comprises North Rhine-Westphalia and Thuringia, both of which subsidise insurance for fruit, wine, and vegetables (in North Rhine-Westphalia, insurance subsidies are also offered for tree nurseries). The third category (purple, only Baden-Wuerttemberg) represents the case where insurance subsidies are provided for fruit and wine. In the fourth category (red), we find those federal states that only subsidise insurance for wine, namely Rhineland-Palatinate, Saxony-Anhalt, and Saxony. The remaining federal states do not offer any insurance subsidies (blue).

In addition to the differences in which crops are covered by subsidies, there are numerous regional differences in which perils, i.e., which weather events are covered by weather insurance subsidies, as shown in Table 1. The weather risks of storm, heavy rain and frost are included in most of the federal insurance subsidy schemes (see Table 1, column 2). Except for Lower Saxony/Bremen/Hamburg and Baden-Wuerttemberg, all other subsidising federal states also include hail in their subsidy schemes. Only Lower Saxony/Bremen/Hamburg (from 2025 on) and Bavaria offer subsidies for drought insurance for arable farming and grassland insurance. Bavaria is the only federal state that combines subsidies for grassland insurance with compulsory insurance against damage caused by cockchafer grubs (*Melolontha melolontha*).



**Fig. 1.** Illustration of the subsidy-mosaic for agricultural weather insurances across Germany.

Note:

(1) Since there is very little commercial wine cultivation in Lower Saxony (upper-left: green federal state), we include it in the category ‘All crops and grassland (except vegetables)’.

(2) More details regarding the elected crops are presented in Column 3 of [Table 1](#).

In some federal states, farmers can choose between single-peril and multi-peril insurance designs (see [Table 1](#), column 4). Three states restrict subsidies to multi-peril insurance: (1) Bavaria only subsidises multi-peril insurance covering hail, storm, heavy rain, frost, and drought, (2) North Rhine-Westphalia requires farmers to insure against at least two events of hail, storm, heavy rain, and frost, and (3) Rhineland-Palatinate requires wine producers to insure against hail and frost to receive insurance subsidies.

The design of the (planned) insurance support in Lower Saxony/Bremen/Hamburg is unique in that it attempts to reward on-farm risk reduction and adaptation to climate change. More specifically, farmers can receive points for measures such as a high crop diversity, agroforestry areas or extensive pastureland ([ML, 2024](#)). Given a limited budget, subsidised insurance policies are then preferentially allocated to the farms with the highest scores.

Finally, the budgets as well as the source of funding for insurance subsidies differ considerably between federal states (see [Table 1](#), column 5). For example, Bavaria plans to spend a total of 135 million euro over the period 2023–2027. In comparison, Lower Saxony/Bremen/Hamburg have a total budget of 15 million euro for the period 2024–2027. In order to provide a contextual background for comparing the different insurance subsidy budgets, we additionally provide information on the

utilised agricultural area in 2024 ([Table 1](#), column 6) of the federal states with insurance subsidies.

There are also some key elements of the schemes that are similar across federal states. More specifically, the maximum subsidy rate for insurance is 50 % in all schemes ([Table 1](#), column 4). In addition, almost all schemes have a 20 % deductible, except for those federal state that only subsidise weather insurance for wine cultivation (i.e., Rhineland-Palatinate, Saxony-Anhalt, and Saxony).<sup>3</sup>

#### 4. Implications for agricultural stakeholders

The current insurance subsidy mosaic has disadvantages but may also have some advantages. Regarding the latter, the targeted and tailored support may benefit some farms, especially in vulnerable regions where on-farm risk management may currently be insufficient to ensure farm viability in the face of extreme weather events (e.g., [Schmitt et al., 2024](#)). Moreover, the insurance subsidy mosaic can also be seen as

<sup>3</sup> See more details in the Regulations (EU) 1305/2013, (EU) 1308/2013, (EU) 2021/2115 ([European Union, 2013a](#); [European Union, 2013b](#); [European Union, 2021](#)).

