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Scenar 2040

A scenario study on the Common Agricultural Policy

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Contents

Abstract

The Scenar 2040 study provides a comprehensive analysis of the potential impacts of two hypothetical scenarios related to the Common Agricultural Policy (CAP) on the EU agricultural sector and its broader environment. The baseline (reference scenario) is calibrated to the 2023 EU Agricultural Outlook, and the current national CAP Strategic Plans serve as starting point for the shifts in the policy scenarios. In the first scenario support is directed towards CAP measures enhancing productivity and competitiveness, whereas the second scenario shifts support towards more environmental and climate-focused interventions. The study also includes a counterfactual NoCAP scenario, simulating the removal of the entire CAP framework. The study aims to contribute to policy discussions on the future of the CAP by providing quantitative insights into the general implications of alternative CAP trajectories.

The scenario results underscore the CAP's essential role for the EU's agricultural sector and its broader socio-economic and environmental interlinkages across territories. The results indicate that the removal of the CAP framework would have considerable heterogeneous economic, environmental, and social impacts across the EU. The two alternative CAP scenarios reveal contrasted outcomes aligned with their respective narratives. The results highlight the CAP's critical role, the complexity involved in balancing competing objectives, and confirm market fundamentals as primary drivers of production, although policy can significantly modulate outcomes.

Acknowledgements

The Scenar 2040 study draws upon three agro-economic models of the Joint Research Centre's integrated Modelling Platform for Agro-economic Commodity and Policy Analysis (iMAP). Established to provide in-house analytical support to the European Commission, iMAP has been primarily supported by the Directorate-General for Agriculture and Rural Development (DG AGRI) through an administrative agreement that has been in place and regularly renewed since 2006. From its inception, iMAP has benefited from close collaboration and ongoing dialogue with colleagues at DG AGRI and other Commission directorates. The iMAP models, and in the context of this study particularly MAGNET, CAPRI, and IFM-CAP, greatly benefit from active engagement, methodological developments, and technical support provided by the respective modelling communities. We are grateful to our modelling colleagues for the fruitful collaboration across projects and studies.

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Authors

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Visualisation of results

The Scenar 2040 results are also available in interactive dashboards on the JRC DataM portal: https://datam.jrc.ec.europa.eu/datam/mashup/SCENAR2040/

Executive summary

The Scenar 2040 study provides a comprehensive analysis of the potential impacts of broad Common Agricultural Policy (CAP)-related "what if" scenarios on the EU agricultural sector and its broader environment. The report presents two contrasted and theoretical CAP scenarios: "Productivity and Investment" (Prod&Inv) directs support towards enhancing productivity and competitiveness, whereas "Environment and Climate" (Env&Clim) redirects support towards more environmental and climate-focused interventions. Furthermore, the report presents results of a counterfactual NoCAP scenario, which simulates the removal of the entire CAP framework. This NoCAP scenario provides a useful reference point for assessing economic, social, and environmental impacts in the absence of the CAP framework.

Policy context

The study was commissioned by DG AGRI and was carried out in collaboration with the JRC. The Scenar 2040 analysis builds on the 2023 EU Agricultural Outlook and the current structure of national CAP Strategic Plans to explore support shifts across scenarios. The study aims to enrich policy discussions on the future of the CAP by providing quantitative insights into the general implications of alternative CAP trajectories.

Key conclusions

The Scenar 2040 results underscore the CAP's essential role in the EU agricultural landscape and its broader socio-economic and environmental interlinkages. The results indicate that the removal of the CAP could have considerable economic, environmental, and social impacts, with significant heterogeneity across farms, regions, MSs, and sectors. The results of the two CAP scenarios reveal contrasted outcomes, with both scenarios showing impacts aligned with their respective narratives.

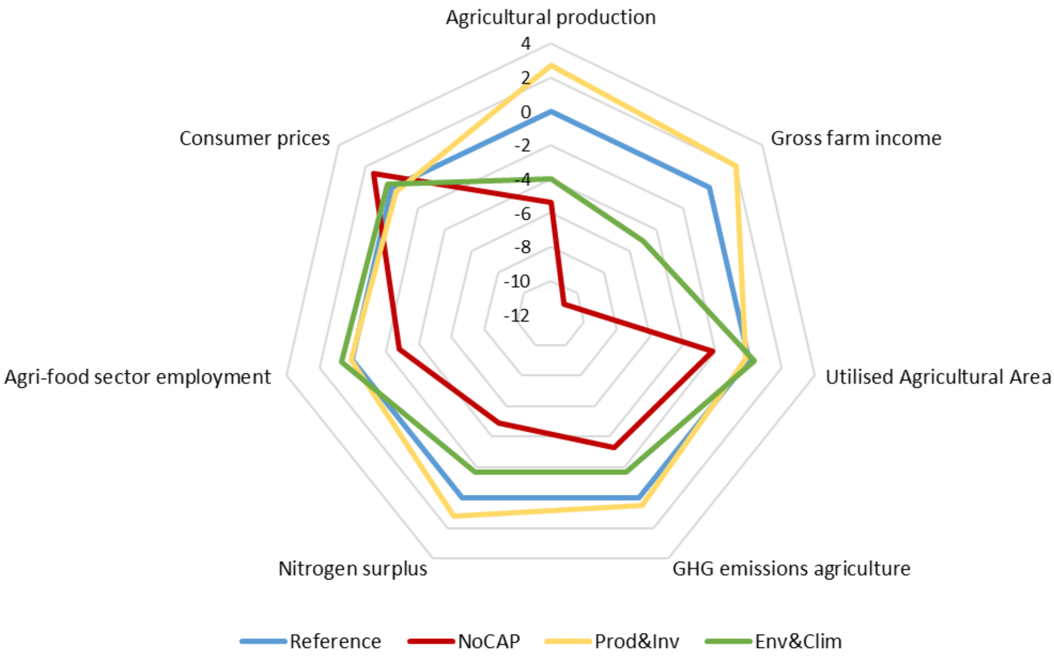
The analysis illustrates critical structural trade-offs. The Prod&Inv scenario shows production expansion lowering per-unit costs and domestic prices, strengthening EU competitiveness in global markets, but potentially intensifying some environmental pressures. Conversely, the Env&Clim scenario's production contraction raises domestic prices, benefiting extensive producers but potentially increasing import reliance and reducing international competitiveness. The results underscore the fundamental structural trade-offs between intensification and extensification. Productivity-focused strategies enhance resource efficiency and limit herd and area expansion. Conversely, environmentally focused extensification, while reducing per-hectare or per-animal environmental pressures, often requires larger livestock and land bases to sustain output levels, which tends to raise pressures per unit of output. This structural trade-off likely persists, even with sustainable intensification approaches.

Overall, while policy measures can significantly affect production and price dynamics, particularly in certain sectors, the Scenar 2040 scenario results consistently indicate that core market fundamentals (e.g., demand elasticities, trade patterns, and production efficiency), remain the primary determinants of production outcomes. Policy choices, while impactful in shaping the distribution and intensity of effects, operate within these broader structural parameters.

The Scenar 2040 study broadly confirms the rationale underpinning existing policy objectives and reveals the diversity of the current CAP and its national CSPs. The results underscore the critical importance of nuanced policy design that effectively accommodates the heterogeneous needs and vulnerabilities within the EU's agricultural sector, and the need for the CAP to address sectoral viability, environmental sustainability, and broader socio-economic outcomes. To be effective, policy instruments must not only achieve stated objectives within the constraints of market fundamentals but also be equitable in addressing the diverse national and regional contexts and conditions across the EU. Furthermore, the broader implications at the global level need to be considered, as demonstrated by the implications on emission leakage.

Main findings

Overview of key scenario impacts at EU level (%-changes compared to baseline by 2040)



The NoCAP scenario induces significant and heterogeneous economic, environmental, and social transformations across the EU's agricultural sector. Farm income would decline substantially, disproportionally affecting smaller farms, heightening vulnerability and increasing farm exit risks. Total EU agricultural production decreases considerably, and Utilised Agricultural Area (UAA) declines. Livestock production contracts significantly, especially in the meat sector, with substantial variation across categories. Trade dynamics shift, deteriorating the EU agri-food trade balance. Consumer prices rise, increasing household food expenditure shares, disproportionately affecting more vulnerable Member States (MSs). Collectively, these outcomes underscore the CAP's redistributive role, revealing its impact on income distribution across farms, MSs and territories. Environmentally, EU agriculture non-CO2 GHG emissions decrease, but leakage leads to a net global emission increase. Total nitrogen surplus decreases but remains well above critical levels in hotspot regions. EU crop diversity declines, and the scenario indicates an intensification, with increased high-intensity farming.

The two alternative CAP scenarios present contrasting outcomes reflecting their respective narratives. The Prod&Inv scenario results in higher competitiveness and production, driven by higher investments and improved yields, enhancing EU self-sufficiency and trade, but slightly increasing nitrogen surpluses and agriculture GHG emissions. However, net global GHG emissions decrease as the more emission-efficient EU production replaces less efficient non-EU production (leakage benefit). Furthermore, the scenario indicates a decline in crop diversity in many farm types, and the stronger emphasis on enhanced productivity leads to increased high input intensity. Conversely, the Env&Clim scenario places greater emphasis on environmental sustainability, which results in lower productivity, decreased EU production levels, and higher prices. Overall UAA decreases, although increasing in several MSs as farmers try to partially compensate the assumed negative yield impacts. The EU trade balance worsens but without causing significant disruptions to self-sufficiency rates. While achieving EU environmental improvements (e.g. lower GHG emissions, reduced nitrogen surpluses), it may increase global challenges, such as higher non-EU agriculture GHG emissions due to production shifts (emission leakage). Crop diversity increases for the majority of farms across all farm types, and stronger support for more extensive farming practises decreases high-intensity farming.

Related and future Joint Research Centre work

The JRC has conducted other work relevant to this topic, including Scenar 2030 and the development of sustainable agricultural practices. The follow-up work to this report will include further analysis of the potential impacts of alternative CAP scenarios, the development of new policy measures, enhancements in integrated modelling frameworks, and improvements in key parameters, such as those related to sustainable productivity increases.

Quick guide

The Scenar 2040 study provides a comprehensive analysis of potential impacts of alternative CAP scenarios on the EU agricultural sector. The methodology uses a combination of three agro-economic simulation models. The scenarios simulate the impacts of different policy scenarios, including the Prod&Inv and Env&Clim scenarios, and a counterfactual NoCAP scenario, to assess their economic, social, and environmental impacts. The analysis builds on the 2023 EU Agricultural Outlook and the current structure of national CAP Strategic Plans to explore support shifts across scenarios. The main uncertainties and risks associated with the report's findings relate to several key assumptions, including yield impacts of CAP measures and national co-financing rates. Moreover, the report does not account for potential impacts of additional climate change, market volatility, and future policy uncertainty.

Extended summary

The objective of Scenar 2040 is to assess the medium-term impacts of broad Common Agricultural Policy (CAP)-related "what if" scenarios, thereby identifying potential outcomes for the EU agricultural sector that may inform future policy development of the CAP framework towards 2040. This analysis is carried out against the 2023 medium-term outlook for agricultural markets and takes the current structure of national CAP Strategic Plans as starting point for payment shits across interventions in the simulated scenarios. The scenarios analysed are not proposals for the post-2027 CAP, nor are the modelling outcomes evaluations of existing or previous CAP frameworks. Instead, the study aims to enrich policy discussions on the CAP by providing quantitative insights into the general implications of alternative CAP trajectories.

Two stylised CAP scenarios are assessed based on reallocating payments within Member States' (MSs) current CAP Strategic Plans (CSPs) while maintaining the total EU budget contribution. The "Productivity and Investment (Prod&Inv)" scenario emphasises CAP support towards economic performance and investments, directing support towards enhancing productivity and competitiveness. The "Environment and Climate (Env&Clim)" scenario prioritises CAP support for climate neutrality and environmental sustainability, redirecting support towards environmental and climate-focused interventions, with more stringent compliance obligations. In addition to the two CAP scenarios, the report also presents results for a counterfactual NoCAP scenario, which simulates the removal of the entire CAP framework, including CAP payments and the standards of good agricultural and environmental condition (GAECs). Although this scenario is not a plausible policy pathway, given its incompatibility with EU Treaty objectives, it provides a useful reference point for assessing economic, social, and environmental impacts in the absence of the CAP framework.

The figure below provides an overview of key scenario results at the EU level, expressed as percentage changes relative to the baseline (reference scenario). These results are subsequently elaborated and further complemented in the following extended summary.

Overview of key scenario impacts at EU level (%-changes compared to baseline by 2040)

NoCAP scenario

The hypothetical NoCAP scenario, which simulates the removal of the CAP, triggers profound heterogeneous economic, environmental, and social transformations across the EU's agricultural sector and territories. While removing CAP requirements, including compliance with GAECs, would allow farmers greater flexibility, this does not compensate for the significant loss of CAP payments, as structural constraints and market conditions limit farmers' ability to maximise flexibility benefits. Consequently, **the NoCAP scenario substantially reduces farm income**, across all farm specialisations. These income **reductions vary considerably by farm size**, with smaller farms (less than 50k EUR standard output) experiencing particularly large relative income declines (on average around –21%) compared to the biggest farming businesses (–6%). The greater vulnerability of small-scale farms increases the likelihood of negative gross margins, which serves as a proxy indicator of potential farm exits. Such disproportionate effects may raise concerns about the long-term sustainability and resilience of small-scale farming operations in the absence of CAP payments, accelerating structural changes in the agricultural sector as smaller farms struggle to remain viable.

Following these impactful changes in profitability and structures, **total EU agricultural production is projected to decline significantly.** Crop production (cereals, oilseeds, and fruit and vegetables) is projected to decrease by about 5%, mainly due to the absence of productivity-enhancing interventions. Utilised Agricultural Area (UAA) is projected to be reduced by 2.5% (approximately 4 million hectares), mainly driven by declining cereal areas. The livestock sector would also undergo a significant decline, with total EU milk and dairy production decreasing by 3% and total meat production by 7.1%, with considerable differences across the meat types (beef –13.2%, sheep & goat meat –13.4%, pigmeat –7.4%, and poultry meat –3.9%). Productivity losses, due to the removal of policy support, combined with feed supply constraints—driven by reduced availability and rising costs—exacerbate this decline by increasing input costs and limiting feed availability.

Macroeconomic impacts include altered trade dynamics. EU agri-food exports decrease by EUR 3.4 billion (–1.8%), and imports increase by of EUR 4.7 billion (+3.9%), leading to a **deterioration in the EU agri-food trade balance** by approximately EUR 8.1 billion (–12.4%). EU self-sufficiency ratios decline for all commodity groups, more pronounced for crops and plant-based commodities. **Consumer prices increase** across all commodity groups (most pronounced for fruit and vegetables, +4%), leading to a notable **rise in household food expenditure shares**, disproportionately affecting MSs with higher price increases or already higher food expenditure shares in the baseline (e.g., Bulgaria and Greece, where household food expenditures rise by more than 2%, and Croatia, Latvia, Lithuania and Romania near this threshold).

Overall, from a socio-economic perspective, the NoCAP scenario underscores the **redistributive role of the CAP**, revealing its impact on income distribution across MSs and their territories. The MSs receiving larger net CAP transfers relative to their GDP are most negatively affected. In contrast, some MSs with net contributions to the CAP (as modelled for this study), predominantly Western EU MSs, may see minor positive GDP changes. The **overall EU GDP effect**, resulting from the redistribution of the net transfers to the CAP budget combined with the agri-food market effects, **is only minimal, but pronounced disparities exist across MSs**. Especially Eastern MSs would face the largest GDP decreases (e.g., Bulgaria and Lithuania, but also Greece show GDP reductions of around 0.6%). Additionally, the share of agri-food value added over total GDP diminishes, particularly in MSs where agriculture represents a significant share of the economy. In MSs such as Bulgaria, Romania, and Greece, the value added from agri-food production as a share of GDP would experience notable reductions, signalling a shift in the economic importance of the sector and the need for careful policy consideration to mitigate potential negative consequences. Labour market impacts include a projected **EU agri-food sector employment decrease** of about 250 000 workers (–2.8%), most pronounced in Eastern MSs.

In terms of environmental impacts, the NoCAP scenario projects a 3% (–12.4 MtCO2e) **decline in EU agriculture non-CO_2 GHG emissions**, mainly due to the production decreases. However, **substantial emissions leakage occurs**, as agricultural production in the rest of the world increases to compensate for increased EU imports and decreases in exports. As EU agriculture is relatively emission-efficient compared to most other world regions, EU emission reductions are more than offset by increases non-EU countries (+20.6 $MtCO_2e$), resulting in **a net global emission increase of 8.2 $MtCO_2e$** (emission leakage of 166%). Due to the EU production declines, **nitrogen surplus generally decreases** (–5% overall reduction, with a decrease of 2.7% N-surplus per ha), but remains well above critical levels in hotspot regions. Crop diversity, as indicated by the Shannon index, declines, with a **reduction in the variety of crop mixes across farm types**. This decrease is mainly attributable to the removal of GAEC obligations and could have adverse effects on biodiversity and ecosystem services. Additionally, scenario results indicate an **intensification of farm input use**, with an increase in the number and area of high-intensity farms and a decrease in the number of farms and area with low input intensity.

CAP scenarios

The NoCAP scenario demonstrates that the CAP exerts a considerable influence on the socio-economic and environmental dimensions of agricultural production across the EU. These impacts involve substantial trade-offs, which are analysed in more detail in the Prod&Inv and Env&Clim scenarios. The two scenarios were created based on different payment shifts in the CAP, while keeping budget neutrality with respect to the EU budget contribution. Although the share of national mandatory co-financing was assumed to remain at the same levels as in the MSs current CSPs, the variation in budget allocated by each MS across CAP interventions and their related national co-financing rates mean that the total budget a MS would spend varies depending on the policy scenario. This is due to payment shifts towards rural development interventions, which result in additional national co-financing, altering the budget contributions of MSs. These variations highlight the challenges of aligning policy trajectories with the diverse national agricultural contexts across the EU, as well as the flexibility allowed within the CSPs. As a result, the total budget for the two scenarios (comprising the constant EU contribution and the higher MS co-financing) increases by 0.2% under the Prod&Inv scenario and by 11% under the Env&Clim scenarios.

Prod&Inv scenario

Under the Prod&Inv scenario, **larger farms** (especially those with ≥500k EUR standard output) **benefit the most** from the shift towards interventions that support productivity and investment, with production increasing consistently across all agricultural sectors, reaching up to +2% in arable and +3.4% in permanent crops for this economic farm size class. In contrast, smaller farms (2k–8k EUR), tend to experience little or no increases, except in permanent crops (+4%). **Overall**, **EU agricultural production increases** with cereals (+1.7 production increase), oilseeds (+2.3%), fruit, vegetables, and permanent crops (+3%) benefiting from improved yields and increased investments. Dairy (+1.8%) and meat production also increase (+3.8%). The **EU's UAA is projected to decline slightly** by 0.2% (–252 thousand ha) as the productivity gains allow for the same or higher production levels on less area.

Prices follow the productivity gains, with **producer and consumer prices decreasing**. For example, consumer prices for fruits and nuts decline by 2.7%, vegetables, roots, and pulses by 2%, and cereals by less than 1%. This fosters slight demand increases, with the fruits and nuts group rising by just over 0.6%. Consumer price impacts vary regionally, with largest decreases observed in Slovenia and Ireland (approximately −1.2%) and smallest in Greece (less than −0.1%). Overall, the consumer price-decreasing effect entails also a **small decrease in the household food expenditure share** (about −0.5%).

Furthermore, the scenario results in **enhanced EU trade outcomes and augmented EU self-sufficiency**, with noticeable improvements in the EU net trade for all the main commodities. Total EU agri-food exports increase by EUR 1.3 billion (+0.7%) and imports decrease by EUR 1.4 billion (−1.2%), thereby improving the trade balance by EUR 2.7 billion (+4.1%). These gains are most pronounced in cereals, fruits and nuts, and vegetables. As import dependence somewhat decreases, modest improvements in EU self-sufficiency levels are achieved in certain commodity groups.

The **overall GDP impacts are very modest** (+0.01%), most pronounced in Eastern MSs, as they show GDP improvements by 0.04%, while Northern and Western MSs experience increases of 0.02% and 0.01%, respectively, reflecting the benefits of redirecting funds toward productivity-enhancing investments. Furthermore, the Prod&Inv scenario results in a **slight EU overall employment increase** of just above 0.1%, and leads to a structural shift, with productivity-driven reductions in livestock employment and moderate job gains in crop production, particularly in fruit and vegetable sectors. Crop employment is rising by 0.6% (roughly +45 000 jobs) partially offset by a −0.7% decline in livestock-related employment (about −28 000 jobs). At the MSs level, employment changes are mixed, with reductions in Estonia (−1.9%), Latvia (−1.2%), and Finland (−0.8%), contrasted by increases in the Czechia (+0.8%), Slovenia (+1.5%), and Greece (+1.6%).

With regard to the environmental impacts, the Prod&Inv scenario indicates a **slight increase in total nitrogen surplus**, amounting to 1% (+1.4% per ha), predominantly due to the production increases. **EU agriculture GHG (non-CO_2) emissions increase by about 2 $MtCO_2e$ (+0.5%)** due to the production increase. However, due to the increase in EU production, and the related increase in EU exports and decrease in imports, the rest of the world observes production decreases and, therefore, a reduction of 11 $MtCO_2e$ (−0.2%) in agriculture GHG emissions. This results in a **net decrease in global agriculture GHG emissions** by 9 MtCO2e. With respect to crop diversity, the reduction in payments for Eco-schemes and ENVCLIM interventions results in a **decline in the crop diversity index** in 17 to 41% of the farms (depending on the farm specialisation). In addition, the assumed stronger emphasis on investment and sectoral payments to enhance productivity, results in more farms and more area with high input intensity. However, with increases between 0.2% and 0.9% in the number of high intensity farms (depending on the farm specialisation) this impact is moderate.

Env&Clim scenario

The Env&Clim scenario, which emphasises environmental sustainability, is assumed to result in **lower productivity levels and leads to a general decrease in EU production levels**. Impacts are generally **more uniform across farm sizes**, albeit negative. For milk and meat producers, production reductions deepen with farm size, reaching −3.6% for mid-to-large farms. However, also here the largest farm size class (≥500k EUR standard output) is less negatively affected. Arable farms experience milder production decrease at farm level than those for meat, with smaller farms more negatively affected (up to −3.6%). Aggregated production impacts include a decline in EU cereals production (−2.1%), oilseeds (−2.9%), fruit, vegetables and permanent crops (−4.3%), primarily driven by assumed yield reductions. Dairy production declines by 2.6%, while meat production decreases by 5.2% (beef –10.3%, sheep & goat meat –10.4%, pigmeat –5.4%, poultry –2.7%). Overall EU UAA decreases by 0.3% (−505 thousand ha). However, the environmental emphasis of the scenario leads to an **increase in UAA in many MSs**, as farmers try to partially compensate the assumed negative yield impacts, mainly driven by expansions in cereals area.

The EU production decreases lead to **slight consumer price increases** (with prices for vegetables, roots, and pulses rising by less than 1%), which in turn results in a **modest decline in demand**. Price impacts vary regionally, with Hungary experiencing the highest price increase (approximately +1.8%), contrasted by Poland's negligible change (less than +0.1%). **Impacts on household food expenditure shares remain generally limited** to an increase by 0.5%.

In terms of trade, the shift in production results in a **decline in the EU's trade performance**, with increased imports and reduced exports across all agricultural sectors. EU exports decline by EUR 821 million (–0.4%), with substantial declines in livestock, meat, and dairy exports, and an increase in imports by EUR 997 million, ultimately worsening the EU trade balance by EUR 1.8 billion (−2.8%), with meat (notably beef, −EUR 407 million, –6.0%) being particularly affected. The scenario yields only **limited changes in EU self-sufficiency rates**, which remain close to baseline levels even as production and exports decline proportionally. Nevertheless, **import reliance increases slightly for certain commodities, but without causing major disruptions to EU self-sufficiency rates.**

EU-level GDP slightly declines (–0.02%), with the largest reductions in Eastern MSs (–0.07%) and Northern MSs (–0.04%), as the shift towards more environmentally sustainable practices is assumed to impose productivity constraints. Conversely, the scenario generates **net employment growth in the agri-food sector, particularly in livestock farming**, due to the shift towards less intensive, more labour-demanding practices. The result is a net employment increase of 0.65% (approximately 90 000 jobs) driven by gains in both crop (+0.8%) and livestock (+0.7%) production across most MSs.

Regarding environmental indicators, the **total nitrogen surplus in the EU declines** by 1.7% (–2% per ha). **EU agriculture GHG emissions decrease** by 6 $MtCO_2e$ (–1.7%), reflecting production declines. However, non-EU countries increase production to compensate for the increase in EU imports and decrease in EU exports, leading to **non-EU emission increases** of 16 $MtCO_2e$ (+0.3%), and hence a **net increase in global agriculture emissions** of 10 $MtCO_2e$ (+0.2%), **indicating profound emission leakage** due to the relative emission efficiency of EU agriculture compared to most non-EU countries. **Crop diversity increases** for the majority of farms across all farm types (59 to 88% of the farms, depending on the farm type), due to increased support for environmental-friendly practices. Furthermore, this scenario fosters **lower input intensity**, given that it provides stronger support for more extensive farming practises, with decreases in the number of high-intensity farms between 2.3% and 8.7% (depending on the farm specialisation).

Conclusions

The NoCAP scenario results underscore the essential role of the CAP in underpinning the EU agricultural landscape and its broader socio-economic and environmental interlinkages. The results indicate that the removal of the CAP could have considerable economic, environmental, and social impacts, with significant heterogeneity across farms, regions, MSs, and sectors.

With respect to the scenario assumptions of the two CAP scenarios, it is important to emphasise the **heterogeneity introduced by the current national CSPs**, which reflect diverse initial conditions in terms of payment reallocations across interventions. While EU budget neutrality is maintained in both scenarios, Total Public Expenditure increases substantially under the Env&Clim scenario (+11%) due to the shift towards Pillar 2 interventions, which require national co-financing. The increased heterogeneity across CSPs and flexibility in determining national co-financing under the current CAP leads to significant disparities in co-financing rates across interventions and MSs, particularly pronounced in the Env&Clim scenario. These findings suggest that uniform budget shifts across CAP interventions present greater challenges for future CAP reforms than those in previous iterations of the policy. In practice, such budget reallocations would likely prompt adjustments in national co-financing rates to mitigate financial burdens. However, if MSs would have autonomy over both co-financing rates and budget allocation across interventions, the resulting disparities across CSPs and their subsequent impacts on the agricultural sector and the single market could further increase.

The results of **the two CAP scenarios reveal contrasted outcomes**, with both scenarios showing impacts aligned with their respective narratives. The Prod&Inv scenario results in production increases, driven by higher investments and improved yields, enhancing EU self-sufficiency and trade, but increasing nitrogen surpluses and EU GHG emissions. However, the net global effect is a reduction in global agriculture GHG emissions as the more emission-efficient EU production replaces less efficient non-EU production. Conversely, the Env&Clim scenario places greater emphasis on environmental sustainability, which results in production declines and higher producer prices due to the assumed yield decreases. While achieving environmental improvements at the EU level, it may increase global challenges, such as higher non-EU agriculture GHG emissions due to production shifts (leakage).

The analysis further illustrates **critical structural trade-offs**. The expansion of production under the Prod&Inv scenario reduces per-unit costs, lowers domestic prices and strengthens EU competitiveness in global markets, but may intensify some environmental pressures. Conversely, the contraction in production under the Env&Clim scenario raises domestic prices, benefiting extensive producers but potentially increasing import reliance and reducing international competitiveness. As such, the results underscore the fundamental structural trade-offs between intensification and extensification strategies. Productivity-focused approaches tend to enhance resource-use efficiency and limit herd and area expansion, thereby maximizing output per unit of input. Conversely, environmentally focused policies often promote extensification, which, despite reducing per-hectare or per-animal environmental pressures, may require larger livestock and area bases to sustain output levels, which tends to raise pressures per unit of output. This structural trade-off is likely to persist even with approaches enabling more sustainable intensification. Overall, while policy measures can significantly affect production and price dynamics, particularly in sectors with longer production cycles, higher direct support, and less flexible supply chains, our results indicate that core market fundamentals (such as demand elasticities, trade patterns, and production efficiency), remain the primary determinants of production outcomes across the scenarios. While policy choices can significantly influence the distribution and intensity of effects, they do so within these broader structural parameters.

A potential **caveat** in the interpretation of these results relates to the inherent assumptions regarding technological change and its potential to enable sustainable intensification. The scenarios may not fully capture the transformative potential of specific technological and management-based sustainable farming options. These approaches could facilitate more sustainable productivity increases than implicitly assumed, potentially enabling a greater decoupling of agricultural growth from environmental pressures. The analysis might not fully account for the diverse pathways and rates of adoption of such technologies across farms and regions, nor fully model their nuanced impacts on both yields and environmental indicators. Further main uncertainties associated with the report's findings include the potential impacts of additional climate change, market volatility, and future policy uncertainty.

In conclusion, the Scenar 2040 results highlight the importance of nuanced policy design accommodating the heterogeneous needs and vulnerabilities within the EU's agricultural sector, and the need to address sectoral viability, environmental sustainability, and broader socio-economic outcomes. This requires ensuring that policy instruments are not only effective in achieving stated objectives at the EU level, but that they address the diverse national and regional contexts and conditions across the EU, and consider the broader implications at the global level, as demonstrated by the implications on emission leakage.

1 Introduction

Scenar 2040 is a modelling-based study commissioned by the European Commission – Directorate General for Agriculture and Rural Development (DG AGRI) to the Joint Research Centre – Economics of the Food System unit. Scenar 2040 is a follow-up to the previous studies, namely Scenar 2020 (Nowicki et al. 2007, 2009) and Scenar 2030 (M'barek et al. 2017). In terms of general organisation of the Scenar 2040 study, the quantitative modelling work was done by the JRC, and the assumptions and scenarios were developed jointly by DG AGRI and the JRC, in consultation with other relevant DGs.

The objective of Scenar 2040 is to assess the medium-term impacts of broad "what if" scenarios assuming alternative scenarios for the Common Agricultural Policy (CAP), thereby identifying outcomes that may inform further policy considerations for the EU agricultural sector.

The study consists of agro-economic modelling of theoretical policy scenarios for the CAP under contrasting assumptions regarding the focus of CAP support. The policy scenarios presented in this report should not be considered as proposed policy options for the CAP post-2027, and the outcomes of the modelling exercise should not be viewed as an assessment of the CAP, or of other EU policies. However, this study aims to enrich current and future policy discussions on the CAP with quantitative insights.

In addition to the two CAP scenarios, this report also provides results of a counterfactual scenario that simulates the removal of the CAP framework (NoCAP scenario), including CAP payments and the standards of good agricultural and environmental condition (GAECs). While such a scenario would not be compatible with the objectives of the EU Treaty and, therefore, not a realistic policy trajectory, this scenario provides a useful point of reference for assessing economic, social, and environmental impacts of the absence of the policy framework provided by the CAP.

The methodological approach of Scenar 2040 employs models from the JRC's integrated Modelling Platform for Agro-economic Commodity and Policy Analysis (iMAP) (M'barek et al. 2012, M'barek and Delincé 2015, Barreiro-Hurle et al. 2024). For this study, we employ three iMAP models, namely the Computable General Equilibrium (CGE) model MAGNET, the Partial Equilibrium (PE) model CAPRI, and the Farm-Level model IFM-CAP. These models are specifically developed for studying the impacts of policy changes on agricultural markets, farm incomes, land use, environmental indicators (including GHG emissions) and overall sustainability. The combination of these three models allows the assessment of a wide range of factors and impacts across different scales, from global markets to individual EU farm types. In compliance with the EU's Better Regulation Agenda[1], their description and use for policy impact assessments is publicly available in MIDAS.[2] Further details regarding the primary characteristics of the three models employed in this study are available in Annex 3.

- MAGNET (Modular Applied GeNeral Equilibrium Tool) is a recursive-dynamic, economy-wide global CGE model. The model adopts a modular approach, whereby the standard GTAP-based core can be augmented with extensions and modules such as the CAP land supply, land allocation, biofuels, food waste, and SDG modules, depending on the purpose of the study. MAGNET covers 141 regions and individual countries, including the 27 EU Member States (MSs).

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1 Better Regulation: why and how

2 Modelling Inventory and Knowledge Management System of the European Commission (MIDAS), see also Acs et. al. (2019), Di Benedetto et al. (2023).

- CAPRI (Common Agricultural Policy Regionalised Impact) is a global, multi-commodity, comparative-static, partial equilibrium model, specifically designed to analyse the CAP, environmental, climate change, and trade policies. The model is based on a consistent data set over different regional scales (global, EU, Member State, and NUTS2 regions), combining a detailed and disaggregated representation of EU regional agricultural production with a global market model.
- IFM-CAP (Individual Farm Model for Common Agricultural Policy Analysis) is an EU-wide comparative static positive mathematical programming model applied to each individual farm from the Farm Accountancy Data Network (FADN). The model allows for assessing a wide range of farm-specific policies while capturing the heterogeneity of EU commercial farms. It provides disaggregated economic results (farm income, land use, production, etc.) at finer geographical scale.

The combined use of these iMAP models leverages the strengths of each individual model by providing a fuller picture of scenario impacts. This approach addresses variations in spatial resolution, product disaggregation, sectors coverage, explicit representation of farming practices, and indicator coverage (Fellmann et al. 2023). To avoid discrepancies in simulation results (beyond those rooted in different model structures and approaches), consistency in the model inputs is critical. Hence, the iMAP models use harmonised baselines, aligning key external drivers - macroeconomic assumptions, population trends, and policy frameworks - and main agricultural commodity developments to the EU Medium-Term Outlook for agricultural markets (MTO, DG AGRI 2023). To effectively model the CAP 2023-2027, the models were updated to integrate the various elements of the CAP Strategic Plans (CSPs) of the EU Member States (MSs), covering the diversity across MSs with varying numbers and architectures of interventions (Fellmann et al. 2023). To facilitate a harmonised implementation of the CSPs across the iMAP models, the JRC created a "Master file of the CAP Strategic Plans of the EU Member States", which includes the information necessary for integrating the approved CSPs into the models, as well as for conducting additional analyses (Isbasoiu and Fellmann 2023, 2024).

2 CAP overview and scenario assumptions

The Scenar 2040 scenario narratives were discussed and further refined during a workshop jointly organised by DG AGRI and the JRC Competence Centre for Foresight (EU Policy Lab). The workshop followed a participatory format, focusing on few main CAP pathways built in continuity with the previous Scenar 2030 exercise. Compared to Scenar 2030, the pathways were further updated based on insights from relevant scientific literature, particularly drawing from the JRC foresight scenarios on the EU's global standing in 2040 (Vesnic Alujevic et al. 2023). While the initial aim was to define broader pathways, including for example variations in underlying macroeconomic assumptions and shifts in consumer behaviour across, the complexity of modelling the current CAP, particularly due to the heterogeneity of national CSPs prompted a revision of this approach. To adequately capture the implications of budget shifts across interventions and diversity of CSPs in terms of intervention-specific allocations across MSs, the Scenar 2040 scenarios assume only differences in the distribution of CAP payments across interventions. Consequently, all assumptions unrelated to the CAP, such as those concerning climate change trends and trade liberalisation, remain constant across the scenarios (see Annex 5).

In this report, we present two contrasted and theoretical scenarios for the CAP with distinct policy implications and drivers across social, technological, economic, environmental, and trade dimensions. The first scenario assumes that the budget of the CAP is increasingly allocated towards productivity and investment. The second scenario places emphasis of CAP support on improved environmental and climate performance of the EU agricultural sector. The impacts of these scenarios are assessed in terms of economic, environmental and social sustainability, including global trade aspects, relative to a baseline (reference scenario for 2040) built upon the 2023 Medium-Term Outlook for agricultural markets (DG AGRI 2023; see also Annex 5 for the assumptions on main baseline drivers).

The following section offers a concise summary of the characteristics of the current CAP, which are critical for the correct interpretation of the scenarios under examination. This is followed by a detailed description of the Scenar 2040 scenarios and the corresponding payment shifts across CAP interventions, and a description of how the assumptions are implemented in the three models.

2.1 CSPs overview and implications for scenario implementation

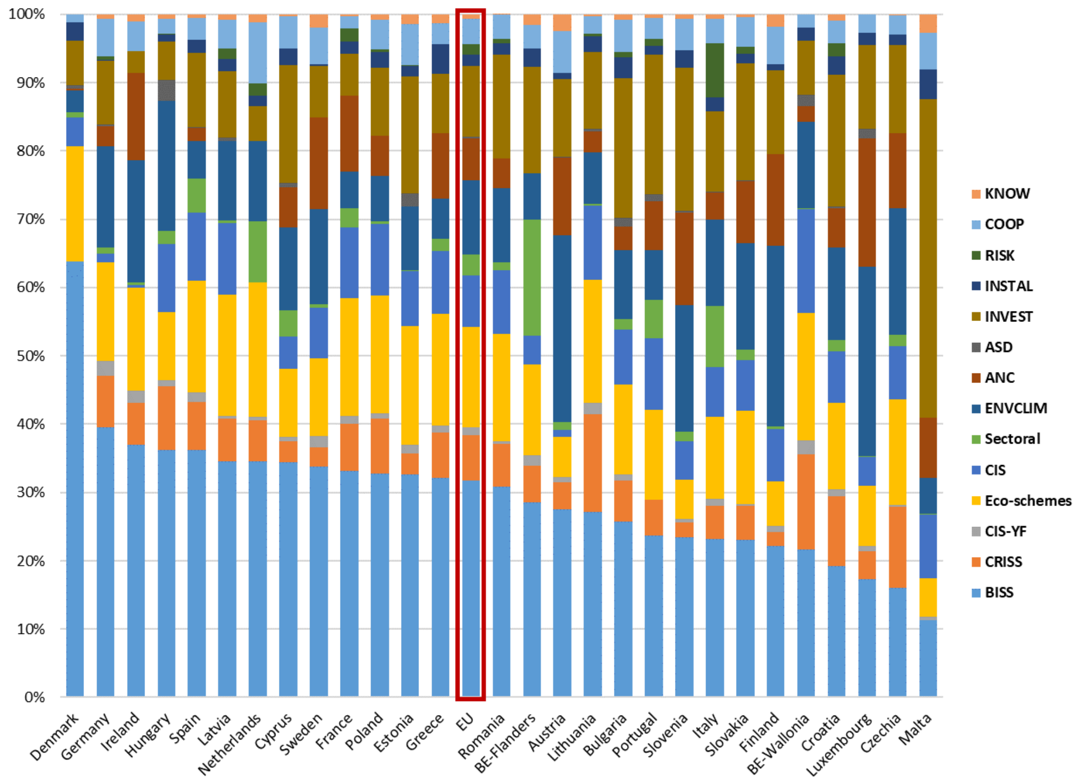
The most recent CAP reform, implemented for the 2023-2027 programming period, aimed to support the EU’s farming sector in addressing both local and global challenges.[3] The reform enhanced subsidiarity and flexibility by enabling each MS to develop a national CAP Strategic Plan (CSP) that integrates CAP funding and policy measures to achieve ten common policy objectives. CSPs are designed to cater for national priorities within the policy’s common framework. The CAP delivery model brings both CAP funds within a single national CSP, covering direct income support and sectoral interventions financed through the European Agricultural Guarantee Fund (EAGF) and rural development interventions co-financed by MSs under the European Agricultural Fund for Rural Development (EAFRD). MSs are required to allocate designated resources to sustainability initiatives, including at least 25% of direct payments for Eco-schemes promoting climate-friendly farming and animal welfare, and at least 35% of rural development funds must be directed towards environmental, climate, and biodiversity measures.

[3] See Annex 1 for an overview of the evolution of the CAP.

Despite minimum allocation requirements for certain interventions or objectives, MSs had significant flexibility in building their CSPs, resulting in substantial variations in intervention priorities and budget allocations. Table 1 presents an overview of the annual average of the Total Public Expenditure (comprising both the EU contribution and mandatory national co-financing) for the CSPs by MS, highlighting the share of the corresponding national co-financing.

The total budget of the CAP 2023-2027 is over 307 billion EUR, with an average annual allocation of approximately 61 billion EUR. Most of this budget is funded by the EU (86% of the Total Public Expenditure), while the remaining share is provided by mandatory national co-financing for rural development and sectoral interventions. The EU budget (EU contribution) is allocated in the following way: 72% to direct income support, 25% to rural development interventions, and 3% to sectoral interventions. National co-financing is mandatory for rural development interventions. When considering also the national co-financing, the Total Public Expenditure (i.e., EU contribution plus national co-financing) shifts to 62% for direct income support, 35% for rural development, and 3% for sectoral interventions. However, the relative share of these components and specific interventions in a MS's Total Public Expenditure varies significantly across the CSPs (Figure 1).

Figure 1. Share of interventions in the Total Public Expenditure by MS



Note: BISS (Basic income support for sustainability), CRISS (Complementary redistributive income support for sustainability), CIS-YF (Complementary income support for young farmers), CIS (Coupled Income Support), Sectoral (Sectoral interventions), ENVCLIM (Environmental, climate-related and other management commitments), ANC (Natural or other area-specific constraints), ASD (Area-specific disadvantages resulting from certain mandatory requirements), INVEST (Investments, including investments in irrigation), INSTAL (Setting up of young farmers and new farmers and rural business start-ups), RISK (Risk management tools), COOP (Cooperation), KNOW (Knowledge exchange and dissemination of information).

Source: Own elaboration based on the information in the CSPs Master file (Isbasoiu and Fellmann 2023).

Table 1 further demonstrates that the composition of Total Public Expenditure and the associated co-financing shares vary significantly across MSs. These variations have important implications for the implementation of the Scenar 2040 policy scenarios, as discussed in the following section.

Table 1: Annual average of Total Public Expenditure (million EUR) planned in the CSPs and the corresponding national co-financing rate (% of the total payment) by MS

	BISS	CRISS	CIS-YF	Eco-schemes	CIS	Sectoral interventions	ENVCLIM	ANC	ASD	INVEST	INSTAL	RISK	COOP	KNOW
Austria	477.6	67.8	14.2	100.0	18.0	20.7 (7%)	472.4 (49%)	198.0 (50%)	1.6 (49%)	197.8 (56%)	15.7 (56%)	0	106.5 (49%)	41.2 (56%)
Belgium-Flanders	112.9	21.0	6.3	52.3	16.7	67.5 (0.3%)	26.7 (49%)	0	0	61.7 (40%)	10.1 (57%)	0	13.9 (52%)	6.0 (57%)
Belgium-Wallonia	80.5	51.8	7.7	69.1	56.6	0.4 (50%)	46.9 (63%)	8.9 (63%)	5.8 (63%)	29.6 (63%)	7.0 (63%)	0	7.3 (63%)	0
Bulgaria	398.3	94.2	12.3	205.3	123.2	25.0 (12%)	154.7 (60%)	54.5 (60%)	19.2 (60%)	316.8 (60%)	48.4 (60%)	12.0 (60%)	72.5 (60%)	12.1 (60%)
Cyprus	31.0	2.9	0.5	9.0	4.3	3.5 (5%)	11.0 (20%)	5.3 (35%)	0.5 (20%)	15.6 (57%)	2.2 (57%)	0	4.3 (31%)	0.2 (57%)
Czechia	255.0	189.4	4.3	247.1	123.5	25.7 (8%)	295.6 (65%)	174.9 (65%)	1.0 (65%)	205.8 (65%)	22.9 (0%)	0	44.9 (65%)	3.0 (65%)
Denmark	619.2	0.0	0.0	163.9	40.6	7.1 (4%)	30.4 (19%)	2.6 (0%)	5.0 (0%)	63.5 (13%)	25.9 (0%)	0	11.6 (20%)	0
Estonia	105.4	10.1	4.0	55.9	26.2	0.3 (50%)	30.1 (20%)	0	6.2 (36%)	55.6 (39%)	5.0 (40%)	0.2 (40%)	19.4 (25%)	4.6 (40%)
Finland	295.6	26.2	13.1	86.0	101.7	4.9 (4%)	352.5 (57%)	179.3 (57%)	0	163.8 (57%)	11.2 (57%)	0	72.7 (57%)	24.5 (57%)
France	3304.9	684.6	118.2	1711.5	1026.9	276.8 (2%)	543.5 (20%)	1100.0 (35%)	0	607.9 (38%)	184.0 (41%)	189.8 (1%)	177.5 (23%)	27.7 (28%)
Germany	2703.6	515.0	147.5	987.0	85.8	64.3 (3%)	1016.6 (24%)	195.4 (43%)	22.1 (19%)	636.3 (43%)	6.8 (30%)	35.3 (46%)	376.0 (25%)	44.3 (41%)
Greece	854.9	177.1	28.0	435.1	245.3	50.2 (12%)	155.4 (15%)	255.1 (35%)	1.4 (15%)	229.3 (12%)	118 (0%)	0	80.7 (15%)	34.3 (15%)
Hungary	723.6	186.3	18.7	199.0	199.0	39.5 (11%)	380.6 (50%)	0	60.4 (50%)	112.3 (57%)	22.2 (18%)	2.2 (57%)	43.0 (52%)	12.7 (57%)
Croatia	142.4	75.0	7.5	93.7	56.2	12.5 (15%)	99.3 (20%)	42.7 (20%)	1.8 (20%)	142.7 (20%)	20.3 (20%)	14.0 (20%)	24.1 (20%)	7.1 (20%)
Ireland	728.5	118.6	35.6	296.6	7.0	9.1 (1%)	351.4 (60%)	250.0 (60%)	0	64.0 (60%)	0	0	85.9 (59%)	19.7 (60%)
Italy	1690.3	352.2	70.4	880.4	528.2	651.7 (2%)	914.3 (54%)	292.0 (55%)	7.0 (59%)	858.2 (55%)	151.3 (55%)	574.9 (55%)	261.7 (55%)	44.4 (56%)
Latvia	170.7	30.7	2.4	87.6	51.4	2.0 (16%)	57.4 (15%)	0	2.4 (15%)	48.0 (11%)	8.7 (3%)	7.5 (15%)	21.2 (15%)	3.8 (15%)
Lithuania	227.0	120.5	14.0	150.6	90.4	2.2 (25%)	62.9 (16%)	26.1 (19%)	3.5 (16%)	94.3 (23%)	19.0 (23%)	2.7 (23%)	21.6 (18%)	2.4 (23%)
Luxembourg	16.1	3.9	0.7	8.2	3.9	0.08 (64%)	25.9 (80%)	17.4 (80%)	1.4 (80%)	11.4 (80%)	1.6 (80%)	0	2.5 (75%)	0
Malta	3.6	0.0	0.1	1.8	3.0	0.03 (50%)	1.7 (20%)	2.8 (35%)	0	15.0 (37%)	1.4 (40%)	0	1.7 (24%)	0.9 (40%)
Netherlands	338.5	59.6	4.6	192.8	0.0	86.9 (0.3%)	115.2 (34%)	0	0	50.8 (33%)	14.9 (0%)	17.5 (32%)	87.6 (21%)	11.5 (26%)
Poland	1640.9	400.8	37.1	866.7	519.8	19.4 (26%)	330.4 (34%)	296.0 (35%)	0	500.6 (45%)	114.6 (45%)	21.2 (45%)	212.9 (45%)	40.2 (45%)
Portugal	314.6	69.7	0.0	174.9	138.1	74.5 (3%)	96.8 (19%)	95.4 (31%)	13.2 (20%)	270.9 (17%)	16.3 (17%)	13.3 (18%)	40.8 (19%)	7.6 (17%)
Romania	964.5	195.7	13.4	489.5	293.5	36.4 (17%)	341.1 (15%)	132.8 (15%)	0	478.4 (15%)	50.1 (3%)	19.6 (16%)	111.1 (15%)	2.0 (15%)
Slovakia	188.7	41.0	2.4	111.8	60.7	12.9 (7%)	128.4 (37%)	73.9 (36%)	1.3 (37%)	140.9 (37%)	11.4 (37%)	8.0 (37%)	36.1 (37%)	2.8 (38%)
Slovenia	82.9	7.8	2.0	20.4	19.7	5.3 (12%)	65.7 (30%)	48.0 (63%)	0.5 (20%)	74.3 (66%)	9.5 (66%)	0	16.2 (41%)	2.2 (66%)
Spain	2461.2	482.8	96.6	1110.5	677.2	342.6 (3%)	367.3 (33%)	130.8 (39%)	11.9 (22%)	739.6 (37%)	133.1 (38%)	0	213.0 (29%)	36.4 (41%)
Sweden	407.1	34.3	19.9	136.0	89.2	6.3 (9%)	168.1 (40%)	161.3 (70%)	0	90.9 (74%)	3.4 (78%)	0	65.0 (62%)	22.9 (78%)
EU27	19,339.5	4018.8	681.5	8942.5	4606.2	1847.9 (4%)	6642.5 (39%)	3743.2 (43%)	166.1 (40%)	6275.8 (41%)	1035 (34%)	918.3 (41%)	2232 (37%)	414.7 (45%)

Notes: The Total Public Expenditure as planned in the CSPs includes the EU contribution and the national co-financing. The national co-financing is expressed as share (%) of the total payment per type of intervention. The national co-financing does not include the additional national financing (top-ups). Under Sectoral Interventions, only apiculture receives national co-financing in addition to the EU contribution.

2.2 Scenario rationales and budget shifts across the interventions

This section explains the three simulated scenarios, and the configuration of the payment shifts in the two CAP scenarios.

NoCAP scenario:

Overall rationale: This scenario serves as a point of reference for assessing economic, social, and environmental impacts in the absence of the policy framework provided by the CAP.

Overview of CAP instruments: The NoCAP scenario simulates the complete removal of CAP support by 2040. Accordingly, all CAP support under both Pillar 1 and Pillar 2 interventions is removed in the scenario simulations. This includes the EU contribution and mandatory national co-financing (as without CAP, co-financing requirements cease to exist). Additional national financing (top-ups[4]), where applicable, remain. With the removal of CAP support, also the standards of good agricultural and environmental condition (GAECs)[5] are no longer applicable and are removed in this scenario.

Policy scenario 1: Productivity and Investment (Prod&Inv)

Overall rationale: This scenario assumes an emphasis of CAP support on economic performance and investments, with policies designed to enhance the productivity and competitiveness of the agricultural sector.

Overview of CAP instruments: While the EU contribution remains at baseline levels, budget allocation is shifted across interventions towards increased investment support and measures that increase productivity through enhanced knowledge transfer, whereas other forms of support are reduced. Under this scenario, investment support, with possible environmental conditions, is considered more efficient than specific environmental payments, which is why the EU contribution to Eco-schemes and ENVCLIM interventions are reduced by 50%. Complementary support dedicated to young farmers remains unchanged. Basic income support is reduced by 7% but remains granted as a mechanism to buffer farm income volatility. A uniform capping threshold of 75 000 EUR is imposed on basic income support for all farms across all MSs, irrespective of current national implementation practices, thereby introducing a more stringent and harmonized income support ceiling across the EU, further limiting the amount larger and more competitive farms can receive. Consequently, under Pillar 1, direct income support is more targeted towards smaller, less competitive farms to enhance their productivity and competitiveness, while large farms still benefit from policies that facilitate investments. The budget for sectoral interventions is increased for specific agricultural sectors facing competitiveness challenges. Rural development support focuses on investments, while maintaining minimal support for environmentally sustainable businesses and farm production systems (e.g., organic farming).

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[4] MSs can provide additional national financing (top-ups) for rural development interventions, beyond the obligatory national co-financing. Sixteen MSs have included top-ups in their CSPs, totalling 11.23 billion EUR. In the CSPs, top-ups apply only to certain rural development interventions (e.g., in France: ENVCLIM – intervention 70.01: Support for conversion to organic farming - CAB Hexagon; in Italy: INVEST – intervention SRD01: Agricultural productive investments for the competitiveness of agricultural holdings).

[5] For this exercise, the models do not take into account the changes for GAECs introduced by the 2024 simplification package specified in SWD(2024) 360 (for the baseline). At the time of writing, these changes have not yet been formally included in the CSPs, and therefore full GAEC implementation is assumed in all MSs in the baseline.

Policy scenario 2: Environment and Climate (Env&Clim)

Overall rationale: This scenario assumes an emphasis of CAP support on climate neutrality and more environmentally sustainable production, with agricultural policies focusing on climate change adaptation and the reduction of environmental impacts.

Overview of CAP instruments: In this scenario, the EU contribution remains at baseline levels, but budget allocations shift towards environmental and climate-focused interventions, with stricter compliance requirements for agri-environmental and climate objectives. Generalised basic income support mechanisms are reduced by 80%, while young farmers benefit from increased support. A payment cap of 100 000 EUR per farm is applied consistent with the baseline for those MSs currently implementing capping (see Table 17 in the Annex 4.3). Risk management tools are promoted to enhance sector resilience. The Pillar 1 budget is redirected towards rewarding the provision of ecosystem services, primarily through increased payments for Eco-schemes. Simultaneously, Pillar 2 is refocused on further supporting sustainable land management practices (agri-environmental-climate commitments under ENVCLIM interventions), areas with natural constraints (ANC) and other area-specific disadvantages (ASD). Cooperation, and knowledge exchange and dissemination initiatives receive increased funding to foster innovation and the adoption of sustainable practices. The budget for sectoral interventions remains unchanged to address market imbalances, such as crisis and supply chain management.

Configuration of the payment shifts in the two CAP scenarios

As shown in Figure 1 and Table 1, the configuration of Total Public Expenditure and associated co-financing shares vary significantly across MS. These variations have important implications for the implementation of the two policy scenarios. These were designed assuming the overall EU budget at the same level as in the CAP 2023-27, achieving a budget-neutral reallocation of EU payments (i.e. the EU contribution) across interventions at the EU level. However, replicating this reallocation at the MS level proved to be challenging due to the heterogeneous distribution of payments across interventions within each CSP. Indeed, implementing identical relative shifts at the MS level would alter EU contributions received by individual MSs compared to the baseline. To address this, an optimisation model was developed to determine the optimal reallocation of payments at the MS level, ensuring that EU budget neutrality is maintained down to the MS level while approximating the intended EU-wide scenario assumptions as closely as possible.