**Table 1**  
Overview of insurance subsidies in the federal states of Germany <sup>1</sup> (as of Aug. 2024).

Federal state(s) <sup>2</sup>	Weather risks	Cash crops	Subsidy design <sup>4</sup>	Budget and source of funding	Utilised agricultural area 2024 (1000 ha) <sup>5</sup>
Lower Saxony, Bremen, Hamburg	Storm, Heavy Rain, Frost, Drought, Waterlogging	arable farming without vegetables, grassland, several fruits	Insurance subsidies are distributed based on climate change adaptation measures of farms.  Single- or multi-peril.  Max. 50 % subsidisation of insurance premium.	15 million Euro for 2024–2027 CAP, pillar 2: Federal state + EU	2609
Bavaria <sup>3</sup>	Hail, Storm, Heavy Rain, Frost, Drought	arable farming without vegetables, grassland, wine, fruits, hops, tree nurseries	20 % deductible. Drought can only be insured in the package with all the other risks.  Multi-peril.  Max. 50 % subsidisation of insurance premium.	135 million Euro for 2023–2027 CAP, pillar 2: Federal state + EU	3087
Baden-Wuerttemberg	Storm, Heavy Rain, Frost	fruits, wine	20 % deductible. Single- or multi-peril.  Max. 50 % subsidisation of insurance premium.	21 million Euro for 2023–2027 Currently federal state; from 2025 CAP, pillar 2: federal state + EU	1405
North Rhine-Westphalia	Hail, Storm, Heavy Rain, Frost	Fruits, wine, horticulture, tree nurseries	20 % deductible. Minimum two weather risk must be insured.  Max. 50 % subsidisation of insurance premium.	16 million Euro for 2023–2025 Federal state	1489
Thuringia	Hail, Storm, Heavy Rain, Frost, Drought, Waterlogging	Fruits, vegetables, wine, medical plants, herbs	20 % deductible. Single- or multi-peril  Max. 50 % subsidisation of insurance premium.	5 million Euro for 2023–2027 CAP, pillar 2: Federal state + EU	772
Rhineland-Palatinate	Hail, Frost	wine	20 % deductible. Multi-peril  Max. 50 % subsidisation of insurance premium & max. 180€/ha.	4 million Euro/year CAP, pillar 1: specific intervention for wine sector (EU)	712
Saxony-Anhalt	Hail, Rain, Frost, Ice, Drought	wine	Single- or multi-peril  Max. 50 % subsidisation of insurance premium.	14.500 Euro/year CAP, pillar 1: specific intervention for wine sector (EU)	1152
Saxony	Hail, Frost, Ice, Rain, Drought	wine	Single- or multi-peril  Max. 50 % subsidisation of insurance premium.	136.000 Euro/year CAP, pillar 1: specific intervention for wine sector (EU)	897

#### Notes

<sup>1</sup> Based on [BMEL \(2024\)](#) and [MLV \(2023a\)](#).

<sup>2</sup> The following federal states do not provide insurance support: Brandenburg, Hesse, Mecklenburg-Vorpommern, Saarland, Schleswig-Holstein, Berlin.

<sup>3</sup> Bavaria is the only federal state which subsidizes insurance for grassland, which includes both weather risks and compulsory insurance against damage caused by cockchafer grubs.

<sup>4</sup> Federal-state-specific references: (1) Lower Saxony, Bremen, Hamburg: [ML \(2024\)](#); (2) Bavaria: [STMELF \(2022\)](#); (3) Baden-Wuerttemberg: [MLR \(2023\)](#); (4) North Rhine-Westphalia: [MLV \(2023b\)](#); Thuringia: [TMIL \(2023\)](#); Rhineland-Palatinate: [MWVLW \(2024\)](#); Saxony-Anhalt: [MWL \(2023\)](#); Saxony: [SMEKUL \(2024\)](#).

<sup>5</sup> Statistisches Bundesamt (2024).

an opportunity to gain experience with different insurance designs and support schemes in a short period of time. More specifically, it is an opportunity to identify the strengths and weaknesses of different insurance subsidy designs and implementations. However, it is doubtful whether state-specific schemes, once introduced, can be adapted to another state's system.

The current mosaic of weather insurance subsidies can also have several negative effects on farmers, insurance companies and other political objectives related to agricultural risk management. First, the current subsidy-mosaic leads to an inequality among farmers across

Germany in terms of their ability to afford insurance and thus also regarding their economic opportunities. Depending on the federal state and the crop(s) grown, farmers may or may not benefit from insurance subsidies. Such system is often difficult to understand, can lead to frustration and confusion among farmers (e.g., if some of their fields are in different federal states) and may cause market distortions across Germany. It also contributes to increasing income inequality in the farming population, i.e., some farms (e.g., farms in a particular state or growing particular crops) systematically benefit more than others. This increase in inequality is usually viewed negatively by farmers, citizens,

and policymakers (Finger and El Benni, 2021). Second, the subsidy-mosaic can have negative effects on insurance companies and the efficiency of the insurance market, because: (a) insurance companies have to create specific insurance products for each federal state, which can be an additional cost driver, (b) the small regional markets are less attractive for insurance companies, which can reduce competition and innovation in the insurance market and (c) the small regional markets also exacerbate the exposure to systemic risk, i.e. weather events affecting many insured producers at the same time and, thus threatening the viability of the traditional insurance business model of risk pooling. The result is high financing and/or reinsurance costs. All these aspects push up insurance premiums.

Moreover, most of the current insurance subsidies may encourage farmers to ‘skip’ on-farm risk management, such as crop diversification. This runs counter to the policy goals of climate change adaptation, where on-farm crop diversification plays an important role, and of making farmers more self-reliant. More specifically, farmers may be tempted to grow riskier but more profitable crops because of the possibility of receiving a subsidised insurance (see e.g., Müller et al., 2017).

In this respect, the subsidy system approach of the federal states of Lower Saxony/Bremen/Hamburg is a promising direction of subsidisation, as it makes subsidies conditional on farmers’ on-farm risk management (e.g., crop diversification) and adaptation to climate change. However, in these schemes crop diversification is “only” one of many aspects within the eligibility process, but there is no actual reward for on-farm crop diversification in the insurance product itself. Future agricultural insurance products should therefore include incentives to increase on-farm crop diversification. For example, a focus on insuring the entire portfolio of different crops together could allow the portfolio effect to be exploited with insurance products. This idea of incentivising crop diversification through insurance subsidy schemes is, for instance, also part of the whole farm revenue protection system in the U.S. and the Income Stabilisation Tool in the EU (El Benni et al., 2016; USDA, 2023). In addition, climate change mitigation aspects shall be considered so that agriculture is incentivised to contribute reducing the increased weather risks caused by climate change.

Finally, achieving the goal of reducing ad hoc disaster aid and administrative costs through insurance subsidies is challenging, as the experience in other countries such as the US shows (Coble and Barnett, 2013; Lusk, 2017). This becomes even less likely under the subsidy mosaic, as catastrophic losses from systemic weather risks may lead to ad hoc disaster aid in federal states without subsidised insurance, increasing pressure in federal states with subsidised insurance to also provide ad hoc disaster aid to uninsured farmers (and thus reducing the incentive for farmers to insure in the first place). A similar ‘mechanism’ can be observed at the EU level. For example, the recent provision of ad hoc EU aid for frost and hail damage to fruit and wine production (Agrarheute, 2024) was promptly followed by demands for similar aid for affected farmers in southern Germany (Bayerisches Landwirtschaftliches Wochenblatt, 2024), despite the existence of subsidised insurance schemes (see Fig. 1).

## 5. Conclusion

In this perspective paper, we present new insights in the emerging insurance subsidy-mosaic in German agriculture. We show that the possibility for farmers to receive weather insurance subsidies varies greatly by federal state, crop and weather event. This increases inequality across farms and is likely to increase the costs of insurance due to federal-state-specific insurance designs and federal-state-specific systemic risks. In addition, small federal-state-specific insurance markets are less attractive to insurance companies, which has a negative impact on competition among insurance companies and innovation in insurance products. The German case is a national example of what is currently happening across the European Union with very different insurance subsidy systems in different countries (Bucheli et al., 2023),

which will require constant monitoring and balancing of the need for regionally adapted risk management support with the requirements of the EU common market.