It is important to note that while the optimised payment shifts preserve budget neutrality in terms of the EU budget contribution, they do not maintain budget neutrality in terms of Total Public Expenditure (i.e. the sum of the EU contribution and mandatory national co-financing). This discrepancy arises due to differences among MSs in both the budget share allocated to specific interventions and the national co-financing rates applied by the MSs. Assuming that each MS maintains the same national co-financing rate for a given intervention as in its current CSP also under the two CAP scenarios, the resulting Total Public Expenditure by MS is subject to alteration due to changes in the amount each MS allocates to national co-financing. Moreover, this alteration is not uniform across MSs, as the proportion of national co-financing varies across interventions and MSs, leading to asymmetric impacts on overall expenditure structures.

The main CAP payment assumptions for the two policy scenarios are summarised and presented in Table 2. Further information on the changes in the budget allocation across interventions and related implications at MS level are provided in Table 13 and Table 14 in Annex 2.

While the total EU contribution remains unchanged in both scenarios, the shifts of EU budget across interventions results in differences in the national co-financing. As national co-financing is mandatory for Pillar 2 payments, a payment shift from Pillar 1 (no national co-financing) to Pillar 2 interventions (mandatory national co-financing) alters the MSs co-financing expenditure. While in the Prod&Inv the total co-financing amount by the MSs increases annually by 138 million EUR (+1.6%), the substantial shift of BISS payments towards Rural Development interventions under the Env&Clim scenario results in a substantially higher increase in the amount MSs spent on co-financing (+6,660 million EUR, +77%). As such, the total budget for the two scenarios, including constant level of EU budget and the higher MS co-financing, increases by 0.2% under Prod&Inv and by 10.9% under Env&Clim (see Annex 2). It needs to be noted that while the scenarios simulate hypothetical budget reallocations, it could be expected that such changes, were they to occur in reality, would likely lead MSs to adjust national co-financing rates to mitigate the financial burden.

Table 2. EU contribution and total national co-financing changes (% and million EUR) by policy scenario

	BISS	CRISS	CIS-YF	Eco-schemes	CIS	Sectoral	ENVCLIM	ANC	ASD	INVEST	INSTAL	RISK	COOP	KNOW
Scenario "Productivity and Investment"														
EU	**-7%**	**70%**	**0%**	**-50%**	**0%**	**204%**	**-50%**	**0%**	**0%**	**67%**	**-67%**	**49%**	**-75%**	**80%**
	-1 354	2 807	0	-4 471	0	3 635	-2 029	0	0	2 476	-457	267	-1 055	181
MSs						251%	-50%	0%	0%	72%	-67%	30%	-75%	81%
						163	-1 292	0	0	1 859	-236	111	-619	153
Scenario "Environment and Climate"														
EU	**-80%**	**0%**	**99%**	**101%**	**-100%**	**0%**	**128%**	**103%**	**132%**	**0%**	**103%**	**98%**	**100%**	**96%**
	-15 472	0	675	9 038	-4 606	0	5 193	2 177	132	0	701	536	1 408	219
MSs						0%	125%	101%	139%	0%	101%	92%	99%	94%
						0	3 236	1 638	92	0	356	342	820	177

Source: Own elaboration based on scenario assumptions.

2.3 Scenario implementation in the models

2.3.1 General representation of the CAP

While the CAP and the CSPs are implemented in a harmonised manner across the iMAP models, variations exist in how the CAP interventions are represented within the three models used for this study. These variations arise from the inherent characteristics of the distinct model types (CGE, PE, farm-level), which shape their respective approaches to CAP representation and implementation. Table 3 provides an overview of the CAP interventions covered by the three models. Considering these divergences, the models incorporate in the simulation additional exogenous shocks and integrate potential effects on productivity that are not endogenously captured within their respective mechanisms.

Given the dynamic nature of MAGNET, additional assumptions are needed to simulate the removal of CAP support and the implementation of the two CAP scenarios up to 2040. The MAGNET simulations are conducted in three five-year periods: 2025-2030, 2030-2035, and 2035-2040. Since the current CAP is assumed to remain in effect until 2027, the three scenarios are assumed to be implemented only partially during the period 2025-2030. For the NoCAP scenario, this means that the removal of CAP support is only partially implemented in the first period. Specifically, CAP payments are reduced in proportion to the years within the period not covered by the policy, leading to a 60% reduction (corresponding to three out of five years). In the subsequent two periods (2030-2035 and 2035-2040), the CAP is assumed to be fully phased out, with all associated payments removed from the model. For the other two scenarios, the approach is similar. The shift in payments is only partially implemented in 2025-2030, complete in 2030-2035, and maintained in 2035-2040.

In the following section we provide insights on additional assumptions implemented in the models regarding the general CAP productivity impacts. Further information on CAP and scenario implementations in the three models are provided in Annex 3.

Table 3. Overview of the CAP interventions covered by the three models

CAP – Direct Payments	**MAGNET**	**CAPRI**	**IFM-CAP**
Basic income support for sustainability (BISS)	✓	✓	✓
Complementary redistributive income support for sustainability (CRISS)	✓	✓	✓
Complementary income support for young farmers (CIS-YF)	✓	✓	✓
Schemes for the climate, the environment and animal welfare (Eco-schemes)	✓	✓	✓
Coupled income support (CIS)	✓	✓	✓
Cotton payments	✓	✓	✓
Capping of direct payments			✓
CAP – Sectoral Interventions			
Fruit and Vegetables; Apiculture products; Wine; Hops; Olive oil and tables olive; Cereals; Beef and veal; Pigmeat, etc.	✓	✓*	✓
CAP – Rural Development			
Environmental, climate-related and other management commitments (ENVCLIM)	✓	✓	✓
Natural or other area-specific constraints (ANC)	✓	✓	✓
Area-specific disadvantages resulting from certain mandatory requirements (ASD)	✓	✓	✓
Investments, including investments in irrigation (INVEST)	✓	✓*	✓
Setting up of young farmers and new farmers and rural business start-up (INSTAL)	✓	✓*	
Risk management tools (RISK)	✓	✓*	
Cooperation (COOP)	✓	✓*	
Knowledge exchange and dissemination of information (KNOW)	✓	✓*	

Notes: ✓ = directly included in the model, ✓ = indirectly included in the model via productivity impacts.*
Source: Own elaboration based on the implementation of policies in the models.

2.3.2 Additional assumptions on general CAP productivity impacts

A crucial aspect of CAP support is the impact of different types of payments on yields and factor productivity, both overall and by sector. Although this topic has been studied in the literature, the evidence remains inconclusive regarding the sign and magnitude of the impact of various CAP measures, especially those related to rural development (i.e. Pillar 2).

Khafagy and Vigani (2022) employed farm-level data from the FADN (117,179 observations) to estimate the elasticity of substitution among labour, capital and land, quantify the magnitude of technical change, and assess the impact of CAP payments. Regarding the potential impact of market support payments, the findings of the study suggest that decoupled support could have a positive influence on productivity in the EU27, while coupled payments may exert a negative effect.

While decoupled support has the potential to enhance productivity, as it provides farmers with the flexibility to invest in new technologies or adopt more risk-taking production strategies (Boulanger et al. 2016; Khafagy & Vigani 2022), coupled support may exert a negative influence, particularly following the 2005 transition of the CAP towards decoupled support. This is due to the possibility of inefficient resource or input allocations (Biagini et al. 2023). Moreover, the impact is contingent upon context: Khafagy and Vigani (2022) identified disparities in terms of both the direction and statistical significance of the effects observed for the regions under analysis. Indeed, this discrepancy could be attributed to various factors, such as the selected countries, the time period considered, and the production mix. In conclusion, the existing literature does not provide a clear consensus on the impact of coupled and decoupled payments on productivity.

With regard to CAP rural development measures, Khafagy and Vigani have distinguished three categories of payments: (i) subsidies to investments, (ii) agro-environmental payments, and (iii) payments for less favoured areas (which correspond to ANC in the CAP 2023-2027). The results demonstrate a positive impact on factor productivity of subsidies to investments, with an estimated factor productivity elasticity of 0.03[6]. This can be attributed to investments in human capital, which can be expected to enhance labour productivity by improving knowledge and best practices in agriculture. Furthermore, physical capital investments designed to boost productivity across all agricultural sectors may also have contribute to this positive impact. For the agro-environmental payments, the objective is to support the development of sustainable practices by farmers, such as the restoration of ecosystems related to agriculture and forestry, the implementation of which, according to Khafagy and Vigani (2022), can result in a decrease in land productivity, with an estimated factor productivity elasticity of -0.024[7]. Finally, for less favoured areas payments, which provide income payments linked to land, Khafagy and Vigani (2022) estimate a positive coefficient of 0.03 like for the subsidies to investments.

The results of previous studies on the productivity impacts of CAP payments are heterogeneous and, in some cases, do not provide disaggregated results by type of policy measure (M'barek et al. 2017, Biagini et al. 2023). It is therefore not yet possible to determine the precise impact of different types of payments at the level of individual activities or regions. In the present study, the simulations of removing all CAP payments also assume different impacts on productivity. Due to the heterogeneous nature of the models, alternative approaches were adopted to address the assumed effects in productivity that would result from a removal of the CAP as well as a shift of CAP payments across interventions in the two policy scenarios.

MAGNET

The MAGNET CAP module allows for accounting for the effects on factor productivity associated with the different CAP payments. For this purpose, a set of parameters representing the elasticities of factor productivity linked to each class of measure must be defined for the MAGNET model. These parameters are defined combining scientific evidence with expert knowledge. The starting point is Khafagy and Vigani (2022). This study is selected due to its EU-wide coverage compared to other studies with less extensive geographical scope. Additionally, the categorisation of payments in this study aligns with the categories used in the MAGNET model. Based on the aforementioned study, the following assumptions were made:

[6] With a 1% increase in investments, the productivity of the associated factors increases by 0.03%.

[7] With a 1% increase in agro-environmental subsidies, the productivity of land decreases by -0.024%.

- Regarding coupled and decoupled direct payments, no effects on productivity are considered in the MAGNET model for this analysis.
- For subsidies to investments, MAGNET assumes a positive impact on productivity, as defined in Khafagy and Vigani (2022) (0.03 elasticity of factor productivity), in the three categories of payments within Pillar 2 that match subsidies on investments in MAGNET, namely (i) human capital investments; (ii) physical capital investments; and (iii) wider rural development measures.
- Agro-environmental payments are tied to land in MAGNET and, following Khafagy and Vigani (2022), are assumed to have a factor productivity elasticity of -0.024.
- Finally, for ANC payments, given the limited evidence available on these payments and the lack of consensus on their effect on productivity, no effect of these payments on productivity are assumed in MAGNET.

CAPRI

Most of the CAP payments are modelled within CAPRI (Table 4), allowing for endogenously derived impacts in the scenario analysis. However, the production impacts of certain rural development payment categories have to be approximated based on expert knowledge or existing literature estimates. Given the limited information and the lack of consensus in the literature regarding the overall impact of some CAP interventions on productivity, for the CAPRI simulations we adopt a systematic and transparent methodology. This approach approximates productivity impacts through exogenous yield shocks for those interventions not directly modelled endogenously within the CAPRI framework.

For the NoCAP scenario, we first identify the payment categories that are not included in the endogenous model simulations of CAPRI and for which there is reasonable evidence suggesting these interventions could influence productivity. Subsequently, we determine an average (-6%), maximum (-3%), and minimum (-9%) effect on yields for the scenario simulation. Although these values rely to a certain extent on expert knowledge, they are comparable in magnitude with the previous Scenar 2030 study. That study reported for the CAPRI simulations an average yield effect under the NoCAP scenario of -4% (M'barek et al. 2017). For the CAP scenarios, we similarly identify the payment categories that are not included in the endogenous model simulations of CAPRI and for which there is reasonable evidence suggesting these interventions could influence productivity. Specifically, for the Prod&Inv scenario, these include payments regarding the INVEST, RISK and KNOW, while for the Env&Clim scenario this includes Eco-schemes and ENVLIM. Subsequently, we determine average, maximum, and minimum yield effects for the scenario simulation, summarised in Table 4:

Table 4. Assumed exogenous productivity (yield) shocks in CAPRI by scenario

	NoCAP	Prod&Inv	Env&Clim
Average	-6%	5%	-5%
Min	-9%	0%	-10%
Max	-3%	10%	0%

Source: Own elaboration

These values are based on expert knowledge, and they are comparable in magnitude with the Scenar 2030 study, which reported for the CAPRI simulations an average yield effect of +5% under the production-oriented scenario, and -3% under the environmental scenario.

At the MS level these exogenous yield shocks are applied based on two tangible and data-driven criteria:

1. *Monetary change per hectare:* This approach assesses the monetary subsidy changes per hectare implied in each scenario. Thus, this approach is grounded in the understanding that MSs experiencing larger per-hectare monetary changes are likely to experience more significant production impacts.
2. *Relative productivity:* This approach accounts for the relative productivity of each MS with respect to the analysed crop and livestock sectors in CAPRI. As no comprehensive publicly available productivity ranking exists for agricultural activities across all MSs, we select 17 major agricultural activities that can be easily mapped to the CAPRI activities. To smoothen extreme year-to-year fluctuations, we calculate a five-year productivity average (2016-2020) based on FAOSTAT data. Highly productive countries with advanced agricultural systems are less likely to experience substantial yield changes, whereas less productive countries in specific crop and livestock sectors may still achieve significant yield increases. However, such gains are harder to realize in advanced systems, where improvements tend to be more modest, and yields have rather stagnated in recent years.

These two criteria are equally weighted, resulting in a final ranking that attributes crop-and livestock-specific exogenous yield shocks per MS within the boundaries outlined in Table 4.

IFM-CAP

IFM-CAP follows a farm-level approach to model the productivity changes due to the removal of CAP support. Productivity impacts depend on the type of intervention. More specifically:

- For decoupled payments, namely Basic income support for sustainability (BISS), Complementary redistributive income support for sustainability (CRISS) and Complementary income support for young farmers (CIS-YF), no productivity effects are assumed as these interventions are decoupled from production. Farms receive the payments independently of the yields or the input use and with no reference to the type of crop or livestock activity. Thus, it is assumed that these payments do not affect the farm-level production.
- For coupled income support (including cotton), production (and thus productivity) is affected by the level of payment. This is modelled endogenously. Farms incorporate the value of the coupled payment (e.g., EUR per hectare or per head) into the gross margin of the respective activity. Consequently, the decision to produce—determined by the condition that marginal revenue equals marginal cost—is also affected by the level of the coupled payment.
- For the CAP conditionality (the GAECs), although not an explicit intervention, the impact on production and input use (and thus productivity) is modelled through management constraints. Conditionality imposes certain restrictions on land use and input use intensity, namely the share of permanent pasture, a minimum share of arable land with catch crops, mulching or winter cover, rotation and landscape elements (including set aside). Thus, the CAP conditionality has a negative impact in productivity, modelled endogenously.
- For the Eco-schemes (i.e., schemes for the climate, the environment and animal welfare), the impact on farm-level productivity is modelled through constraints related to environmental obligations. The constraints relate to crop rotation, soil cover and landscape elements. Farms that receive a relatively high eco-scheme payment per hectare need to follow more stringent management constraints than farms with a relatively low payment per hectare.

- For Pillar 2 interventions, we assume that farms receiving investment payments (according to FADN data) will achieve higher productivity by 2040, modelled as either an increase in yields, a reduction in costs, or both. For the baseline, we assume these farms experience a productivity increase compared to the base year, with an increase in yields (3%) and a decrease in variable costs (-3%). In the Env&Clim scenario, farms receiving support for investments are assumed to achieve productivity gains primarily through a reduction in input costs (-6%). This aligns with the environmental ambition of this scenario, which promotes environmental-friendly practices that are generally less input intensive. Conversely, in the Prod&Inv scenario, where the budget dedicated to investment support is expanded compared to the baseline level, the productivity increase is implemented as an increase in yields (6%), whereas we assume that variable costs remain unchanged. Under the NoCAP scenario, where CAP support is removed, farms that previously benefitted from investment support experience a decline in productivity compared to the baseline.

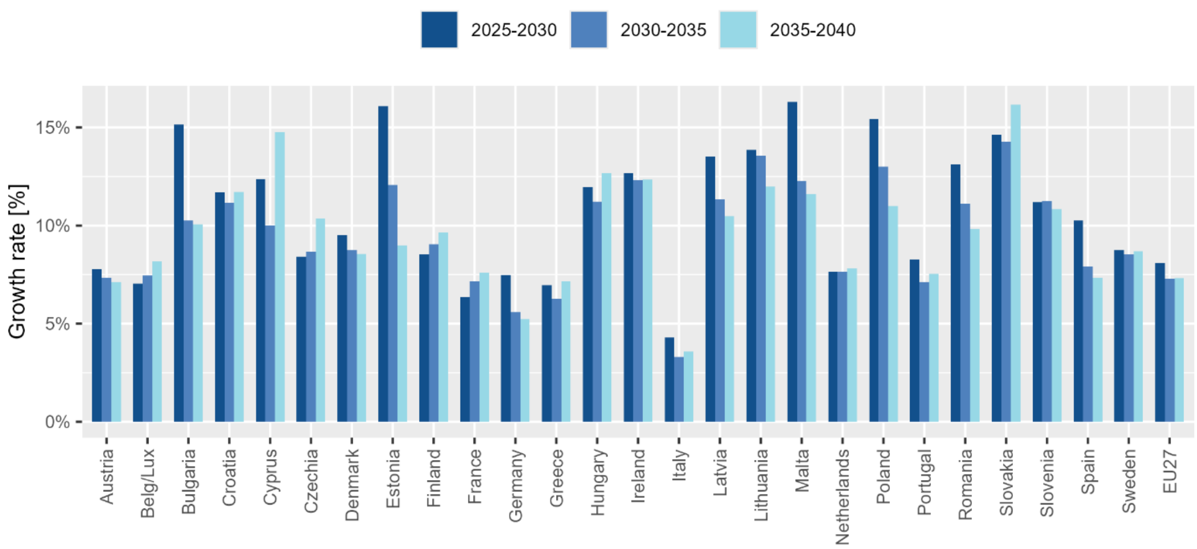
3 Results: Baseline projections

The CAPRI and MAGNET models are calibrated to the 2023 EU Medium-Term Agricultural Outlook (MTO) market developments and integrate identical macroeconomic assumptions (DG AGRI 2023). As this study extends five years beyond the MTO horizon, linear time trends are applied to project the baselines to 2040. IFM-CAP does not require a specific calibration to the MTO, but uses prices and yields from CAPRI, which allows a harmonisation with the 2023 MTO baseline. Annex 5 presents the main assumptions and motivating factors underlying the 2023 MTO.

In this section, we provide a brief overview of the main aggregated baseline projections, as provided by the MAGNET model and consistent with the macroeconomic assumptions and agricultural market projections of the 2023 MTO (DG AGRI 2023). The specific aim is to contextualise the projected trends on demand and production of food products in the baseline scenario. More detailed and disaggregated insights into the baseline are provided within the following sections on the scenario results.

GDP in the EU is projected to increase on average by approximately 8% during the first period (2025-2030), followed by around 7% in the subsequent two periods (Figure 2)[8]. At country level, however, there are notable variations, with the highest growth rates expected in Eastern MSs, particularly in Slovakia, Poland, Lithuania, and Estonia.

Figure 2. GDP changes by MS (periods vs reference year 2025)

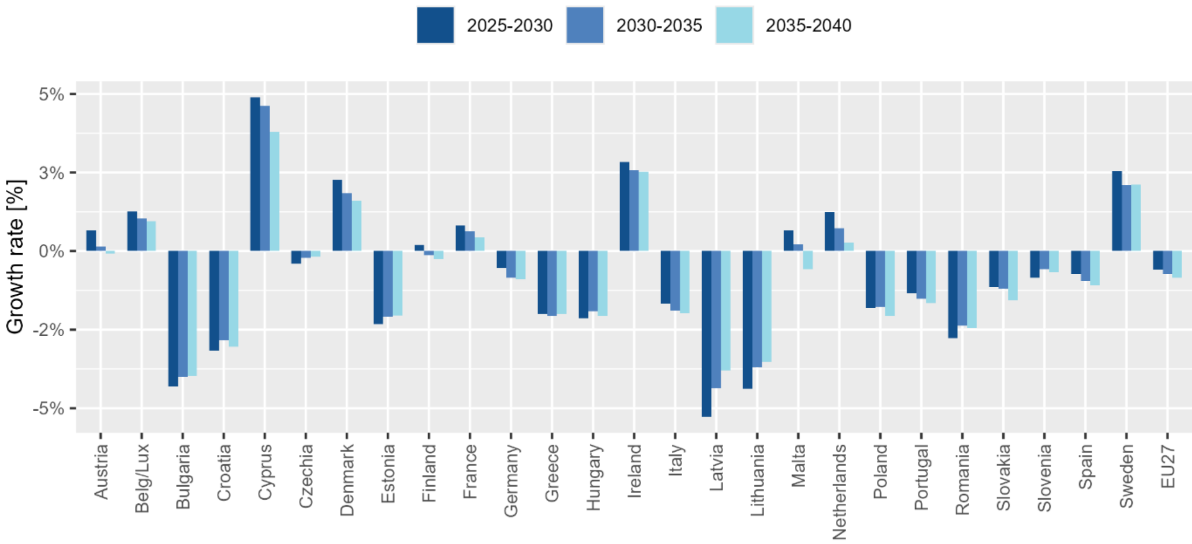


Source: MAGNET, based mainly on MTO 2023

EU population is an important driver of demand and production projections in the baseline scenario. Overall, the total EU population is expected to slightly decline, with an average decrease of 0.7% by 2040 (Figure 3). However, this aggregate trend masks regional variations. Notably, more pronounced population decreases are expected in Eastern MSs, with Latvia, Lithuania and Bulgaria experiencing the strongest reductions. Conversely, population growth is expected in a limited number of MSs, most notably Cyprus, Ireland, and Sweden.

8 The values presented for 2025 are projections and not actual figures.

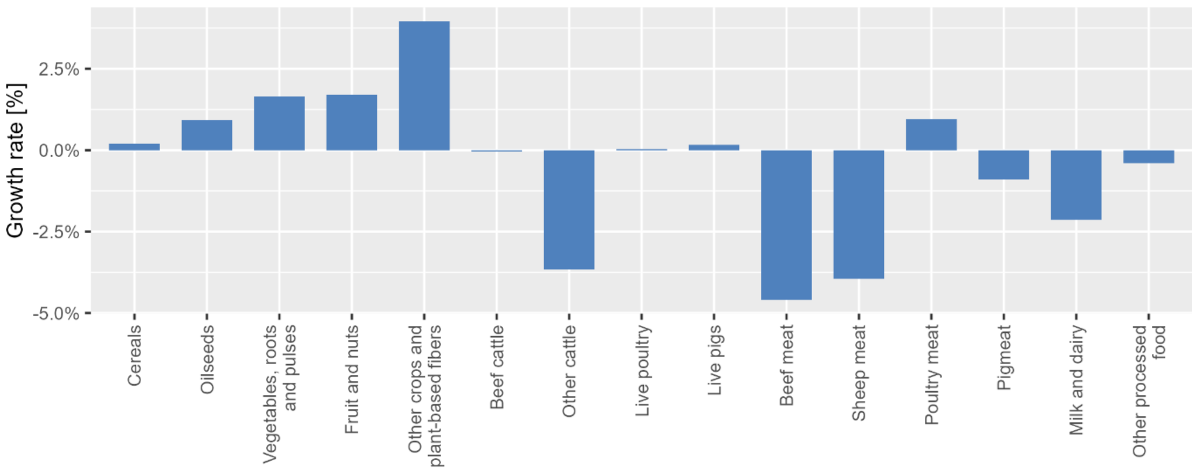
Figure 3. Population changes by MS (periods vs reference year 2025)



Source: MAGNET, based mainly on MTO 2023

This slight decline in the overall EU population implies that total demand for agri-food products is projected to remain relatively stable in the baseline scenario. However, notable changes are expected in the animal protein sector (Figure 4). Specifically, demand for poultry meat is projected to slightly increase, while demand for beef and sheep meat is projected to decline. Furthermore, a modest reduction in demand is also projected for dairy commodities.

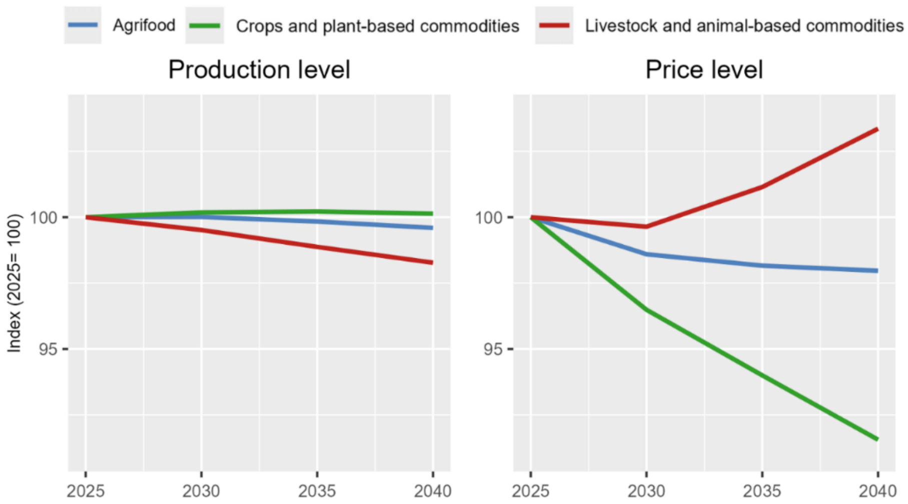
Figure 4. EU total demand changes by commodity (baseline 2040 vs reference year 2025)



Source: MAGNET projection

Consistent with the consumption trends, the overall agri-food production value (at 2017 prices) is projected to remain relatively stable in the baseline, with a limited decrease of 0.4% between 2025 and 2040 (Figure 5). At the sectoral level, a modest increase is expected in crops and plant-based commodity production (0.1%), while production of livestock and animal-based commodities are projected to decline by around 1.7%. These sectoral dynamics reflect the projected changes in the composition of agri-food demand. In contrast, the picture is more complex for agri-food prices. Overall, prices are expected to decrease by around 2.0%, although trends vary considerably across sectors. Livestock and animal-based commodity prices are expected to rise by 3.4%, driven by decreasing supply and increasing production costs, Conversely, prices for crops and plant-based commodities are projected to decline by 8.4%, following a post-2025 market correction after the price spikes caused by the Russian invasion of Ukraine. However, while these price projections indicate general tendencies, significant uncertainty remains, particularly regarding energy prices and exchange rate fluctuations, which may substantially influence actual price trajectories over the projection horizon.

Figure 5. Production and producer prices real-term trends by agri-food commodity groups



Note: Price indices are expressed in real terms (i.e., adjusted for inflation).
Source: MAGNET projection

4 Results: Impacts on production and producer prices

This chapter analyses the main impacts of the scenarios on agricultural production, focusing on the main changes in quantities and producer prices. The changes are presented at the EU and MS levels for the crop (Section 4.1) and livestock (Section 4.2) sectors, followed by production impacts at the farm level (Section 4.3).

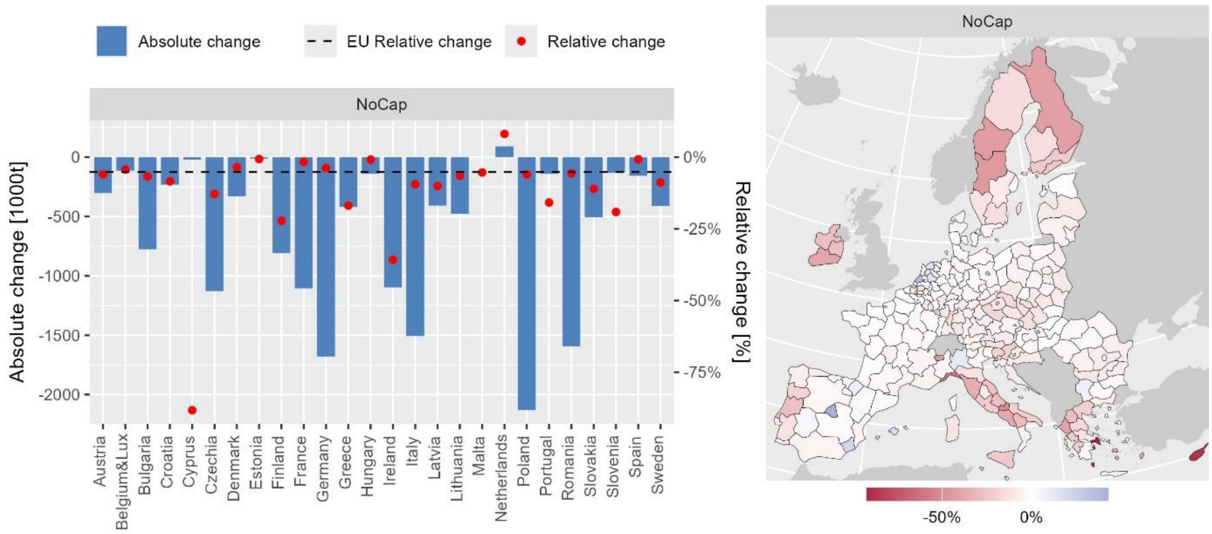
4.1 Crop sectors

4.1.1 Cereals

NoCAP scenario

Total EU cereals production in the absence of CAP support is projected to decline by about 5.1%, while the area dedicated to cereals decreases by 2.5% (Figure 6).

Figure 6. Cereals supply changes by MS and NUTS2 (NoCAP vs baseline, 2040)



Source: CAPRI projections

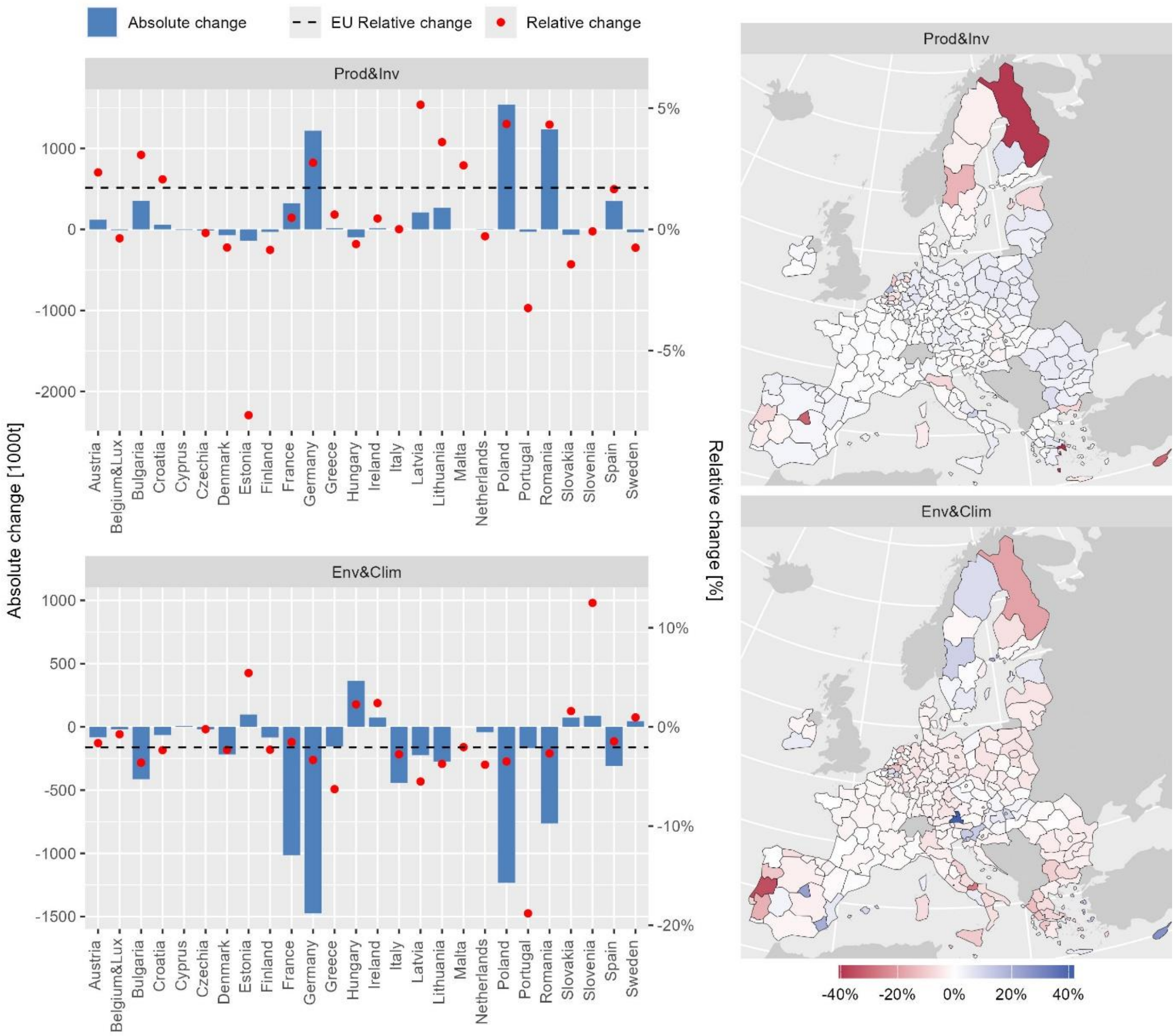
At MSs level, production changes generally range from -1 to -22%, with exceptions in Ireland and Cyprus, where declines exceed 22%. The marginal cereal production in Cyprus results in disproportionately large relative changes, while the substantial reductions in agricultural area dedicated to cereals in Ireland (-36%) is the main reason for their above-average cereal production declines. In absolute terms, major cereal-producing MSs show the most significant production declines. Poland is most affected (-2 million tonnes), followed by Germany (-1.7 million tonnes), and Romania (-1.6 million tonnes), with also Italy, Czechia, France, and Ireland each projected to have reductions exceeding 1 million tonnes. These substantial changes are driven by a combination of reduced area and lower yields due to the removal of CAP payments. The Netherlands is the only MS with an increase in supply (8%), which is driven by a 10% increase in the cereal cultivation area that compensates the assumed yield reductions. The cereals area increase comes at the expense of set aside and fallow land following the removal of the CAP framework (including GAECs) and is related to an increase in domestic feed use. Nevertheless, cereal production in the Netherlands remains relatively small compared to other EU countries. Looking at the specific cereal categories reveals contrasting impacts for wheat and maize. For wheat, most major producing countries—

except France and Spain—reduce the dedicated area. For instance, Romania, Germany, and Poland experience declines of 9%, 3% and 6% in wheat production, respectively, driven by reductions in both area and yields. Income from cereals, alongside oilseeds, is projected to decline by 21-25% across the EU, making other agricultural sectors relatively more profitable and prompting a reallocation of land away from cereals. Conversely, maize production under the NoCAP scenario remains relatively stable in most major producing countries, with agricultural areas being maintained or somewhat expanded. However, Romania and Bulgaria present exceptions, where maize production declines due to lower productivity levels, making the crop less profitable in the absence of CAP support.

CAP scenarios

EU cereals production is projected to increase by 1.7% under the Prod&Inv scenario, while it decreases by 2.1% under the Env&Clim scenario (Figure 7).

Figure 7. Cereals supply changes by MS and NUTS2 (Prod&Inv and Env&Clim vs baseline, 2040)



Source: CAPRI projections

Under the Prod&Inv scenario, cereal supply decreases are generally limited to a maximum -10%, except for Cyprus (-30%), where the decline is much higher due to low absolute baseline values. After Cyprus, Estonia and Portugal experience the largest reductions in cereal production (-8% and

-3%, respectively), primarily driven by a reduction in cultivated area, which is closely linked to per-hectare income changes. Notably, income from cereal production in Estonia and Portugal decreases by an average of more than 16%, discouraging cereal cultivation. Most of the other MSs, including the major cereal-producing MSs, generally increase their production under the Prod&Inv scenario. Among the major producers, those MSs with relatively lower baseline productivity, such as Poland and Romania, experience the most significant yield increases compared to other major producers (see section on productivity impacts). This results in larger production growth for Poland and Romania, contributing to a more balanced distribution of cereal supply among major producing countries.

These patterns mostly persist at sectoral level. Wheat production is notably increasing in Poland and Romania, while some smaller wheat-producing countries are reducing their output. Overall, the EU is projected to increase wheat production by 2% under the Prod&Inv scenario. Barley production is also expected to rise, with a 2% increase and similar MSs shifts. Maize production remains relatively stable at the EU level, with a marginal increase. However, production declines in a few major producing MSs (Italy, Spain, and Hungary) due to land reallocation towards more profitable agricultural activities.

In contrast, under the Env&Clim scenario, most MSs show a decrease in cereal production. This decline is primarily driven by reduced yields, which are only partially offset by increases in cultivated area for cereals and hence are insufficient to counteract the yield losses. In MSs where shifts in payments as simulated under the Env&Clim scenario increase cereal income, cultivated area tends to expand. Looking at medium to smaller cereal producing MSs, one observes that most of them are also expected to decrease overall cereal production due to lower productivity. These reductions can reach up to -19% as is the case in Portugal. Only a few MSs show an increase in production: Slovenia (+13%), Estonia (+5.4%), and Ireland (+2.4%) (excluding relative changes in Cyprus due to its negligible cereal production). The increase in cereal income, or the absence of income declines, in these countries enhances the competitiveness of cereal production compared to other crop sectors, leading to cereals area expansion (+13.6%, +4.2%, and +3.5%, respectively).

Similar to the Prod&Inv scenario, these trends are also evident across cereal types. Wheat production is projected to decline by 2.6%, and barley by -2.7%, whereas maize supply remains relatively stable, as increases in production in key maize-producing countries like Hungary, Spain, and Italy offset the more often observed reductions in other MSs.

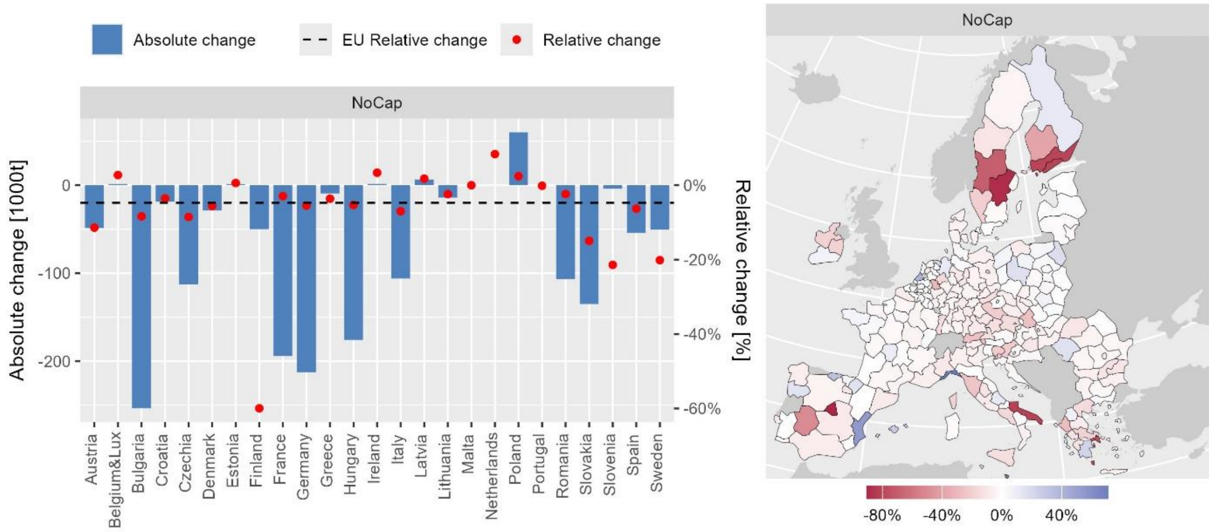
4.1.2 Oilseeds

NoCAP scenario

Overall, in the NoCAP scenario EU oilseeds production is projected to decline by approximately 4.7% compared to the baseline, with a decrease in oilseeds area of 1.1% (Figure 8).

Initial productivity levels play a crucial role in explaining MS-specific changes, as oilseed production remains concentrated in countries with higher productivity. Among the largest oilseed producers, France and Romania maintain their cultivated areas and face only moderate yield reductions (-2.9% and -3.9%, respectively). In contrast, Bulgaria, which has some of the lowest productivity levels among major EU oilseed producers, is projected to reduce its oilseeds area by 3.4% and is expected to also suffer from higher productivity declines, resulting in an overall production decrease of 8.4%. A key factor for this decrease is the sunflower market. Romania, benefiting from its higher productivity levels, consolidates its position as the EU's leading sunflower producer. Following Bulgaria, significant reductions in absolute oilseed production are also expected in Germany. This can be attributed to a sharper-than-average decline in income from oilseed crops compared to other agricultural activities in Germany, as mentioned in the previous section. As a major oilseed producer, largely due to its substantial rapeseed production, even slightly above-average percentage reductions result in notable absolute production losses, exceeding 210 thousand tonnes in this case.

Figure 8. Oilseeds supply changes by MS and NUTS2 (NoCAP vs baseline, 2040)



Source: CAPRI projections

CAP scenarios

Oilseeds production increases by 2.3% in the Prod&Inv scenario and decreases by 2.9% in the Env&Clim scenario (Figure 9).

Under the Prod&Inv scenario, production is expected to increase in most MSs, with Slovenia leading (+11.3%), followed by Portugal (9.4%), and Latvia (8.8%). However, a few MSs experience also production declines, notably Sweden (-13.8%), Estonia (-8%), and Slovakia (-4.6%), driven by reduced incomes, which make alternative activities more profitable, leading to a subsequent decrease in the area dedicated to oilseeds. Similarly to the cereal sector, major oilseeds-producing countries generally increase their production and lead in terms of absolute changes. The main driver of the observed production changes are the expected increases in yields. However, while yields generally improve under the Prod&Inv scenario, income per hectare can sometimes be negatively impacted, with varying consequences across MSs. For example, in two major oilseed-producing countries, Germany and Romania, oilseed income decreases despite productivity gains. In Germany, oilseed cultivation area increases by 1.3%, whereas in Romania, it decreases by 1%. The contrasting response can be explained by broader income changes across crops and livestock sectors in each country. In Germany, cereal income declines even further, prompting some farmers to shift to oilseed production, as its income, though reduced, is less reduced compared to cereals. Conversely, in Romania, cereal income declines less, set-aside and fallow land income increases significantly and hence become more attractive, leading to a decrease in oilseed area.

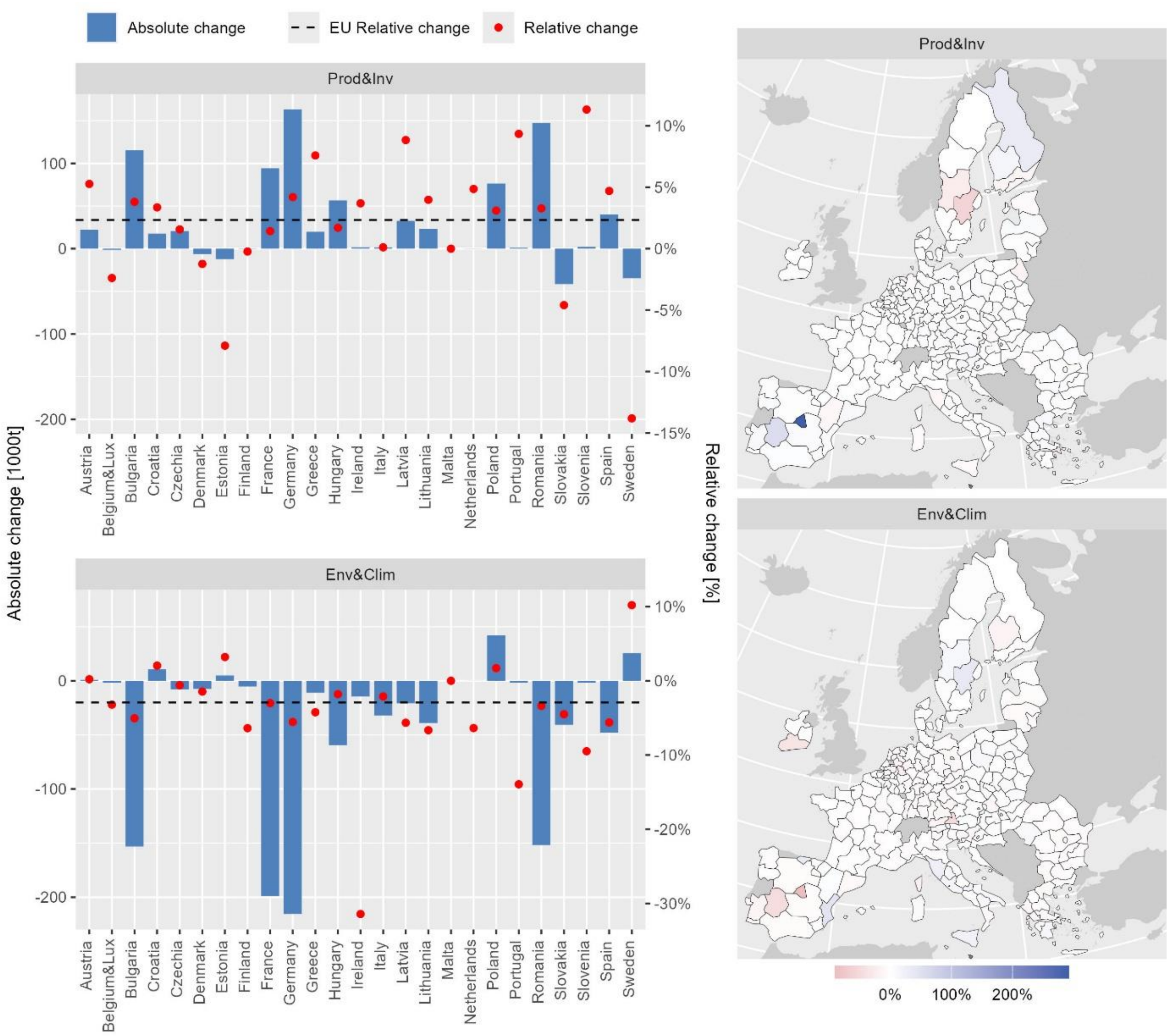
The magnitude of changes is comparable across the underlying crop categories. Sunflower production is projected to increase by 2.1%, closely followed by rapeseed production (+2.3%), while soybean supply is expected to grow by 3.4%. The trend of major producing countries driving absolute and relative changes persists for rapeseed, sunflower, and soybeans. However, the leading

MSs differ across these crops, with different MSs taking the lead in production for rapeseed (France and Germany), soybeans (Italy and Romania), and sunflower (Bulgaria and Romania).

Under the Env&Clim scenario, oilseed production is expected to decrease across most MSs. These reductions can be as large as -31% observed in Ireland, followed by Portugal (-14%). The main driver of these reductions is the simulation of lower yields under Env&Clim, while income for some MSs might increase and for others decrease as per the payment shift simulated under the Env&Clim. The major producing oilseeds MSs decrease their supply driven by a decline in yields.

By crop, rapeseed production is projected to decline by 2.3%, sunflower by 1.7%, and soybeans by a notable 11.3%. The sharper decline in soybean production reflects the relatively smaller scale of soybean cultivation in the EU compared to rapeseed and sunflower. In Romania, a key soybean-producing MS, a shift from soybean to sunflower production—driven by higher profitability—contributes significantly to this decline. The significant reduction in soybean area is largely offset by a smaller relative increase in sunflower area, though their absolute magnitudes are similar. As a result, soybean production declines by more than 47% in Romania.

Figure 9. Oilseeds supply changes by MS and NUTS2 (Prod&Inv and Env&Clim vs baseline, 2040)



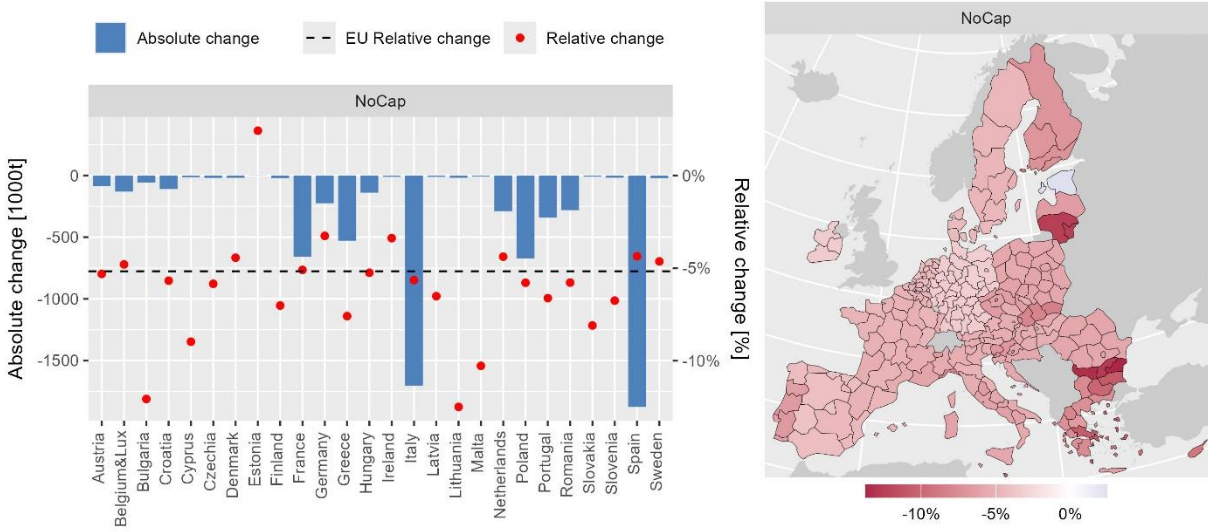
Source: CAPRI projections

4.1.3 Fruit, vegetables and permanent crops

NoCAP scenario

Similarly to the previous two major crop categories, the production of fruit, vegetables, and permanent crops is projected to decline by approximately 5.2% by 2040 under the NoCAP scenario (Figure 10).

Figure 10. Fruit, vegetables, and permanent crops supply changes by MS and NUTS2 (NoCAP vs baseline, 2040)



Source: CAPRI projections

The production of vegetables, fruit, and permanent crops is concentrated in a few main producing MSs—namely Spain, Italy, France and Poland. Consequently, these MSs experience the largest absolute declines, although their relative changes remain close to the EU average. The primary driver for the declines in production is a decrease in yields, as the cultivated area remains relatively stable. CAP payments per hectare support production, helping to maintain high productivity levels, so their removal under the NoCAP scenario contributes directly to yield declines in major producing MSs.

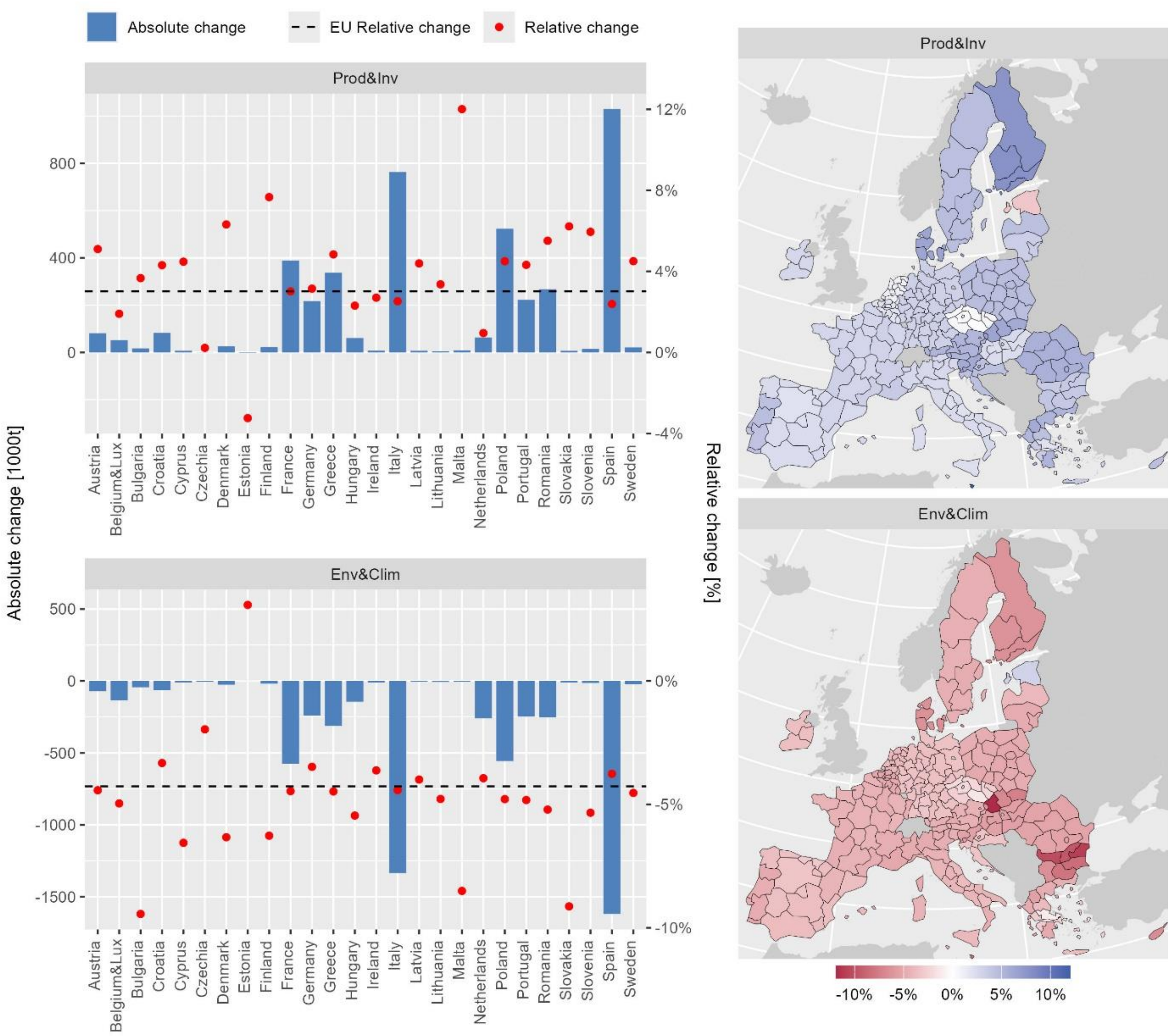
In Spain, Greece, and Italy, the most significant absolute production declines within this category are attributable to reduced olive oil production. Despite being the most productive MSs for olive oil, yields are expected to decline without CAP support. In France and Poland, projected production decreases of about 0.6 million tonnes are mainly driven by reductions in output of other vegetables and wine (in France), and other vegetables, apples, pears and peaches (in Poland). As with olive oil, these declines are mainly linked to yield reductions, which are not expected to be maintained under the NoCAP scenario.