Our analysis has implications for policy. We conclude that, if insurance subsidies are required at all, more harmonised approaches are needed that incentivise on-farm risk management and climate change adaptation (and mitigation) without crowding out other risk management instruments. Furthermore, harmonising the insurance subsidy mosaic towards a nationwide insurance system could reduce the cost of insurance products by eliminating the need for insurance companies to develop federal-state-specific insurance designs and by reducing reinsurance costs as larger insured areas reduce systemic risks (e.g., Holly Wang and Zhang, 2003). Along these lines, the European “Common Agricultural Policy” could in the future promote an increasing harmonisation of agricultural insurance markets and subsidy schemes in the European Union in order to further reduce (local) systemic risks and reinsurance costs and to achieve equal eligibility procedures for insurance subsidies.

Future research should assess whether the insurance subsidy-mosaics in Germany and Europe have market distorting effects, i.e., whether farmers with access to insurance subsidies have significant market advantages. In addition, future research should investigate whether insurance subsidies affect innovation in the insurance sector, especially when not many insurance companies offer weather insurance products regionally. Finally, the subsidy scheme of Lower Saxony/Bremen/Hamburg should be monitored to gain experience with subsidies conditional on on-farm risk management and adaptation to climate change.

## CRedit authorship contribution statement

**Jonas Schmitt:** Writing – review & editing, Writing – original draft, Conceptualization. **Frank Offermann:** Writing – review & editing, Writing – original draft, Conceptualization. **Robert Finger:** Writing – review & editing, Writing – original draft, Conceptualization.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

No data was used for the research described in the article.

## References

- Agrarheute, 2019. Agrarministerkonferenz – Insektenschutz-Programm spaltet die Agrarminister. Available at: <https://www.agrarheute.com/politik/insektenschutz-programm-spaltet-agrarminister-559358>.
- Agrarheute, 2024. EU-Krisenhilfe für Frostschäden: nicht für alle Bauern. Available at: <https://www.agrarheute.com/politik/eu-krisenhilfe-fuer-frostschaden-fuer-alle-bauern-623331>.
- Bayerisches Landwirtschaftliches Wochenblatt, 2024. Frostschäden: Özdemir fordert EU-Soforthilfe für deutsche Bauern. Available at: <https://www.wochenblatt-dlv.de/politik/frostschaden-ozdemir-fordert-eu-soforthilfe-fuer-deutsche-bauern-577487>.
- BMEL, 2022. Main features of the common agricultural policy (CAP) and its implementation in Germany. Available at: BMEL - EU agricultural policy + support - Main features of the common agricultural policy (CAP) and its implementation in Germany.
- BMEL, 2024. GAP-Strategieplan für die Bundesrepublik Deutschland. Available at: [https://www.bmel.de/SharedDocs/Downloads/DE/Landwirtschaft/EU-Agrarpolitik-Forderung/gap-strategieplan-version-4-0.pdf?\\_\\_blob=publicationFile&v=2](https://www.bmel.de/SharedDocs/Downloads/DE/Landwirtschaft/EU-Agrarpolitik-Forderung/gap-strategieplan-version-4-0.pdf?__blob=publicationFile&v=2).
- Bucheli, J., Conrad, N., Wimmer, S., Dalhaus, T., Finger, R., 2023. Weather insurance in European crop and horticulture production. *Clim. Risk Manag.* 41, 100525.
- Bundesrechnungshof, 2021. Abschließende Mitteilung an das Bundesministerium für Ernährung und Landwirtschaft über die Prüfung der Dürrehilfe, p. 2018.
- Bundesregierung, 2021. Koalitionsvertrag zwischen SPD, Bündnis 90/Die Grünen und FDP. Available at: <https://www.bundesregierung.de/breg-de/aktuelles/koalitionsvertrag-2021-1990800>.
- Coble, K.H., Barnett, B.J., 2013. Why do we subsidize crop insurance? *Am. J. Agric. Econ.* 95 (2), 498–504.