CAP scenarios

Under the Prod&Inv scenario, EU production of fruit, vegetables, and permanent crops is projected to increase by approximately 3%, and to decrease by around 4.3% in the Env&Clim scenario.

In the Prod&Inv scenario, major producing MSs like Spain, Italy, and Poland contribute the largest absolute production increases, although these changes are not the most pronounced in relative terms. Smaller producing countries, such as Finland, Denmark, and Slovakia, experience higher relative production gains due to more substantial yield improvements compared to already highly productive MSs. Yield increases in these MSs by more than 5%, resulting in stronger relative production growth for permanent crops and vegetables. The area under cultivation for permanent crops and vegetables is not projected to change significantly in this scenario, with minor adjustments largely driven by responses to shifts in relative productivity. Some MSs might slightly expand or reduce their cultivated areas based on the sector's new profitability when compared to other sectors. However, these area adjustments are modest, especially when compared to the larger yield-driven productivity changes, which are supported by CAP payments linked to investment and productivity-enhancing measures.

Figure 11. Fruit, vegetables, and permanent crops supply changes by MS and NUTS2 (Prod&Inv and Env&Clim vs baseline, 2040)



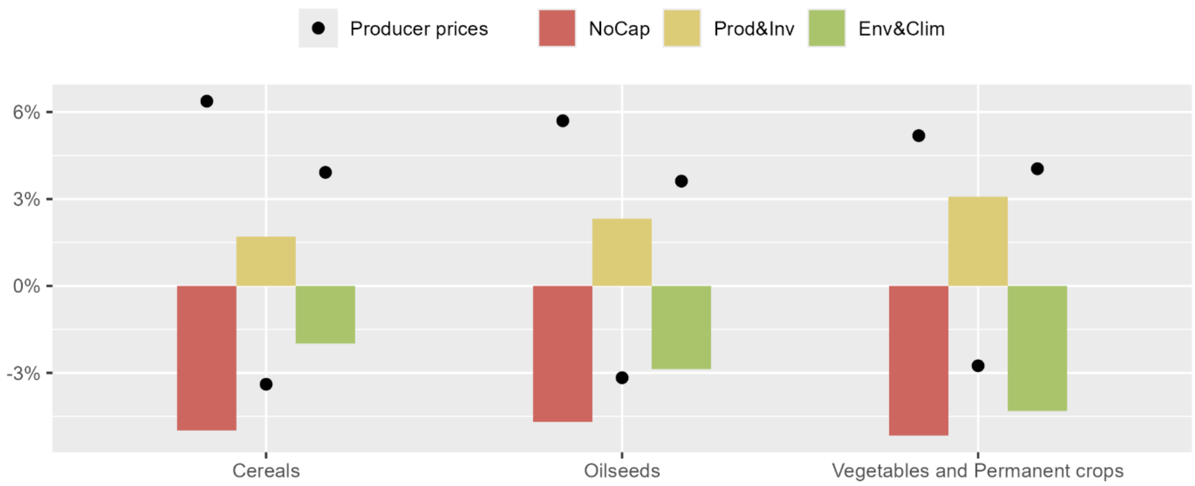
Source: CAPRI projections

In contrast, the Env&Clim scenario leads to a decline in production across almost all MSs due to yield reductions. The EU's overall production is expected to decrease by approximately 4.3%, with the most significant absolute declines observed in major producing countries. At the MS level, production decreases are largest in Bulgaria (–9.4%) and Slovakia (–9.1%). As with the Prod&Inv scenario, changes in cultivated area remain minimal, and hence the observed production declines are primarily driven by yield reductions, which average around 5% across MSs. For example, in Spain, key permanent crops such as olives for oil production and citrus fruits, which dominate the sector, are projected to see production declines of 3.7% and 3.6%, respectively. In Italy, vegetables and wine—major components of the sector—are projected to decrease production by approximately 4%, while in Poland, fruit production, particularly apples and pears, are driving the changes, facing nearly a 6% reduction. In the Env&Clim scenario, similar to the NoCAP scenario, the yield losses are primarily attributed to assumptions about yield reductions due to the decrease in BISS and CIS payments. While area adjustments may cushion these effects in some cases, they remain insufficient to counterbalance the broader yield-driven reductions in production.

4.1.4 Producer prices

Under the NoCAP scenario, following the production decreases (–5.1% for cereals, –4.7% for oilseeds, and –5.2% for fruit, vegetables and permanent crops) (Figure 12), EU producer prices increase across the analysed three crop categories, by 6.4% for cereals, 5.7% for oilseeds and 5.2% for fruit, vegetables and permanent crops. The magnitude of the price changes within each sector varies due to differences in price elasticities, market competitiveness, production structures, and trade dynamics. Among the three categories, cereals show the most inelastic demand, as prices increase the most. This aligns with the role of cereals as staple foods in European diets and a primary source of calories. In addition, being a critical component in animal feed, cereals demand is relatively inelastic compared to the other two crop categories, where substitution is more likely to occur, especially for fruit and vegetables.

Figure 12. EU supply and producer prices changes by crop groups (scenarios vs baseline, 2040)



Source: CAPRI projections

The changes in producer prices under the two CAP scenarios confirm the inverse price-quantity relationship. Figure 12 highlights two additional aspects. First, production shocks under the Env&Clim scenario, while similar in magnitude, are slightly more pronounced than those under the Prod&Inv scenario. Specifically, production decreases under the Env&Clim scenario are slightly larger than the increases projected under the Prod&Inv scenario. Second, although the fruit, vegetable, and permanent crop sector is projected to experience the largest production decreases or increases under both policy scenarios, producer prices are impacted to a similar extent as in the oilseeds and cereals sectors, notably by –2.8% in the Prod&Inv scenario and +4.1% in the Env&Clim. This can be attributed to higher responsiveness and the availability of substitutes for vegetables and permanent crops, which helps to mitigate supply constraints. In contrast, cereals and oilseeds are key staple foods in European diets and essential components of the feed sector. While some substitution between different types of cereals or oilseed-derived meals is possible, this cannot fully offset the effects of simultaneous supply increases or decreases across the cereal and oilseeds board. As a result, demand for cereals and oilseeds remains relatively inelastic, causing producer prices in these sectors to respond more significantly to supply changes compared to vegetables and permanent crops, despite smaller absolute changes in supply. For cereals, this translates in relative price changes of –3.4% in the Prod&Inv scenario and +3.9% in the Env&Clim, while for oilseeds the corresponding changes are –3.2% and +3.6%, respectively.

4.2 Livestock sector

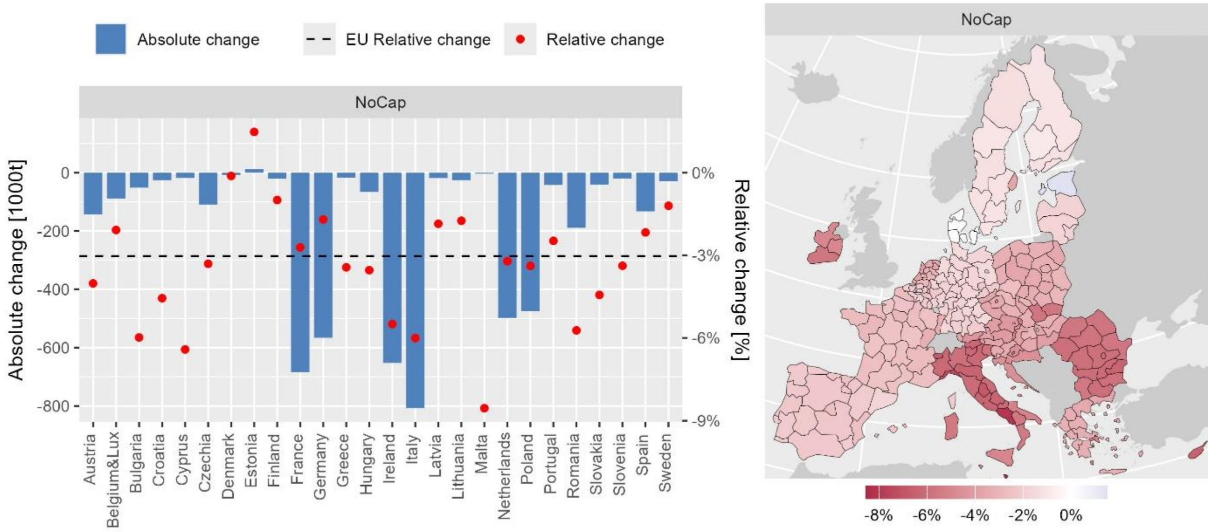
This section presents a comprehensive overview of the simulation outcomes related to livestock production. The results provide insights into the impact of the scenarios on market dynamics, regional contributions, and overall production levels within the dairy and meat sectors. Given the evolving direct coupled income supports, land profitability, and feed input prices driven by the scenario policy assumptions, CAP policy variables significantly affect animal production patterns. Notably, the findings underscore the polarised effects of the simulated CAP scenarios, with meat production demonstrating a greater sensitivity to policy-induced changes than dairy production. A detailed breakdown of these results is presented in the subsequent sections.

4.2.1 Milk and dairy

NoCAP scenario

By 2040, under the baseline scenario, the EU is projected to produce more than 151 million tonnes of milk whilst sustaining a dairy cattle population of 38.6 million animals, including young animals (DG AGRI 2023). Most of the EU milk supply is concentrated in a few MSs, with Germany, France, the Netherlands, Poland, Italy, and Ireland jointly accounting for about 73% of the total EU raw milk production. Against this baseline, the NoCAP scenario (Figure 13) provides valuable insights into the role of the CAP in shaping dairy production outcomes in the EU.

Figure 13. Milk supply changes by MS and NUTS2 (NoCAP vs baseline, 2040)



Source: CAPRI projections

The removal of the CAP payments results in a relatively modest reduction of total EU milk production (approximately -3%), while the spatial distribution of production remains largely unchanged. Among the largest milk-producing MSs, Italy and Ireland experience the most pronounced reductions, with declines of 6.2% and 5.5%, respectively, appearing to be more vulnerable to the increased feed input costs. In contrast, Germany demonstrates a somewhat less pronounced decline (-1.7%) than the EU average, thereby modestly increasing its market share (+0.3%).

Among smaller producers, Estonia emerges as an exception, as it is the only MS projected to increase raw milk production in the absence of CAP support. This expansion is attributed to shifts in relative profitability across agricultural activities, where dairy farming becomes more viable due to declining income potential in alternative agricultural activities.

At the regional NUTS2 level (Figure 13, right-hand panel), the removal of CAP support induces minimal variation in production distribution within individual MSs. However, the aggregated decline in productivity leads to a 1.3% increase in dairy cow numbers, reflecting an attempt to compensate for lower yields. This herd expansion affects both intensive (+2.5%) and extensive (+1.7%) production systems, indicating a system-wide response to declining production efficiency.

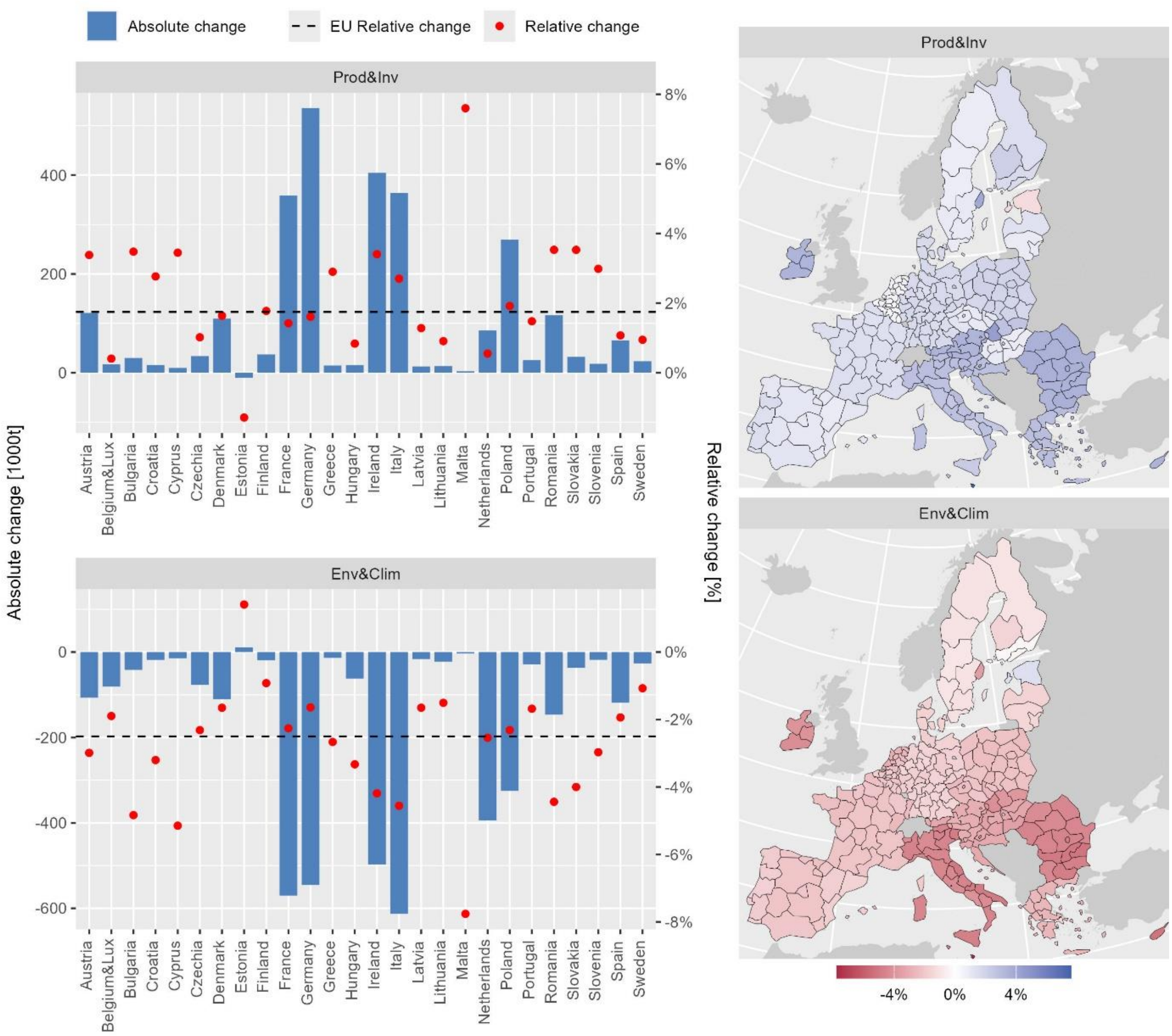
CAP scenarios

The outcomes of the two CAP scenarios are consistent with the core mechanisms observed in the NoCAP scenario, particularly in terms of the primacy of market forces in determining supply levels, i.e. the reallocation of payments under the two CAP scenarios exert only a limited impact on total EU milk production. A uniform pattern emerges across all MSs, with production increasing under the Prod&Inv scenario and declining under the Env&Clim scenario, with the notable exception of Estonia, where changes in rural development payments are projected to be less substantial relative to other MSs.

The most pronounced effects are observed among the largest milk-producing MSs, which collectively maintain their aggregate share of approximately 73% of total EU milk production across both policy scenarios. Compared to the 2040 baseline, milk production is projected to increase by 1.8% under the Prod&Inv scenario (Figure 14) and decreases by 2.5% under the Env&Clim scenario. The production trends under the Env&Clim Scenario closely resemble those of the NoCAP scenario, suggesting a shift towards more market-oriented outcomes driven by the removal in coupled income support intervention.

At the regional level (NUTS2), the distributional effects of CAP interventions within individual MSs remain minimal (Figure 14, right-hand panel), reinforcing the finding that market fundamentals primarily govern the geographical allocation of EU milk production. However, policy design influences herd size dynamics, with varying effects across the scenarios. In the Prod&Inv scenario, where productivity gains are emphasized, total EU dairy cattle numbers decline by 2.3% as efficiency improvements lead to higher yields per animal, thereby reducing the need for larger herds. In contrast, the Env&Clim scenario results in a 2.2% increase in herd size, exceeding the expansion observed under a purely market-driven context (NoCAP). This growth reflects stronger policy-driven incentives for extensive farming systems, where lower stocking densities and reduced input intensities necessitate larger herds to sustain production levels.

Figure 14. Milk supply changes by MS and NUTS2 (Prod&Inv and Env&Clim vs baseline, 2040)



Source: CAPRI projections

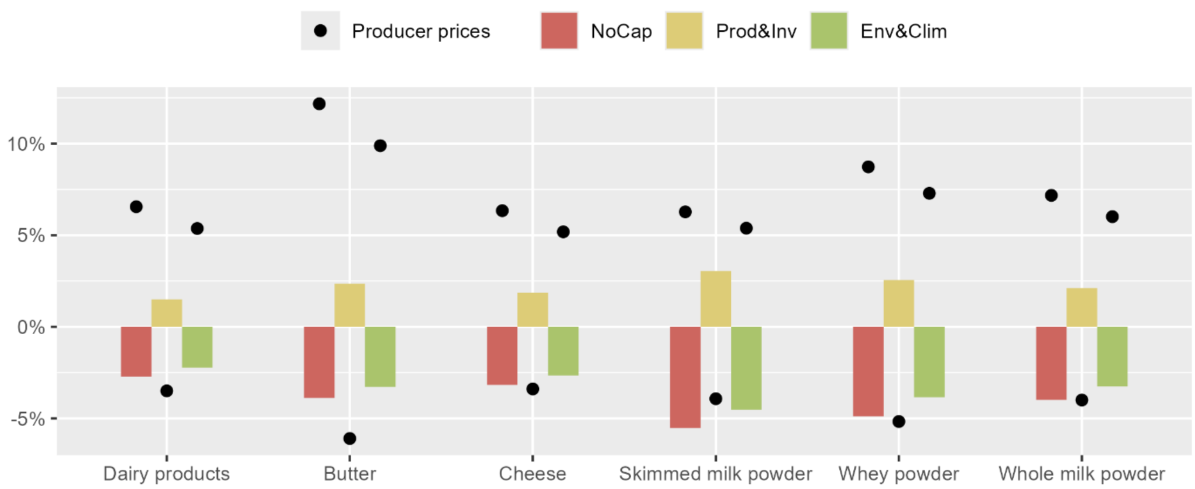
Producer prices

Without CAP interventions, the decline in production exerts upward pressure on producer prices (Figure 15). The magnitude of these production and prices adjustments varies across dairy commodities, depending on the market dynamics and demand elasticity of individual dairy products. The resulting price adjustments reflect a new market equilibrium that is also shaped by trade shifts and substitution between domestically produced and imported dairy products.

Butter, a staple with relatively inelastic demand due to limited substitutes, shows a pronounced price response, with prices increasing by 12.2%, following a 3.7% decline in butter production. In contrast, cheese, which exhibits a relatively higher demand elasticity, sees a more moderate price increase of 6.3% under the NoCAP scenario, despite a comparable production decline (-3.1%). Other dairy products follow similar trends, reflecting their diverse market uses. Skimmed milk powder, a key ingredient in food processing, shows the most significant production decline (-5.4%), prompting a 6.3% price increase. Whey powder production decreases by 4.6%, triggering an 8.7% price increase, while whole milk powder production drops by 3.8%, leading to a 7.2% price rise. The relatively modest price adjustments for these products (compared to butter), indicate higher price elasticity of demand, likely linked to substitution possibilities in industrial, food, and feed processing.

Under the Prod&Inv scenario, increased production capacity exerts downward pressure on prices. Butter production increases by 2.4%, leading to a 6.1% price reduction. Conversely, the Env&Clim scenario results in a 3.2% decline in butter production, driving a 9.9% price increase. A similar pattern is observed in the cheese market, where a 1.9% increase in production under the Prod&Inv scenario leads to a 3.4% price reduction, whereas under the Env&Clim scenario, a 2.6% production decline results in a 5.2% price increase. These contrasting trajectories in the CAP scenarios highlight the trade-off between environmental objectives and market outcomes. While the Prod&Inv scenario prioritises higher productivity and efficiency, resulting in lower consumer prices and competitiveness, the Env&Clim scenario prioritises environmental sustainability, at the cost of increased consumer prices. This seems particularly relevant in the dairy sector, which is both emission-intensive and economically vital.

Figure 15. EU supply and producer prices changes by dairy products (scenarios vs baseline, 2040)



Source: CAPRI projections

4.2.2 Meat

4.2.2.1 Beef production

NoCAP scenario

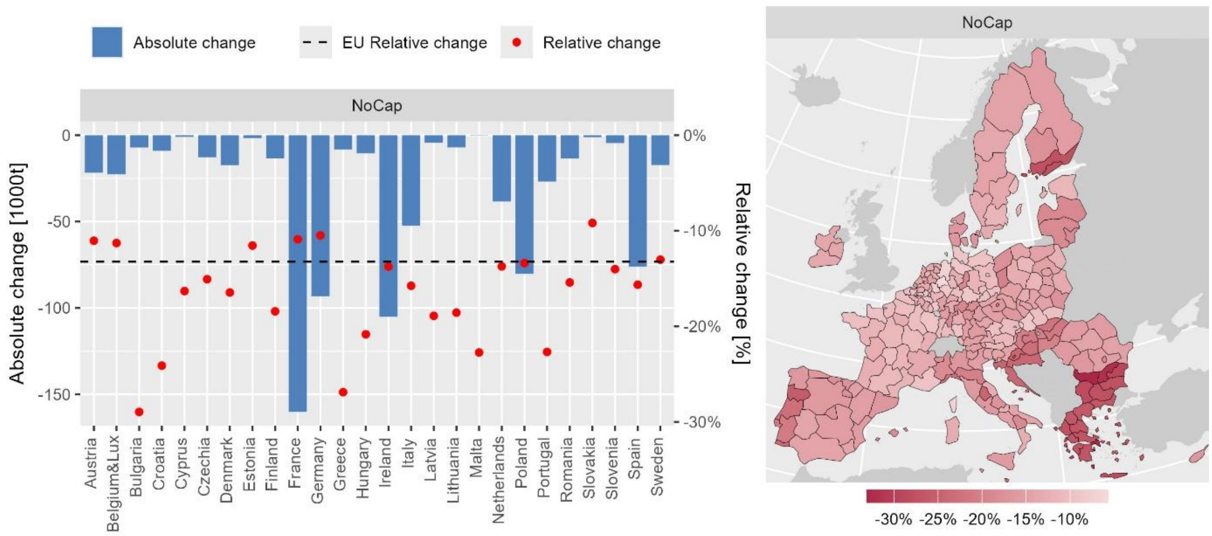
In terms of beef production, the EU is projected to produce approximately 6 million tonnes of beef and supported by a cattle population of 15.5 million head by 2040, according to MTO projections (DG AGRI 2023). Production is geographically concentrated, with France, Germany, Ireland, and Poland collectively accounting for 53% of the EU's total beef output, reflecting established sectoral structures and resource availability.

The simulation of the elimination of CAP support demonstrates a considerable reduction in beef meat supply across all EU MSs (Figure 16), with an aggregate decline of 13.2% relative to the baseline. This reduction is largely attributable to the assumed declines in productivity. Without the assumed productivity effects, beef production would still decline, albeit at a lower rate of 2.6%, suggesting that the CAP supports play a broader role in maintaining sectoral viability beyond mere efficiency incentives. Removing the CAP supports may have an adverse effect on land profitability, which results in a decline in certain crop productions. The decrease in financial returns to land lead to a reduction in land allocated to feed crop cultivation, which leads to a shrinking supply of feed. This contraction induces upward pressure on feed prices, disproportionally affecting more intensive production systems with high feed dependence. As input costs rise, profit margins erode, resulting in a decrease in overall beef output.

In absolute terms, projected declines in beef production without CAP support are most pronounced in France, Ireland, and Germany, with a combined reduction of over 358 thousand tonnes. In relative terms, Bulgaria (-29%) and Greece (-27%) show the highest contractions, indicating a heightened sensitivity to policy withdrawal in MSs with structurally weaker sectors. At the regional (NUTS2) level, the distribution of production remains largely stable within most MSs, with relatively uniform impacts across regions (as illustrated on the right-hand side of Figure 16). A notable exception is Finland, where several southern regions show significantly higher declines of up to 30%.

Beyond production levels, the removal of the CAP also influences beef herd dynamics. Without CAP support, the total EU beef herd contracts by 7.5%, declining to 14.3 million head. However, heterogeneity at MS level responses emerges, with the Netherlands (+10.6%) and Spain (+2.2%) exhibiting increases in cattle numbers. These increases reflect higher market-driven profitability that partially offsets the withdrawal of policy support, incentivizing producers to expand their beef herd sizes to compensate for productivity losses.

Figure 16. Beef meat supply changes by MS and NUTS2 (NoCAP vs baseline, 2040)



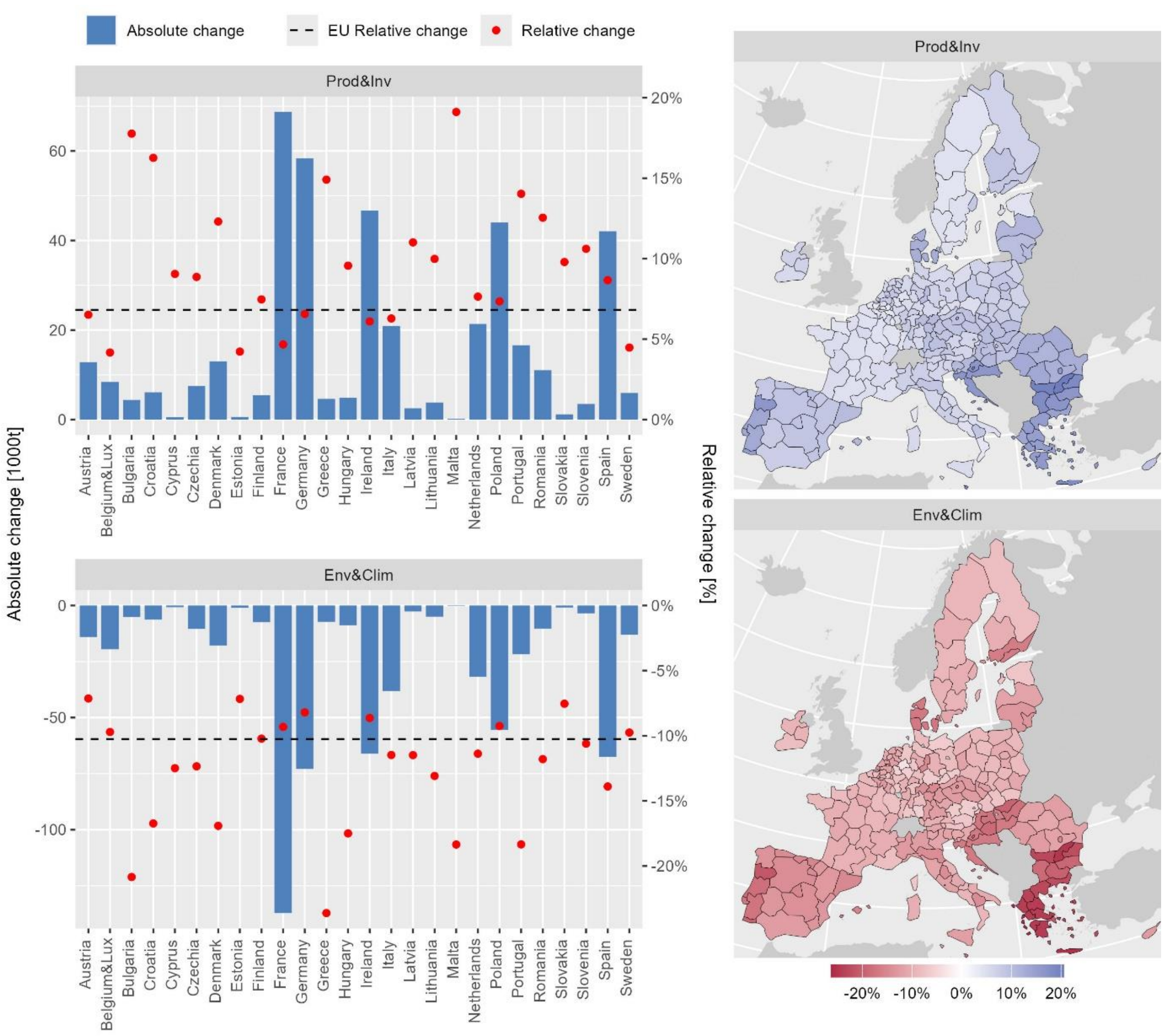
Source: CAPRI projections

CAP scenarios

Policy impacts differ significantly between the two CAP scenarios (Figure 17), which is due to the different policy mechanisms driving productivity and sustainability support. In the Prod&Inv scenario, EU beef production increases by 6.8%, primarily driven by productivity-enhancing interventions under the CAP's Pillar 2, including support for productivity advancements, farm modernization, and efficiency improvements. These interventions lower average production costs and enable production expansion. Conversely, the Env&Clim scenario results in a 10.3% decline of EU beef production. This is attributed mainly to the removal of CIS, which offsets the productivity gains from Pillar 2 interventions. The reduction in CIS weakens farm profitability, particularly in regions where beef production is already less competitive, leading to herd size reductions and a structural contraction in supply.

While larger beef-producing MSs experience the most substantial absolute changes in production, the relative impact is more pronounced among lower-producing MSs. This asymmetry suggests that MSs with smaller beef sectors benefit more from productivity-driven support in the Prod&Inv scenario but are disproportionately affected by CIS removal under the Env&Clim scenario. This highlights the interplay between productivity-driven expansion and income-dependent contraction, demonstrating the importance of both investment-based interventions and direct income support in shaping the competitiveness of the EU beef sector.

Figure 17. Beef meat supply changes by MS and NUTS2 (Prod&Inv and Env&Clim vs baseline, 2040)



Source: CAPRI projections

4.2.2.2 Pigmeat production

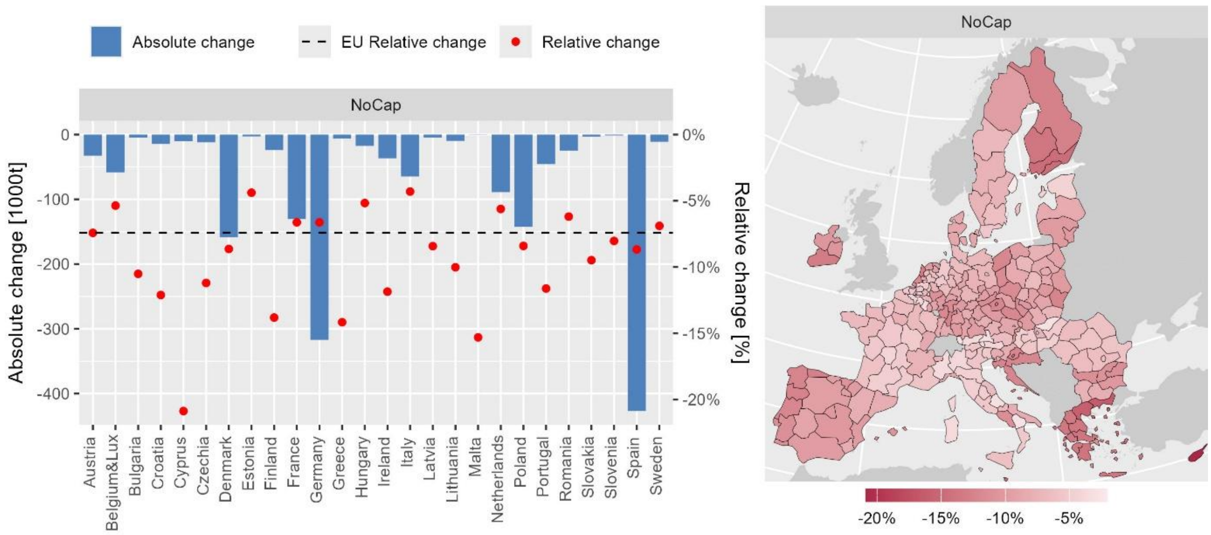
NoCAP scenario

Under the baseline, the EU's pigmeat production is projected to reach 22.2 million tonnes, with a total pig population of approximately 244 million. Production remains highly concentrated in Spain, Germany, and France, which collectively account for 52.5% of the EU's total output (DG AGRI, 2023).

In the NoCAP scenario, the total EU pigmeat production is projected to decline by 7.4% (Figure 18). The decline is evident across all MSs, with Spain experiencing the most significant loss in absolute (-427 thousand tonnes), followed by Germany (-317 thousand tonnes). Spain also shows a 3% reduction in the total pig population and the most significant reduction in market share among EU countries (-0.3%). Conversely, Italy and Germany see an increase of 0.2% in their respective market shares.

Smaller pigmeat producers, including Cyprus, Malta, and Greece, observe the greatest production reduction in relative terms, with losses between 14% and 21%. These outcomes are largely driven by the cascading impact of input costs, particularly feed prices, which account for a major share of production expenses in the pigmeat sector. As observed for beef production, there is a negligible degree of variation at the NUTS2 level within the majority of MSs.

Figure 18. Pigmeat supply changes by MS and NUTS2 (NoCAP vs baseline, 2040)



Source: CAPRI projections

CAP scenarios

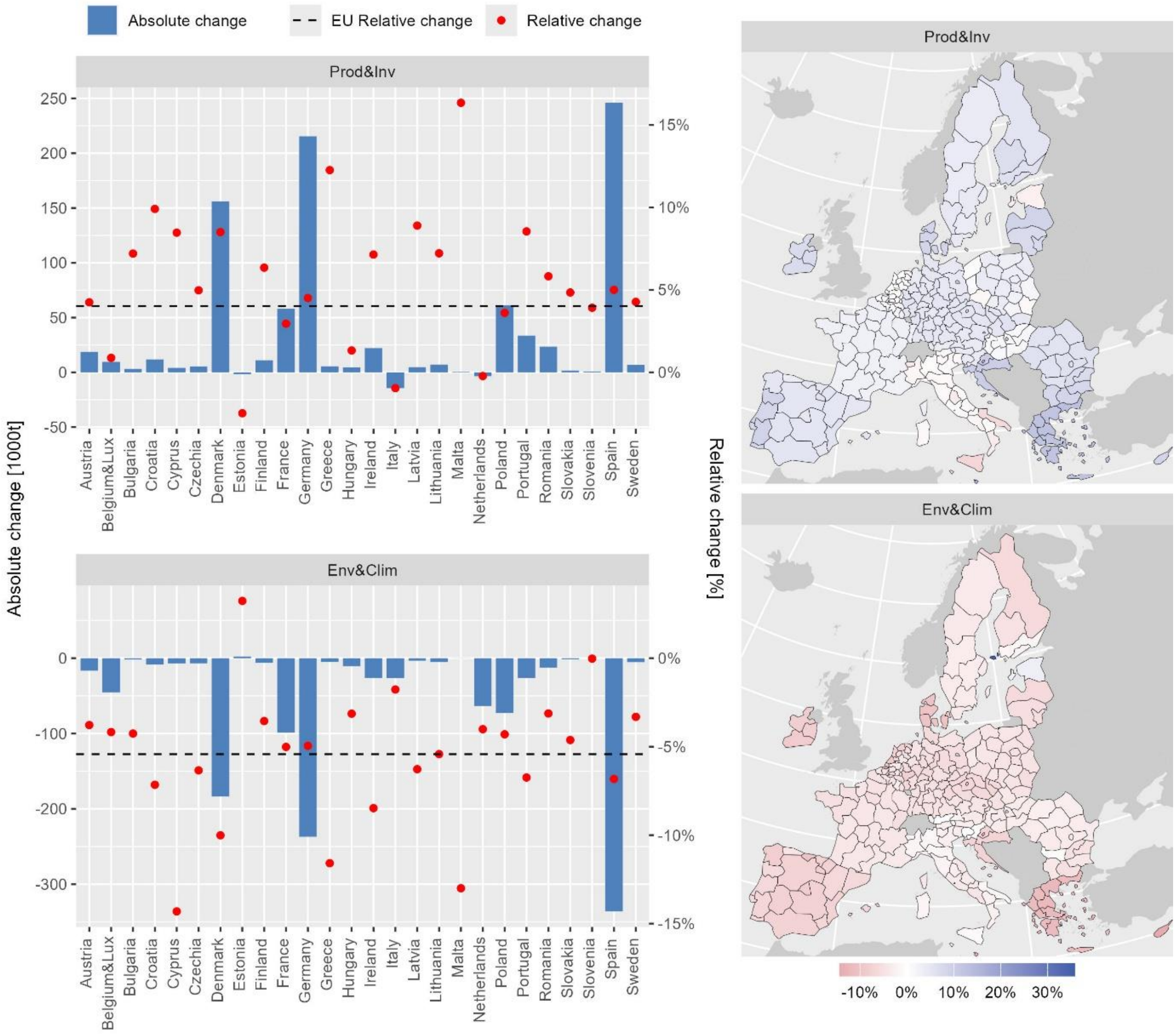
The Prod&Inv scenario leads to a 4% overall increase in EU pigmeat production (Figure 19), reflecting efficiency and competitiveness gains through targeted investment. Notably, the EU pig herd expands by only 0.8%, indicating that the production increase is primarily driven by efficiency improvements rather than herd expansion. The production increase is broadly distributed across MSs, with exceptions in the Netherlands, Italy, and Estonia, where structural constraints and shifts in production incentives lead to marginal declines. These country-specific variations arise from differences in profitability across production systems and evolving market conditions, which incentivize resource reallocation toward more cost-efficient agricultural activities outside the pigmeat sector.

In contrast, under the Env&Clim scenario total EU pigmeat production decreases by 5.4%, primarily due to policy measures prioritizing environmental and climate objectives over direct productivity incentives. In this scenario, the total EU pig herd declines by 1.3%, underscoring the role of reduced stocking density and lower productivity incentives in driving output contraction. The only exception is

Estonia, which experiences a 1.2% production increase, driven by an expansion in feed supply, effectively reducing input costs and improving production conditions.

In both scenarios, Spain, Germany, and Denmark — the EU's largest pigmeat producers — experience the most significant production adjustments, reflecting their central role in the sector's economic structure and their sensitivity to policy-driven cost and incentive shifts.

Figure 19. Pigmeat supply changes by MS and NUTS2 (Prod&Inv and Env&Clim vs baseline, 2040)



Source: CAPRI projections

4.2.2.3 *Poultry meat production*

NoCAP scenario

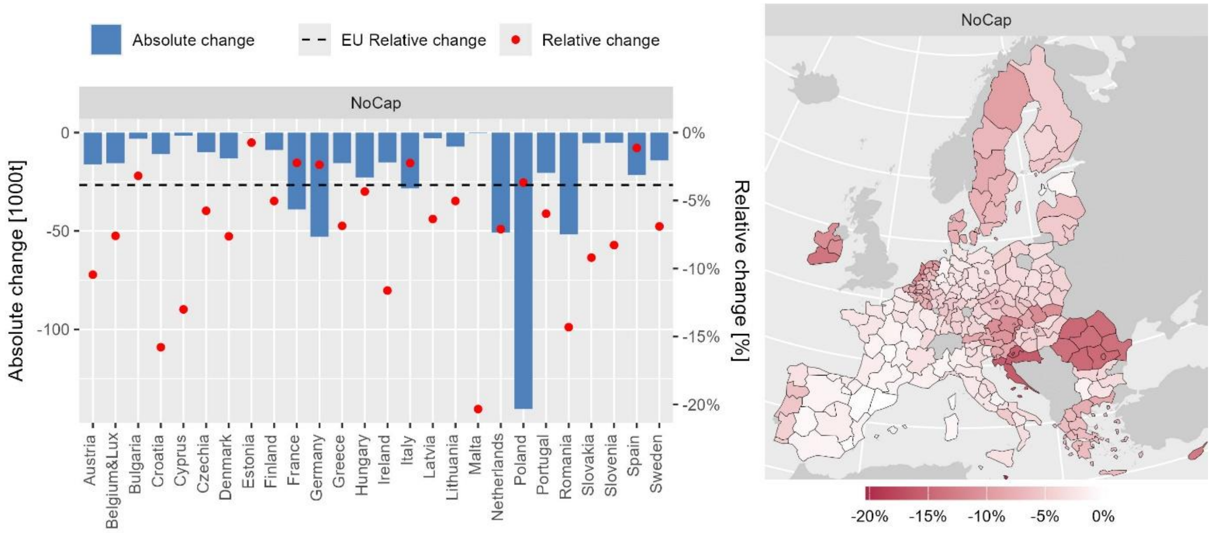
EU poultry meat production is projected to expand significantly under the baseline, reaching 14.8 million tonnes by 2040 and supporting 6.8 million farmed animals. The sector remains highly concentrated in Poland, Germany, and Spain, which collectively account for over 53% of total EU production (DG AGRI 2023).

In the NoCAP scenario, total EU poultry meat production is projected to decline by 3.9%, accompanied by a 0.2% decrease. This indicates that the overall production decline is primarily driven by reduced productivity rather than changes in herd size. The decline is observed across all

MSs (Figure 20). The most significant absolute decline is observed in Poland, with reductions of more than 121 thousand tonnes. Conversely, Malta, Croatia, and Romania are projected to experience the most significant decline in relative terms (between -20% and -15%), highlighting the greater vulnerability of smaller poultry-producing MSs to policy shifts.

Despite these reductions, the moderate overall impact on total production compared to the more pronounced contractions observed in other meat sectors suggests that the poultry market is more structurally resilient, with stronger adaptability to changing policy environments. Notably, the industry's high feed efficiency, short production cycle, and vertical integration make it more adaptable to policy changes. This contrasts with pigmeat and beef, where feed cost changes have a more pronounced effect on production levels due to longer production cycles, higher feed intensity, and greater dependency on external input costs.

Figure 20. Poultry meat supply changes by MS and NUTS2 (NoCAP vs baseline, 2040)



Source: CAPRI projections

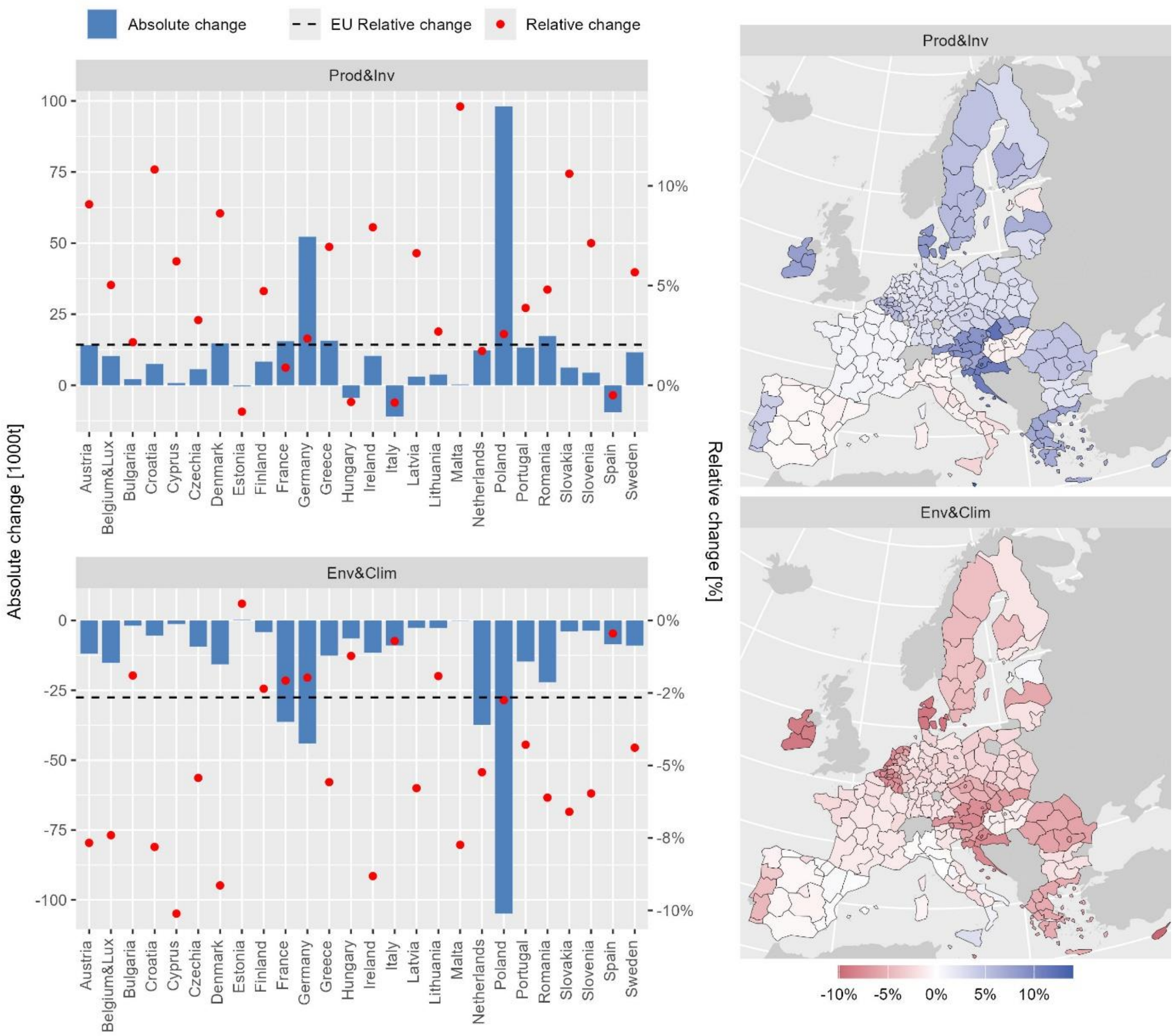
CAP scenarios

In the Prod&Inv scenario (Figure 21), EU poultry meat production is projected to increase by 2.0% relative to the 2040 baseline projections, while the poultry fattening herd declines by 0.53%. This again indicates that output increases are driven by improved feed conversion rates and efficiency gains. The majority of MSs are projected to expand poultry meat production, with exceptions in Hungary, Italy, Spain, and Estonia, likely due to structural constraints or shifts in profitability incentives. Poland — the EU's largest poultry producer, accounting for over 25% of total output — experiences the most significant absolute production growth, reinforcing its central role in the sector.

Conversely, the Env&Clim scenario results in a 2.7% contraction in total EU poultry meat production, with declines recorded across all MSs. The poultry fattening herd increases by 0.9%, suggesting that lower productivity and efficiency losses outweigh potential reductions in stocking density, leading to higher input requirements per unit of output. The only exception is Estonia, which experiences a marginal production increase, due to localized production adjustments and improved feed availability.

Overall, the results of the CAP scenarios underscore the strong market orientation of the EU's poultry sector, where CAP policies influence investment and efficiency but do not drive big structural shifts for major producing MSs, as seen in more CAP-dependent sectors like beef and pigmeat. The relatively limited production adjustments in both CAP scenarios highlight the poultry industry's adaptability, with competitive pressures and supply-chain efficiencies playing a dominant role in shaping medium-term production trends.

Figure 21. Poultry meat supply changes by MS and NUTS2 (Prod&Inv and Env&Clim vs baseline, 2040)



Source: CAPRI projections

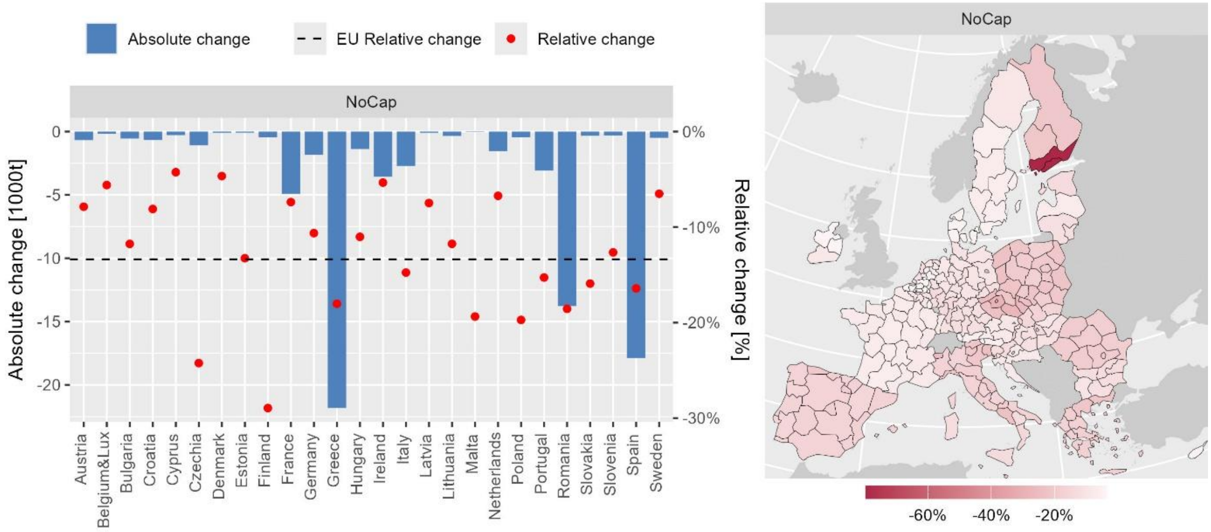
4.2.2.4 Sheep and goat meat production

NoCAP scenario

The EU's sheep and goat meat production in the baseline is projected to reach approximately 0.6 million tonnes by 2040, with 28.3 million farmed animals (DG AGRI 2023). The sector remains predominantly concentrated in Greece, Spain, Romania, Ireland, and France, accounting for approximately 75% of total EU production.

The sector is particularly dependent on CAP support due to its extensive production systems and structural vulnerability. The removal of CAP measures results in a 13.4% decline of EU sheep and goat meat production (Figure 22). The total EU sheep and goat herd size decreases by 11.9%. Among the principal producing countries, Greece, Spain, and Romania would experience the most significant absolute decline, collectively reducing supply by 53.5 thousand tonnes. In relative terms, Finland and Czechia are most affected (-29% and -24.2%, respectively), indicating a disproportional vulnerability of smaller-scale producers to the CAP removal. Ireland, France, and the Netherlands show the greatest resilience in terms of market share (expressed in quantity terms), each gaining between 0.3 and 1.1%, benefiting from higher productivity compared to other MSs. Conversely, Greece would experience the most pronounced decline in market share (-1.1%). As with other meat productions, no significant variations are observed at the NUTS2 level, except in a few Finnish regions, where low baseline output levels amplify percentage changes (of up to -60%).

Figure 22. Sheep and goat meat supply changes by MS and NUTS2 (NoCAP vs baseline, 2040)



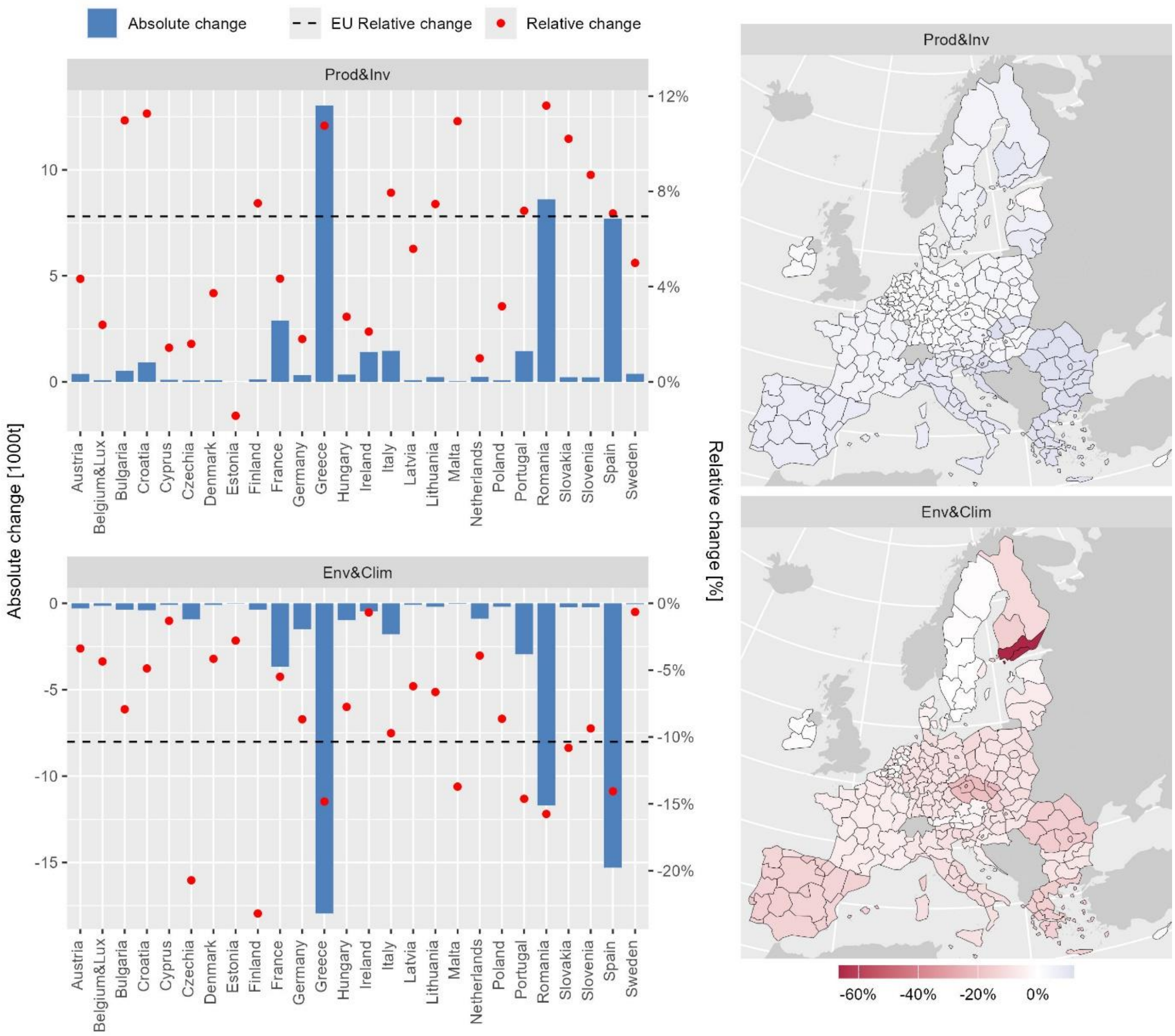
Source: CAPRI projections

CAP scenarios

In the Prod&Inv scenario. EU sheep and goat meat production increases by 7% relative to the 2040 baseline projections (Figure 23). This growth is supported by investment-driven productivity gains and structural improvements, accompanied by a 4.5% increase in herd size, reflecting sectoral expansion and improved stocking rates. The production trend is broadly distributed across MSs, except for Estonia, which demonstrates a minor decline. However, given Estonia's marginal share of total EU production (0.1%), this deviation remains insignificant at the aggregate level.