- Dalhaus, T., Wu, J., Möhring, N., 2023. Rapidly growing subsidization of crop insurance in Europe ignores potential environmental effects. *Nature Plants* 9 (12), 1938–1939.
- De Brito, M.M., Kuhlicke, C., Marx, A., 2020. Near-real-time drought impact assessment: a text mining approach on the 2018/19 drought in Germany. *Environ. Res. Lett.* 15 (10), 1040a9.
- Deutscher Bundestag, 2020. Drucksache 19/17139. Beschlussempfehlung und Bericht des Finanzausschusses (7. Ausschuss) zu dem Gesetzentwurf der Bundesregierung – Drucksache 19/15665 – Entwurf eines Gesetzes zur Einführung von Sondervorschriften für die Sanierung und Abwicklung von zentralen Gegenparteien und zur Anpassung des Wertpapierhandelsgesetzes an die Unterrichts- und Nachweispflichten nach den Artikeln 4a und 10 der Verordnung (EU) Nr. 648/2012.
- Deutscher Bundestag, 2023. Drucksache 20/8334. Antwort der Bundesregierung auf die Kleine Anfrage der Abgeordneten Stephan Protschka, Peter Felser, Frank Rinck, weiterer Abgeordneter und der Fraktion der AfD – Drucksache 20/7719 – Staatliche Maßnahmen zur Abfederung der Auswirkungen witterungsbedingter Risiken in der Landwirtschaft.
- El Benni, N., Finger, R., Meuwissen, M.P., 2016. Potential effects of the income stabilisation tool (IST) in Swiss agriculture. *Eur. Rev. Agric. Econ.* 43 (3), 475–502.
- European Union, 2013a. Regulation (EU) No 1305/2013 of the European Parliament and the Council of 17 December 2013.
- European Union, 2013b. Regulation (EU) No 1308/2013 of the European Parliament and the Council of 17 December 2013.
- European Union, 2021. Regulation (EU) 2021/2115 of the European Parliament and of the Council of 2 December 2021.
- Finger, R., El Benni, N., 2021. Farm income in European agriculture: new perspectives on measurement and implications for policy evaluation. *Eur. Rev. Agric. Econ.* 48 (2), 253–265.
- Goodwin, B.K., 2001. Problems with market insurance in agriculture. *Am. J. Agric. Econ.* 83 (3), 643–649.
- Hazell, P., Varangis, P., 2020. Best practices for subsidizing agricultural insurance. *Glob. Food Sec.* 25, 100326.
- Holly Wang, H., Zhang, H., 2003. On the possibility of a private crop insurance market: a spatial statistics approach. *J. Risk Insuran.* 70 (1), 111–124.
- Lusk, J.L., 2017. Distributional effects of crop insurance subsidies. *Appl. Econ. Perspect. Polic.* 39 (1), 1–15.
- Mahul, O., Stutley, C.J., 2010. *Government support to agricultural insurance: challenges and options for developing countries*. World Bank Publications.
- ML, 2024. Niedersächsische Ministerium für Ernährung, Landwirtschaft und Verbraucherschutz. Richtlinie über die Gewährung von Zuwendungen zur Förderung von Mehrgefahrenversicherungen für landwirtschaftliche Kulturen in Niedersachsen, der Freien Hansestadt Bremen und der Freien Hansestadt Hamburg (RL-MGV-NI/HB/HH). Erl. D. ML v. 15.08.2024 – 10160150-424/2022.
- MLR, 2023. Baden-Württembergisches Ministerium für Ernährung, Ländlichen Raum und Verbraucherschutz. Verwaltungsvorschrift des Ministeriums für Ernährung Ländlichen Raum und Verbraucherschutz zur Förderung von Versicherungsprämien zur Deckung witterungsbedingter Risiken im Obst- und Weinbau (VwV Ertragsversicherung Obst- und Weinbau). Az.: 27–8581.15.