In contrast, the Env&Clim scenario results in a 10.4% decline in total production, and the herd size contracts by 8.5%, indicating lower stocking densities and adjustments in livestock management practices. The impact is most pronounced in Mediterranean and Eastern European MSs, reflecting their reliance on extensive grazing systems and CAP support to maintain sector viability.

Figure 23. Sheep and goat meat supply changes by MS and NUTS2 (Prod&Inv and Env&Clim vs baseline, 2040)



Source: CAPRI projections

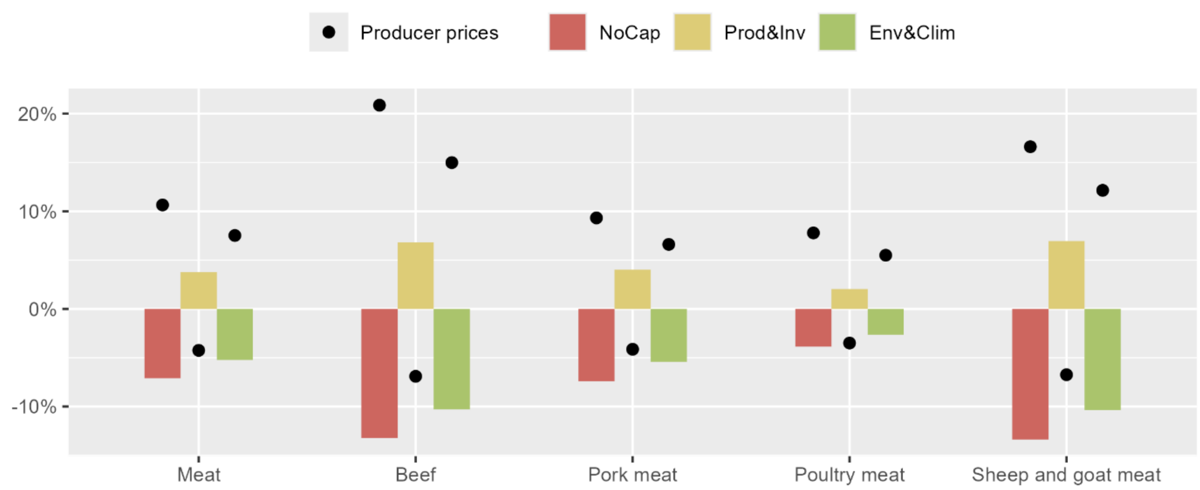
4.2.2.5 Producer prices

In the NoCAP scenario, EU meat producer prices increase, on average, by 10.7%. However, the magnitude of price changes varies across meat types, influenced by differences in market structure and dynamics, production cycles, and demand elasticities (Figure 24). The most significant price increase is observed in the beef sector, where prices rise by 20.8%, aligning with the sharpest production decline among the meat categories and relatively inelastic demand for beef within the EU (especially in higher income segments). Similarly, sheep and goat meat prices increase by 16.6%. This category of meat is frequently considered as a niche product, with limited substitutes available to consumers. Furthermore, the smaller scale and regional concentration of sheep and goat meat production exacerbate supply constraints, intensifying the price impact in the absence of the CAP's stabilising influence. By contrast, pigmeat and poultry producer prices increase more moderately, at 9.3% and 7.8%, respectively, highlighting their greater market flexibility and more elastic demand. Pigmeat is a widely consumed and versatile protein source, and a highly traded commodity, with the EU ranking as one of the world's largest exporters. Similarly, poultry is frequently regarded as a cost-effective protein option. Its relatively shorter production cycle allows for more expedient adjustments to supply disruptions, contributing to its comparatively lower price sensitivity.

Regarding the CAP scenarios (Figure 24), the previously described production shifts are also reflected in producer price movements, with a 4.3% overall price decline for meat in the Prod&Inv scenario and an increase of 7.5% in the Env&Clim scenario, illustrating the interaction between production trends and market prices. Among meat categories, the policy adjustments affect the most beef and sheep/goat meat, which experience the largest price shifts: a decline of 6.9% for beef and 6.7% for sheep and goat meat in the Prod&Inv scenario and increases of 15% (beef) and 12% (sheep/goat meat) in the Env&Clim scenario. Poultry and pigmeat remain comparatively less affected, with prices falling by 3.5% (poultry) and 4% (pigmeat) in the Prod&Inv scenario, and rising by 5.5% and 6.6%, respectively, in the Env&Clim scenario - reflecting their more adaptable production systems and broader consumer base.

Overall, the results suggest that policy measures influence production and price dynamics, particularly in sectors with longer production cycles, direct coupled income supports, and less flexible supply chains. While investment measures enhance productivity and contribute to sectoral expansion, environmental constraints may lead to supply contractions that exert upward pressure on prices. However, market fundamentals, including demand elasticity, trade dynamics, and production efficiency, remain key determinants of price behaviour across all meat categories.

Figure 24. EU supply and producer prices changes by meat products (scenarios vs baseline, 2040)



Source: CAPRI projections

4.3 Farm-level changes

NoCAP scenario

Using IFM-CAP, we can analyse the short-run implications of removing CAP payments, assuming no long-run structural changes, like land reallocation or farms ending operations. The model allows to examine how farms[9] would adjust their production decisions, optimizing for profit maximization, conditional on existing land endowments and without the option of selling or buying land. Notably, this approach differs from the methodologies used in MAGNET and CAPRI, which operate at more aggregated levels and incorporate land reallocation mechanisms rather than farm-level constraints. Consequently, production level outcomes across these models are not directly comparable. In IFM-CAP, farm–level production changes are mostly driven by the scenario assumptions regarding payment levels but also by the compliance with GAECs. The short-run analysis provided by IFM-CAP offers valuable insights into the role of GAECs in shaping farm-level decision-making under subsidy removal. IFM-CAP explicitly models GAECs 1 (protection of permanent grassland), 6 (minimum soil cover), 7 (crop rotation) and 8 (landscape features and non-productive areas).[10] The GAEC obligations are imposed in the baseline but removed in the NoCAP scenario. In the baseline, most farms in all specializations need to comply with GAECs 6 and 8, while for GAEC 7 some are exempted (farms with arable land less than 10 ha, or more than 75% of land with permanent grassland or fallow land). Table 5 shows the number (and share) of farms subject to each GAEC requirement in the baseline scenario, based on the 3.92 million commercial farms represented in FADN.

Table 5. Number of farms following GAECs obligations (baseline 2040)

Type of farm	GAEC 1		GAEC 6		GAEC 7		GAEC 8	
	#farms	%	#farms	%	#farms	%	#farms	%
(15) Specialist COP	3,348	0.5	631,808	99	452,568	71	631,808	99
(16) Specialist other field crops	4,885	1	390,743	97	216,169	53	391,363	97
(20) Specialist horticulture	181	0.1	53,630	39	3,848	3	56,156	41
(35) Specialist wine	847	0.4	154,803	70	12,225	6	99,680	45
(36) Specialist orchards - fruits	1,070	0.4	194,591	76	4,499	2	130,622	51
(37) Specialist olives	1,605	0.9	158,417	90	1,515	1	64,209	36
(38) Permanent crops combined	623	0.6	91,167	93	3,149	3	68,855	71
(45) Specialist milk	32,740	8	365,135	86	174,459	41	415,726	98
(48) Specialist sheep and goats	14,964	5	229,326	77	65,519	22	274,023	91
(49) Specialist cattle	37,608	11	243,610	73	92,566	28	324,658	97
(50) Specialist granivores	2,274	2	80,411	74	54,610	50	86,291	79
(60) Mixed crops	1,402	0.8	168,800	92	39,461	21	169,145	92
(70) Mixed livestock	3,700	5	74,421	95	23,830	30	77,237	98
(80) Mixed crops and livestock	13,043	2	480,310	86	181,061	32	490,562	88

Note: In total, FADN represents 3.92 million commercial farms
Source: IFM-CAP projections

Table 6 shows the production changes resulting from farmers' responses to the removal of GAEC requirements, as they seek to optimize resource use and maintain economic viability within existing land constraints. In the baseline scenario, mainly due to GAEC 8, approximately 6.5 million hectares are maintained as fallow land, corresponding to 5% of the UAA of all farms represented in FADN. Removing the GAECs leads to a 37% reduction in fallow land, with the reallocated area resulting in

[9] FADN is representative of commercial farms in the EU, defined as those exceeding a minimum economic size threshold. It excludes very small and subsistence farms. The FADN sample represents 3.92 million farms and approx., 90% of the EU UAA. Therefore, when referring to IFM-CAP results, they relate to EU commercial farms only (see IFM-CAP section in Annex 3 for further explanations).

[10] It needs to be noted that Scenar 2040 does not consider the possible changes to GAECs introduced by the 2024 simplification package, as specified in SWD(2024) 360. This package allows MSs to convert certain GAECs into Eco-schemes. At the time the study was conducted, these changes had not yet been formally incorporated into the CSPs and are therefore not included in the baseline.

a 7.5% increase in cereals area, a 6.1% expansion of vegetables and flowers area, and a 4.6% rise in protein & oilseeds area. These land-use shifts ultimately lead to IFM-CAP results showing production increases for cereals, in contrast to the decreases reported by MAGNET and CAPRI, where land allocation is more flexible at an aggregated level, allowing for a shift away from agricultural activities towards other land uses (including forestry). For the same reason, the impacts of GAEC removal on permanent crops and livestock are minimal in IFM-CAP, reflecting the lower substitutability of these production systems under short- to medium-term policy changes.

Table 6. Production changes due to GAECs removal (NoCAP vs baseline, 2040)

Crops	**GAECs removal effect**
Cereals	7.5%
Fodder	-6.7%
Protein crops & oilseeds	4.6%
Vegetables and flowers	0.3%
Permanent	0.0%
Livestock	
Beef	0.0%
Pigmeat	0.0%
Sheep and goat meat	0.0%
Poultry	0.0%
Milk (cows)	0.0%
Milk (sheep and goats)	0.0%
Eggs	0.5%

Source: IFM-CAP projections

Table 7 shows the modelled production impacts under the NoCAP scenario across economic farm size classes, resulting from the combined effect of removing both GAECs and CAP payments. Arable production experiences the most significant decline, particularly among smaller farms. Farms in the smallest economic size class (2k–<8k EUR standard output[11]) see a sharp 8.2% production reduction, while the impact progressively shrinks with increasing farm size, dropping to -0.6% for the largest farms (≥500k EUR). This pattern indicates a strong correlation between farm size and production decrease in arable production following the removal of CAP support. Permanent crops show relatively minor changes across all size classes, with marginal decreases not exceeding 0.4%. Similarly, the meat sector experiences moderate and relatively homogenous production decreases across farm sizes, ranging from -0.3% to -0.5%. Milk production is only slightly affected overall, with the largest decline (-0.4%) occurring in the 8k–<25k EUR size class.

As already mentioned, due to the IFM-CAP model assumptions, these results do not account for medium-term structural adjustments. For example, the arable production decrease does not include the potential conversion of arable farms to permanent crop farms. Consequently, these results should be interpreted as representing short-term shocks rather than medium-term equilibrium outcomes as presented by the other two models in the study.

[11] Following the FADN classification, farms are grouped into economic size classes based on their Standard Output (SO). The SO represents the potential monetary value of a farm's production, calculated using average market prices for the farm's crop and livestock outputs. As such, SO serves as a proxy for the farm's economic size, reflecting the scale of production and associated resource use.

Table 7. Production changes by farm size class (NoCAP vs baseline, 2040)

Farm size in EUR	Arable	Permanent	Meat	Milk
2k - <8k	-8.2%	-0.4%	-0.5%	-0.1%
8k - <25 k	-4.7%	-0.0%	-0.5%	-0.4%
25k - <50k	-3.6%	-0.0%	-0.4%	-0.2%
50k - < 100k	-2.0%	-0.0%	-0.4%	-0.1%
100k - <500k	-2.1%	-0.0%	-0.3%	-0.2%
>= 500k	-0.6%	-0.2%	-0.4%	-0.3%

Source: IFM-CAP projections

CAP scenarios

The results of the two CAP scenarios reveal contrasting impacts across farm economic size classes and production sectors (Table 8). Under the Prod&Inv scenario, farms across all size classes benefit from the increase in productivity associated with more investment support. Larger farms see their production increasing consistently across many production sectors, reaching up to +2.0% in Arable and +3.4% in Permanent crops. Smaller farms (2k–8k EUR), in contrast, tend to experience little or no increases, except in Permanent crops, where even the smallest farms see a 4.0% increase. Midsized farms also experience notable production increases in certain sectors (e.g., vegetables, milk and meat from sheep and goat, eggs). The Env&Clim scenario shows a more uniform negative production effect. Effects are most pronounced for Meat and Milk producers, where production reductions tend to deepen with farm size (reaching -3.6% for mid-to-large farms), except for the largest farm size class (≥500k EUR), which shows the smallest impacts. Arable farms also experience production decreases, with smaller farms more negatively affected (up to -3.6%), while Permanent crops are least impacted and remain relatively stable across size classes. These contrasting patterns in the two policy scenarios suggest that investment-oriented policies tend to favour larger and more capital-intensive farms, whereas environmental and climate-driven measures may impose greater relative pressures on smaller farms with more limited adaptive capacity.

Table 8. Production changes by farm size class (Prod&Inv and Env&Clim vs baseline, 2040)

Farm size in EUR	Arable		Permanent	
	Prod&Inv	Env&Clim	Prod&Inv	Env&Clim
2k - <8k	0.0%	-3.6%	4.0%	-0.5%
8k - <25k	0.8%	-2.2%	3.6%	0.0%
25k - <50k	0.8%	-1.8%	2.3%	0.0%
50k - <100k	1.2%	-1.7%	3.2%	-0.0%
100k - <500k	1.0%	-1.8%	2.6%	-0.0%
>= 500k	2.0%	-2.0%	3.4%	-0.2%
	Meat		Milk	
	Prod&Inv	Env&Clim	Prod&Inv	Env&Clim
2k - <8k	0.4%	-2.7%	0.4%	-2.7%
8k - <25k	0.4%	-2.2%	0.4%	-2.2%
25k - <50k	0.5%	-2.5%	0.5%	-2.5%
50k - <100k	0.8%	-2.9%	0.8%	-2.9%
100k - <500k	0.8%	-3.6%	0.8%	-3.6%
>= 500k	1.9%	-1.6%	1.9%	-1.6%

Source: IFM-CAP projections

5 Results: Domestic demand and prices, trade, and self-sufficiency

This chapter presents the results from the NoCAP scenario and the two CAP scenarios with respect to domestic demand, consumer prices, and household food expenditure shares (Section 5.1), followed by impacts on EU trade (exports, imports, and trade balance) (Section 5.2), and EU self-sufficiency ratios (Section 5.3).

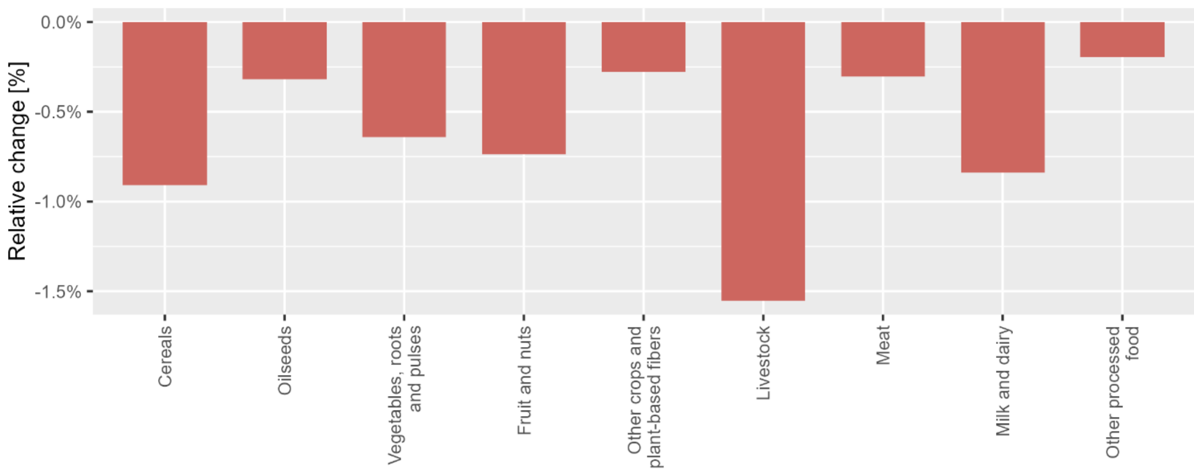
5.1 Domestic demand and prices, and household food expenditure share

5.1.1 Domestic demand and consumer prices

NoCAP scenario

In general, domestic demand in the EU decreases in the NoCAP scenario across all commodity categories (Figure 25), with the highest reduction observed in the EU livestock sector. The stronger decline in livestock demand (i.e. the demand for live animals for breeding or fattening) compared to meat demand can be explained by increased meat imports into the EU (see section 5.3), driven by a relatively inelastic demand for meat. Thus, as the removal of the CAP leads to a reduction in EU livestock production, domestic prices increase which subsequently encourages higher meat imports (see Section 5.1.2). As briefly outlined in section 4 based on the CAPRI modelling results, within the meat categories, demand decreases most for the higher-premium meats beef and sheep & goat meat, whereas consumer demand for pigmeat decreases only marginally, and poultry demand registers a slight increase in EU consumption due to its lower costs and hence affordability.

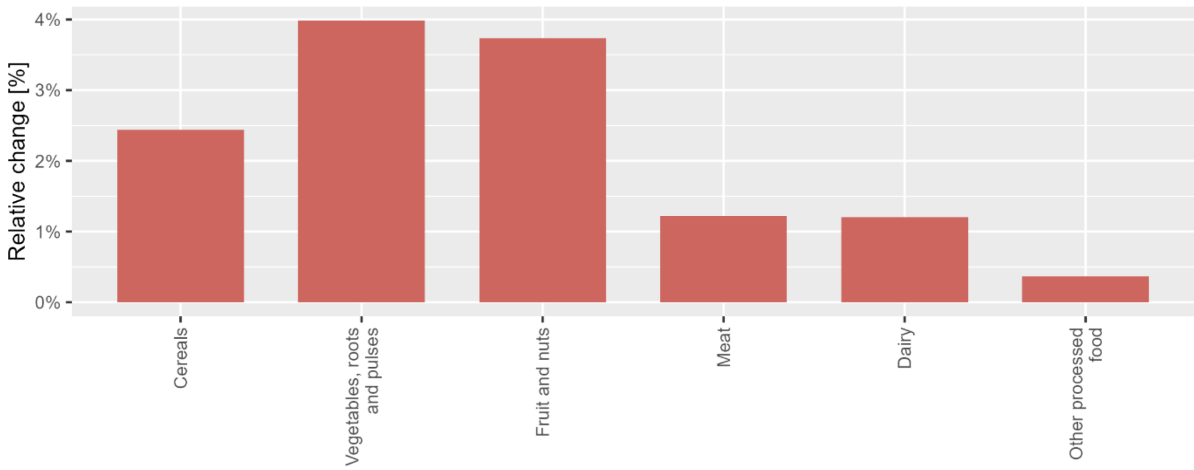
Figure 25. EU total demand changes by commodity (NoCAP vs baseline, 2040)



Note: Livestock includes beef cattle, sheep and other cattle, live pigs, live poultry and raw milk; Meat and Milk and dairy refer to the corresponding processed products.
Source: MAGNET projections

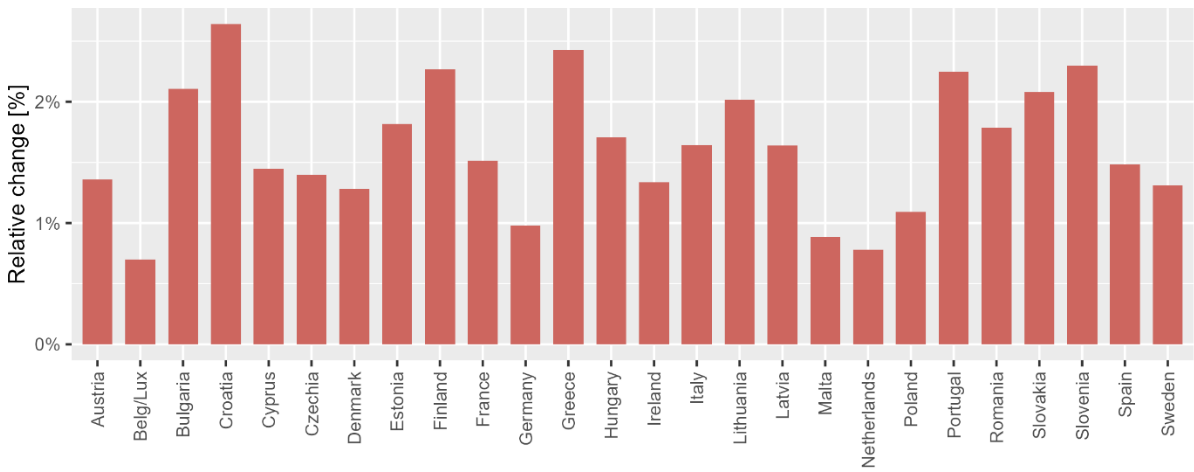
In terms of consumer prices, the meat prices are not the ones that experience the highest increase. Instead, the highest increases are observed for the vegetables sector (+4%), followed by the fruit and nuts category (+3.7%). The impact on consumer prices under this scenario is generally more moderate than that on producer prices, and are closely linked to changes in the demand, as well as trade developments, which are discussed in more detail in section 5.2. The relative changes in consumer prices for meat and dairy are more moderate (Figure 26). At the MS level (Figure 27), the largest increase in agri-food prices is projected for Croatia (+2.6%), while Belgium/Luxembourg experience the smallest increase (+0.7%). Other countries with increases above 2% include Bulgaria, Finland, Greece, Lithuania, Portugal, Slovenia, and Slovakia. In these countries, the impact on consumer prices also appears to be linked to the high relative importance of CAP payments. Specifically, countries that are more reliant on CAP support tend to experience stronger negative impacts on production, leading to higher consumer price inflation not only in the agri-food sector but also in the broader economy (further details on the overall impacts of the CAP are provided in Section 6.2).

Figure 26. EU consumer price changes by commodity (NoCAP vs baseline, 2040)



Source: MAGNET projections

Figure 27. Agri-food consumer price changes by MS (NoCAP vs baseline, 2040)



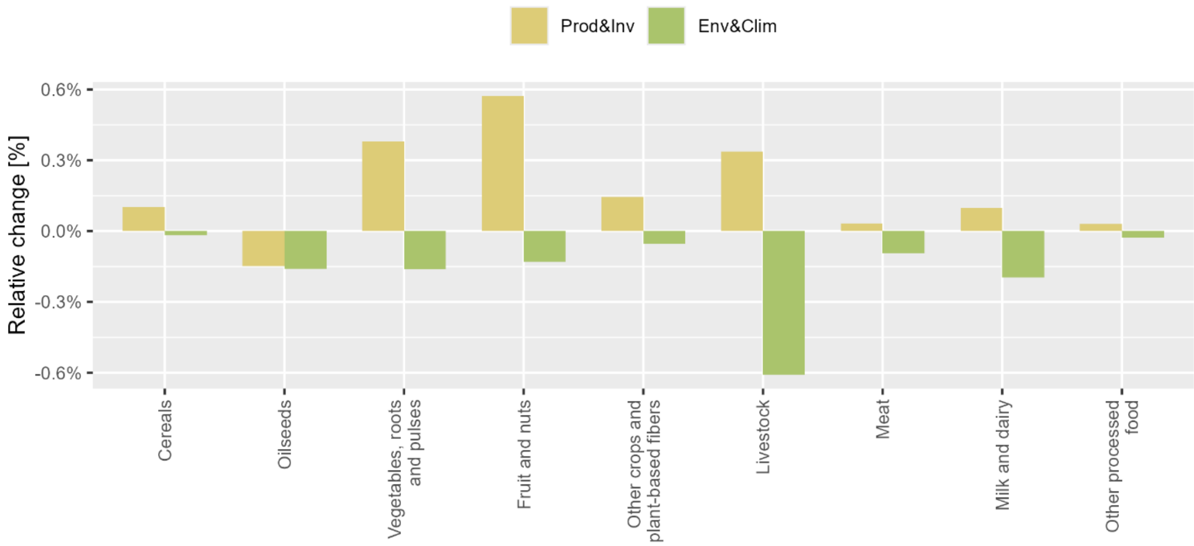
Source: MAGNET projections

CAP scenarios

Compared to the NoCAP, the two CAP scenarios have smaller impacts on both demand and consumer prices. As shown in Figure 28, the Prod&Inv scenario leads to a small demand increase across all commodity groups. This increase is mainly explained by productivity gains in this scenario, which lead to higher supply and lower domestic prices, thereby stimulating demand. The most pronounced demand increase, observed in the fruits and nuts commodity group, slightly exceeds 0.6%, with oilseeds being the sole exception, showing a slight decrease of less than 0.15%.

In contrast, the Env&Clim scenario yields the opposite effect, with demand slightly decreasing across all commodity groups. The reduced production under this scenario leads to higher domestic prices and subsequently to decreases in domestic demand for all commodities. The livestock sector is most affected, with demand declining by almost 0.6%. However, similar to the NoCAP scenario, a decrease in livestock demand has only an almost negligible effect on meat demand, which is largely offset by higher meat imports (see section 5.3).

Figure 28. EU total demand changes by commodity (Prod&Inv and Env&Clim vs baseline, 2040)

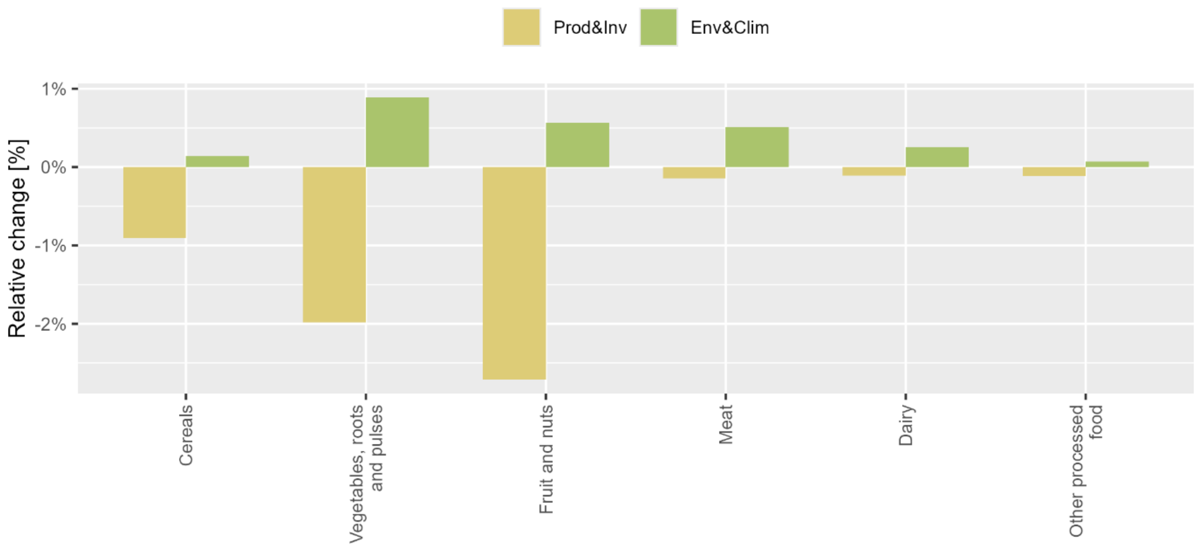


Source: MAGNET projections

With regard to consumer prices, the impacts on production described above are directly reflected in household consumer price levels. Thus, under the Prod&Inv scenario, consumer prices decrease across all commodity groups (Figure 29). Consistently with the supply/demand behaviour in this scenario, the largest reduction occurs in the fruits and nuts group (-2.7%), followed by vegetables, roots and pulses (approximately -2%), and cereals (a decrease of less than 1%). For other commodity groups, the price impact is minimal. Conversely, the Env&Clim scenario leads to an increase in consumer prices across all commodity groups, consistent with the reduced production and higher producer prices. However, the magnitude of the impact is modest, with the most affected group (vegetables, roots and pulses) experiencing a price increase of less than 1%.