- MLV, 2023a. Nordrhein-Westfälisches Ministerium für Landwirtschaft und Verbraucherschutz. Erläuterung zum Haushaltsplan 2024 für den Einzelplan 15 (Vorlage 18/1420). Available at: <https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMV18-1420.pdf>.
- MLV, 2023b. Nordrhein-Westfälisches Ministerium für Landwirtschaft und Verbraucherschutz. Richtlinien über die Gewährung von Zuwendungen für Mehrgefahrenversicherungen. Runderlass des Ministeriums für Landwirtschaft und Verbraucherschutz – IL.3–63.05.06.01/000001.
- Müller, B., Johnson, L., Kreuer, D., 2017. Maladaptive outcomes of climate insurance in agriculture. *Glob. Environ. Chang.* 46, 23–33.
- MWL, 2023. Ministerium für Wirtschaft, Tourismus, Landwirtschaft und Forsten des Landes Sachsen-Anhalt. Stützungsprogramm im Sektor Wein in Sachsen-Anhalt im Rahmen der Verordnung (EU) 2021/2115 und des GAP-Strategieplanes Deutschland – was ist im Land Sachsen-Anhalt förderfähig?.
- MWVLW, 2024. Rheinland-Pfälzisches Ministerium für Wirtschaft, Verkehr, Landwirtschaft und Weinbau. Richtlinie zur Gewährung einer Unterstützung für Ernteversicherungen im Weissektor – Mehrgefahrenversicherung (MGV).
- Schmitt, J., Offermann, F., Söder, M., Frühauf, C., Finger, R., 2022. Extreme weather events cause significant crop yield losses at the farm level in German agriculture. *Food Policy* 112, 102359.
- Schmitt, J., Offermann, F., Ribeiro, A.F., Finger, R., 2024. Drought risk management in agriculture: a copula perspective on crop diversification. *Agric. Econ.* 55 (5), 823–847.
- SMEKUL, 2024. Sächsisches Staatsministerium für Energie, Klimaschutz, Umwelt und Landwirtschaft. Regionales Stützungsprogramm Wein des Freistaats Sachsen, pp. 2024–2027.
- Smit, B., Skinner, M.W., 2002. Adaptation options in agriculture to climate change: a typology. *Mitig. Adapt. Strateg. Glob. Chang.* 7 (1), 85–114.
- Statistisches Bundesamt, 2024. *Landwirtschaftliche Betriebe, Landwirtschaftlich genutzte Fläche; Bundesländer, Jahre, Bodennutzungsarten* (Code: 41271–0012). Destatis. Available at: <https://www-genesis.destatis.de/datenbank/online/statistik/41271/table/41271-0012/search/s/bGFuZHZpcnRzY2hhZnRsaWNoZSUyMGZsJUMzJUE0Y2hl>.
- STMELF, 2022. Bayerisches Staatsministerium für Ernährung, Landwirtschaft und Forsten. Richtlinie zur Förderung von Mehrgefahrenversicherungen in der bayrischen Landwirtschaft (BayMBI. Nr. 731).
- STMELF, 2023. Bayerisches Staatsministerium für Ernährung, Landwirtschaft und Forsten. Merkblatt zur Förderung von Mehrgefahrenversicherungen in der bayrischen Landwirtschaft (MGV), 2023.
- TMIL, 2023. Thüringisches Ministerium für Infrastruktur und Landwirtschaft. Richtlinie zur Förderung der betrieblichen Risikoabsicherung durch Versicherungen gegen witterungsbedingte Risiken (FR Ernteversicherungen).
- USDA, 2023. *Whole-Farm Revenue Protection*. Available at: <https://www.rma.usda.gov/sites/default/files/2024-02/Whole-Farm-Revenue-Protection-Fact-Sheet.pdf>.
- Webber, H., Lischeid, G., Sommer, M., Finger, R., Nendel, C., Gaiser, T., Ewert, F., 2020. No perfect storm for crop yield failure in Germany. *Environ. Res. Lett.* 15 (10), 104012.
- World Bank, 2023. *Cereal Production – Germany*. Available at: [https://data.worldbank.org/indicator/AG.PRD.CREL.MT?locations=DE&most\\_recent\\_value\\_desc=true](https://data.worldbank.org/indicator/AG.PRD.CREL.MT?locations=DE&most_recent_value_desc=true).