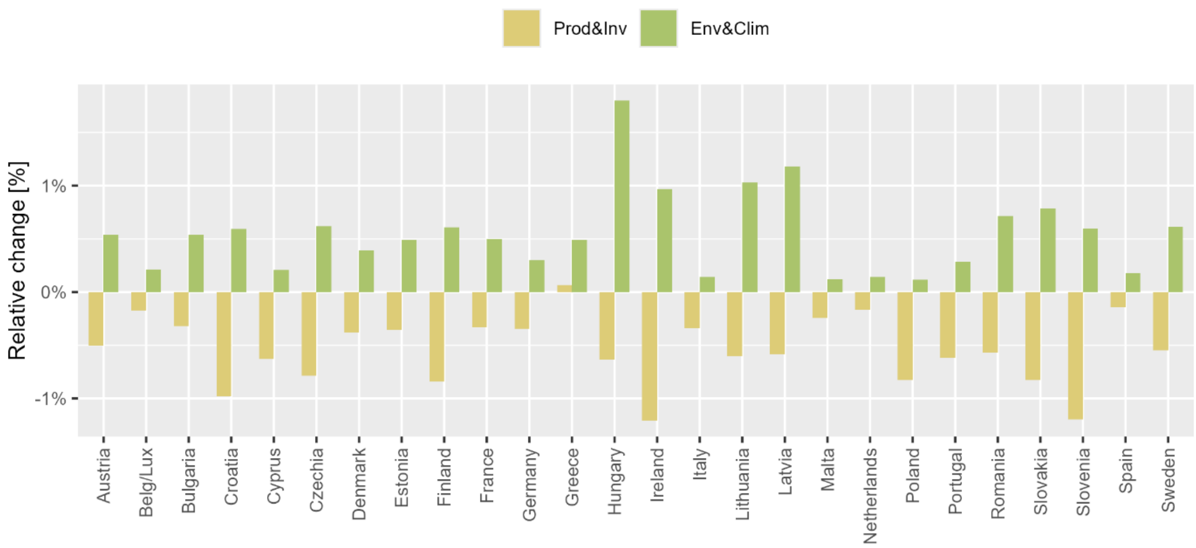
The impact of the two CAP scenarios on consumer prices is quite heterogeneous across MSs (Figure 30). In the Prod&Inv scenario, the largest decrease (approximately -1.2%) is observed in Slovenia and Ireland, followed by Croatia (-1%), whereas Greece shows the smallest decrease (less than -0.1%). In contrast, in the Env&Clim scenario, Hungary experiences the largest consumer price increase (approximately +1.8%), whereas Poland has the smallest increase (less than -0.1%). The stronger relative price impacts in Eastern MSs reflect the greater reliance of their agri-food systems to CAP support. Thus, the impacts on productivity of the shifts in the two CAP scenarios is passed on to a greater extent to consumer prices. Additionally, the size and composition of Pillar 2 also play a role. Those MSs with a larger share of Pillar 2 interventions in their CSP experience larger impacts on consumer prices. Similarly, MSs with higher co-financing contributions are more affected by shifts towards Pillar 2 payments, which amplifies the transmission of policy changes into consumer prices. This also explains why MSs like Finland and Ireland, where the size of the CAP budget as a percentage of GDP is not among the highest, would also only experience a moderate impact on prices.

Figure 29. EU consumer price changes by commodity (Prod&Inv and Env&Clim vs baseline, 2040)



Source: MAGNET projections

Figure 30. Agri-food consumer price changes by MS (Prod&Inv and Env&Clim vs baseline, 2040)

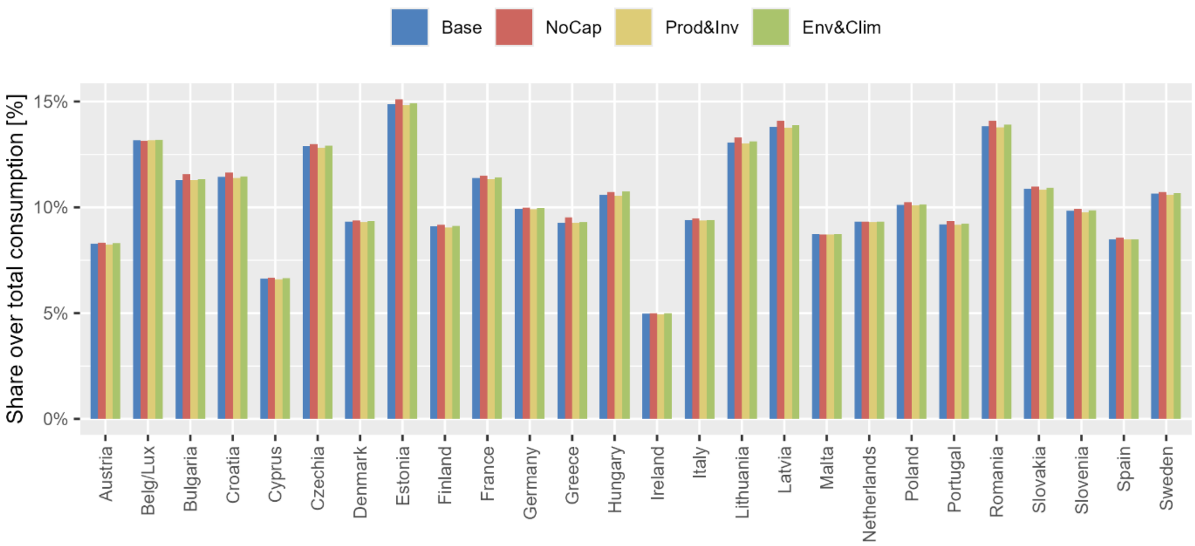


Source: MAGNET projections

5.1.2 Household food expenditure

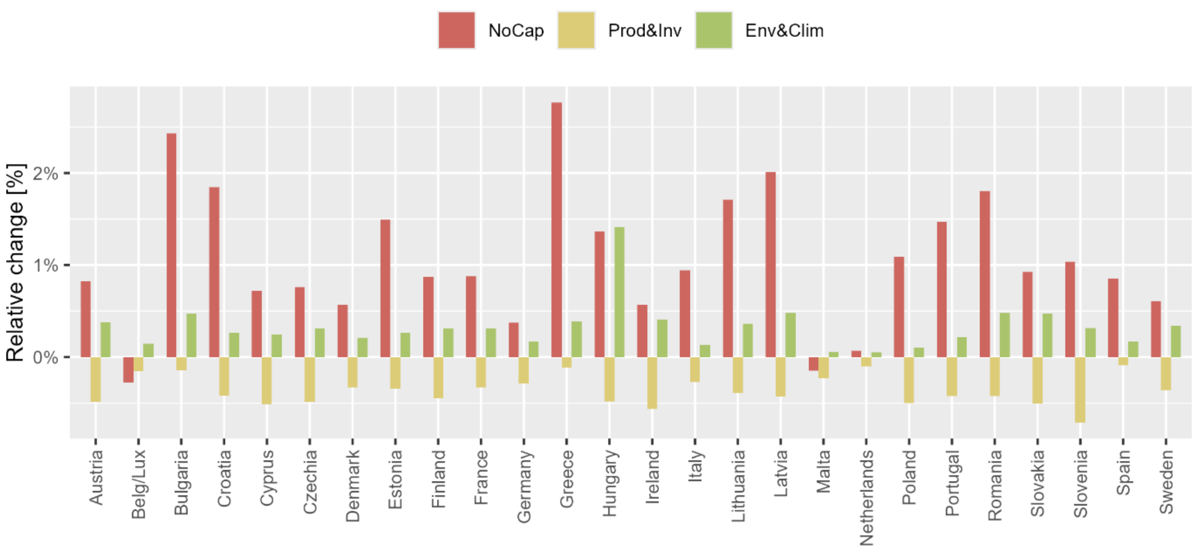
In the 2040 baseline, the EU average household food expenditure share is approximately 10%. Under the NoCAP scenario, rising agri-food prices lead to only a small increase in the household food expenditure share at the EU level (less than +1%). However, this increase is more pronounced in MSs with higher consumer price increases (e.g., Croatia, Greece, Bulgaria) (Figure 27) and/or those with an already high food expenditure share in the baseline (e.g., Romania and Latvia) (Figure 31). Accordingly, the most pronounced increases are projected for Bulgaria, Greece and Latvia, where household food expenditures rise by more than 2% compared to the baseline (Figure 32). Countries such as Croatia, Lithuania and Romania are also near this threshold.

Figure 31. Share of food expenditure over total household consumption by MS (scenarios and baseline, 2040)



Source: MAGNET projections

Figure 32. Household food expenditure share changes by MS (scenarios vs baseline, 2040)



Source: MAGNET simulations

Conversely, the decrease in the share of food expenditure in Belgium, Luxembourg, and Malta is not due to a decrease in the value or quantity of consumed agri-food products, but rather to an increase in household income under the NoCAP scenario. In fact, households in these countries would still spend higher absolute amounts on food. However, as explained later in Section 6.2, these three MSs are among the main net contributors to the CAP financing. Under the assumptions adopted for the MAGNET model, the removal of the CAP would lead to an increase in their GDP, resulting in higher aggregate demand. The increase in overall consumption in the NoCAP scenario would surpass that of agri-food products, thereby reducing the proportion of household expenditure allocated to food.

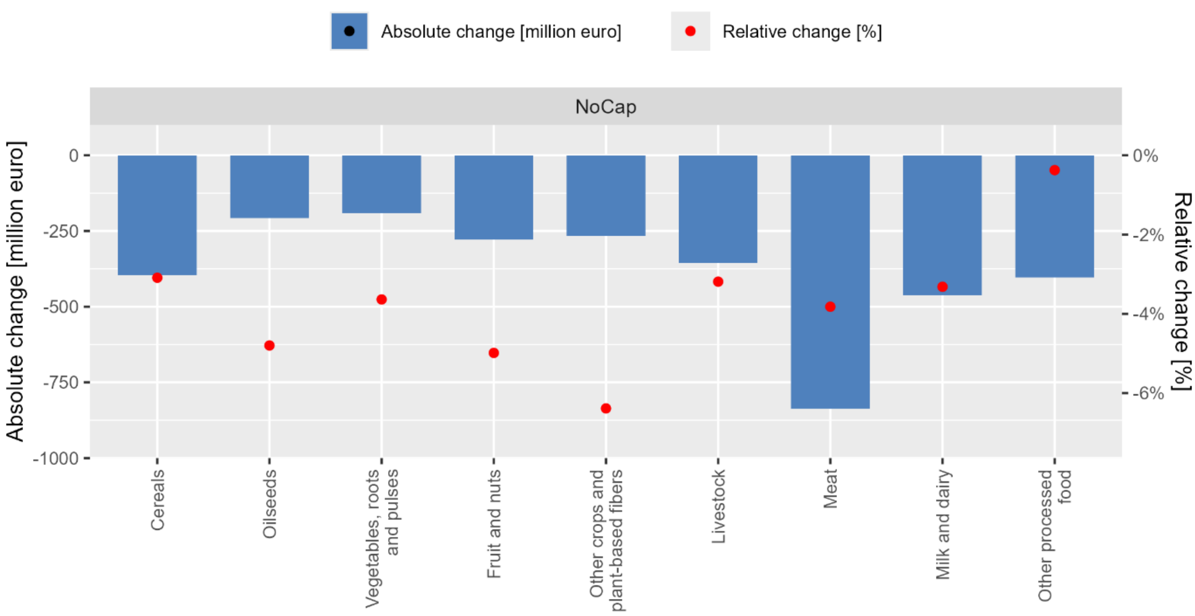
There are no significant differences across the NoCAP and CAP scenarios in household food expenditure shares (Figure 31). For most MSs, changes are limited to 0.5%, with a decreasing trend in the Prod&Inv scenario and an increasing trend in the Env&Clim scenario (Figure 32). This pattern reflects the consumer price-increasing effect of the Env&Clim scenario and the consumer price-decreasing effect of the Prod&Inv scenario. The only exception is Hungary, where the household food expenditure share rises by approximately 1% in the Env&Clim scenario. This effect is linked to Hungary's slight but still relatively larger GDP decrease than other MS under this scenario, which also constraints more the household purchasing power and leads to a higher proportion of income being allocated to food.

5.2 EU exports and imports

NoCAP scenario

The NoCAP scenario leads to a decrease in the EU's agri-food exports due to the reduction in domestic production across all agri-food commodities, alongside a significant increase in imports to compensate for the production decreases. In terms of export value, total EU agri-food exports are projected to decrease by EUR 3 396 million (-1.8%). Although all agri-food sectors are negatively affected, the magnitude of the impacts varies significantly across sectors (Figure 33). Among crops, cereals show the largest export decline in absolute terms (-EUR 396 million, -3.1%), while the most affected product category in relative terms is the category other crops and plant-based fibers (-EUR 266 million, -6.4%). In the food sector, the most substantial decreases are projected for meat products (-EUR 836 million, -3.8%), with beef decreasing by EUR 213 million (-5.8%), and pigmeat by EUR 330 million (-4.8%). Milk and dairy exports also register significant impacts (-EUR 460 million, -3.3%). The category other processed food also declines by -EUR 403 million, although the impact in relative terms is minor (-0.4%).

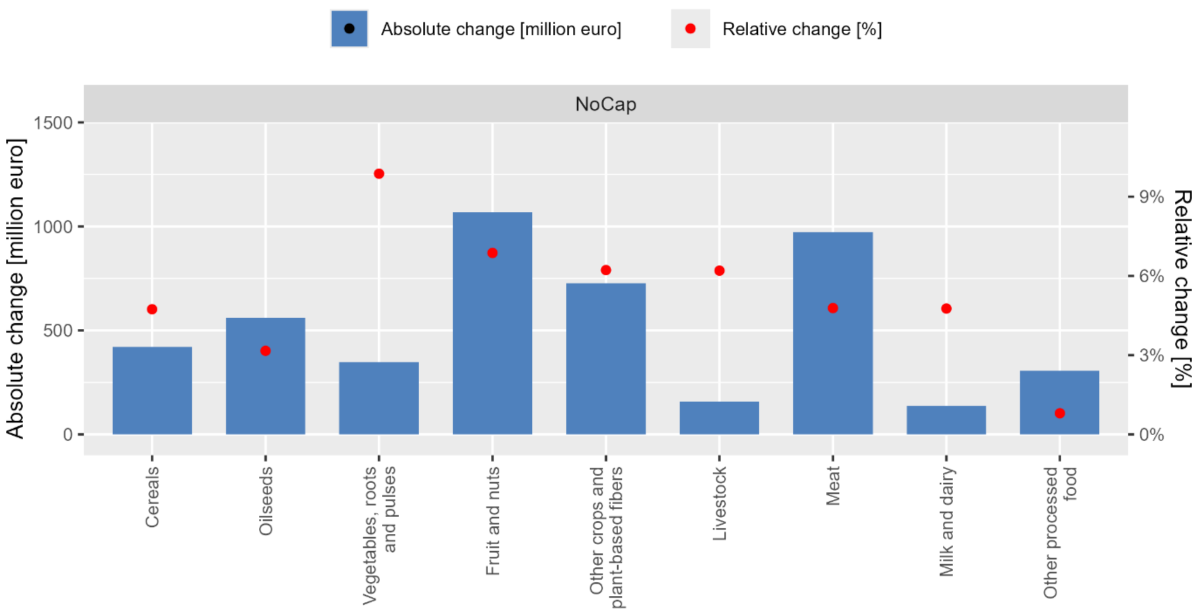
Figure 33. EU's extra-EU exports changes by commodity (NoCAP vs baseline, 2040)



Source: MAGNET projections

The extra-EU agri-food imports (Figure 34) follow a pattern closely tied to changes in domestic production, with imports increasing when production (and exports) decline. Under the NoCAP scenario, the value of imports increases by EUR 4 700 million (+3.9%) to compensate for the reduced domestic production. The most significant import increases are projected for crops, which increase by EUR 3 124 million (+4.6%), with the largest absolute increases observed in fruits and nuts (+EUR 1 069 million, +6.9%), other crops and plant-based fibres (+EUR 726 million, +6.2%), and oilseeds (+EUR 561 million, +3.2%). Vegetables, roots and pulses also show a high import growth in relative terms (+EUR 347 million, +9.8%). Among the other commodities, meat registers the largest increase in imports (+EUR 972 million, +4.8%).

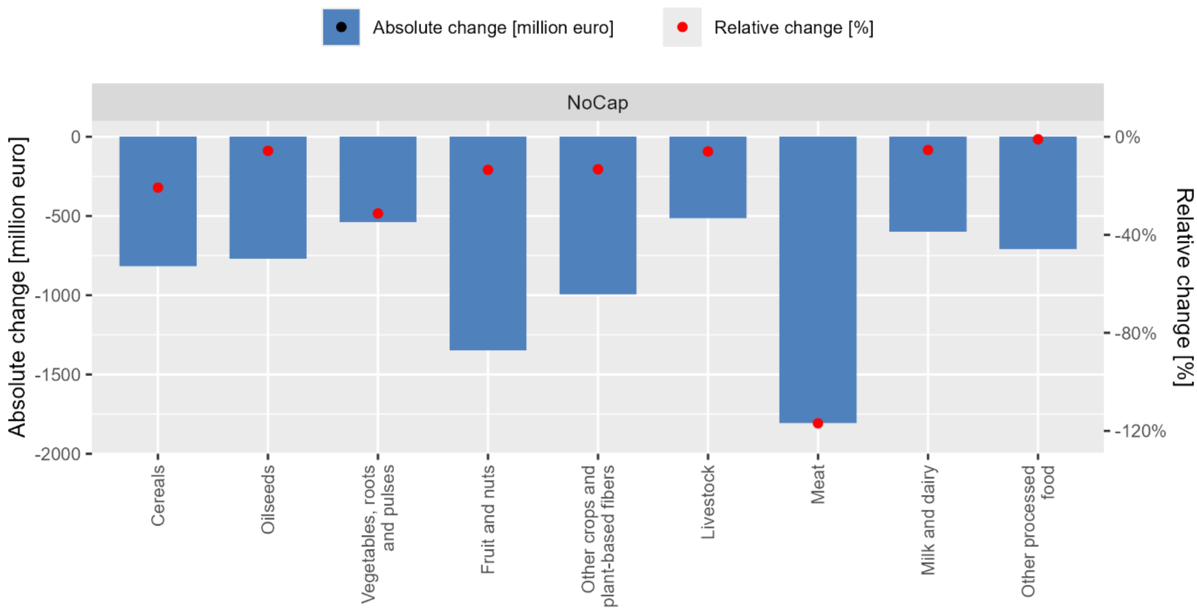
Figure 34. EU's extra-EU imports changes by commodity (NoCAP vs baseline, 2040)



Source: MAGNET projections

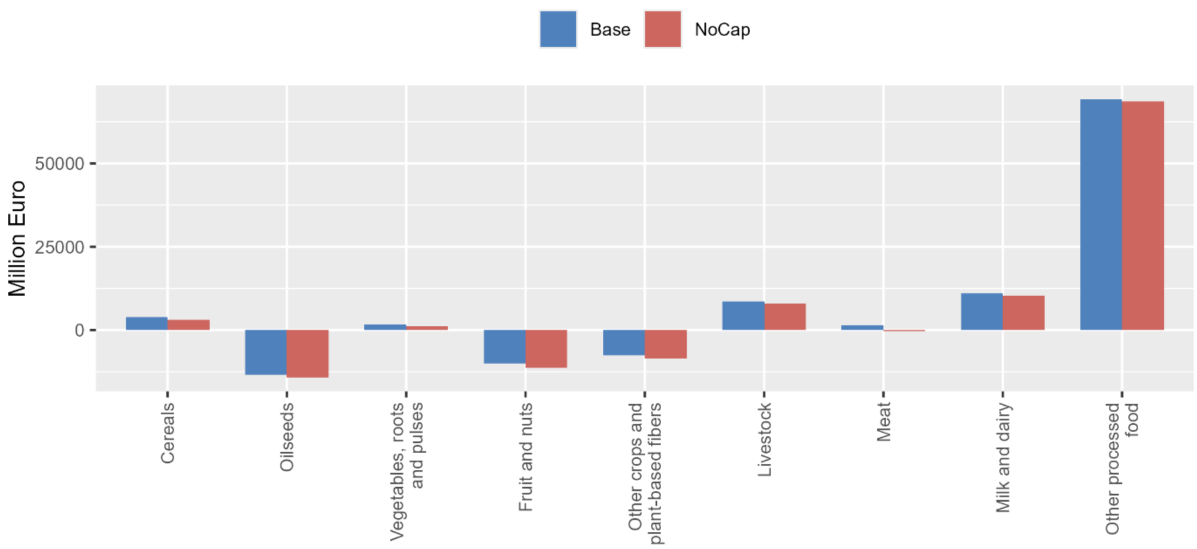
The EU trade balance, i.e. the difference between the export and import values of the agri-food sector, is highly positive in the baseline, with a surplus of approximately EUR 65 billion. Under the NoCAP scenario, the total agri-food trade balance deteriorates by almost EUR 8 096 million, which corresponds to a decrease of 12.4% compared to the baseline. Over half of this reduction comes from the change in the trade balance of crops (-EUR 4 464 million, -17.7%), which was already exhibiting a trade deficit in the baseline due to oilseeds, fruits, and other crops. Fruit and nuts are the most affected plant-based commodities in absolute terms of trade balance loss (-EUR 1 349 million, -13.5%), while vegetables, roots and pulses experience the highest impact in relative terms (-EUR 537 million, -31.3%). For the other categories with positive trade balances in the baseline, the contribution to the overall trade balance deterioration is EUR 3 632 million (-10.2%). This decline is primarily driven by reductions in the trade balances for meat (-EUR 1 808 million), in particular EUR 539 million (-12.8%) for pigmeat and EUR 774 million (-11.5%) for beef. This change implies a reversing of the trade balance for meat products, from a surplus in the baseline (+EUR 1 547 million) to a slight deficit in the NoCAP scenario (-EUR 262 million). As shown in Figure 39, this shift remains small in relation to the overall agri-food trade balance. Milk and dairy (-EUR 594 million, -5.8%) and other food products (-EUR 709 million, -1.1%) also contribute to the overall deterioration of the trade balances (Figure 36).

Figure 35. EU agri-food trade balance changes by commodity (NoCAP vs baseline, 2040)



Source: MAGNET projections

Figure 36. EU's trade balance by commodity (NoCAP and baseline, 2040)



Source: MAGNET projections

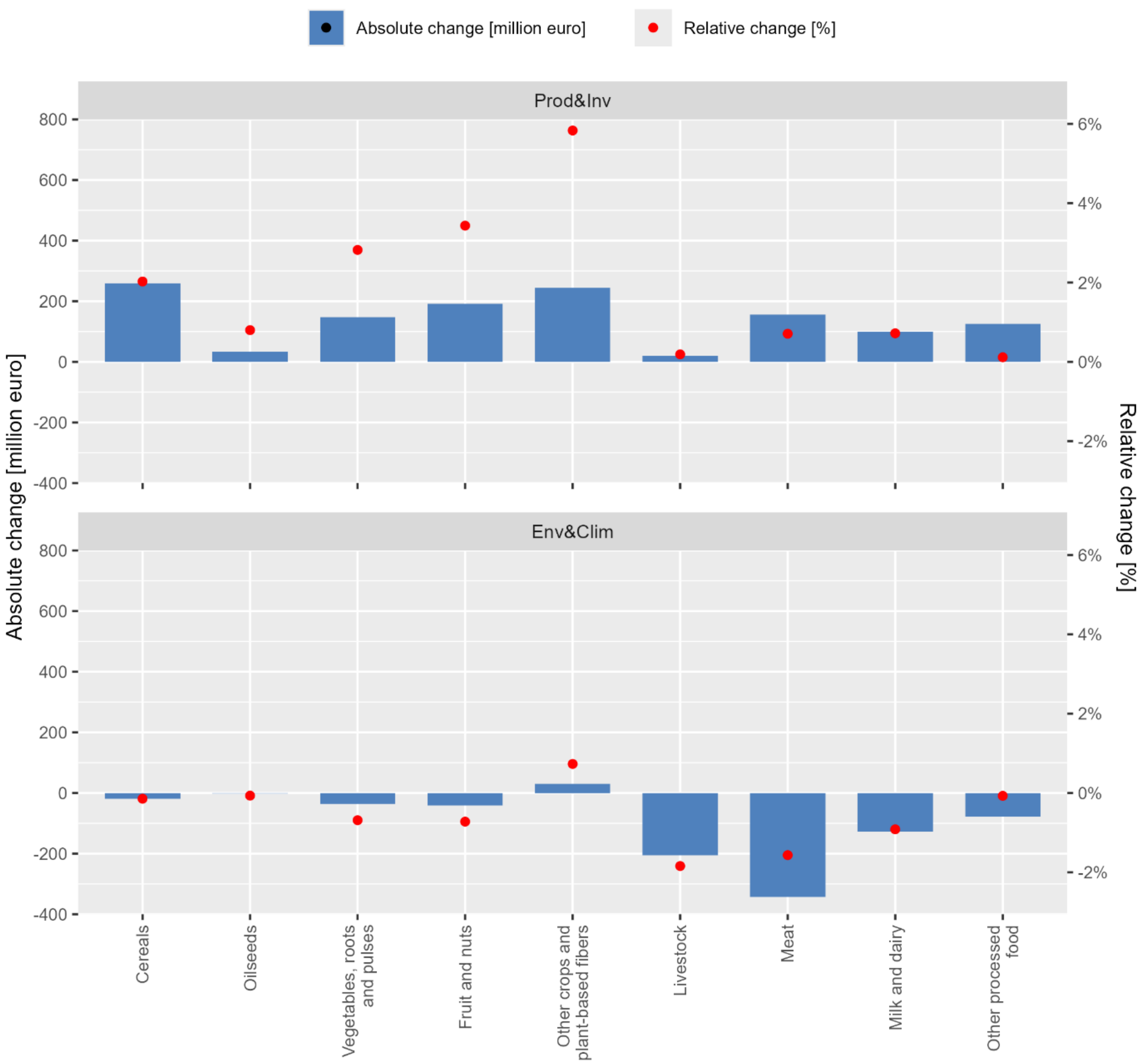
CAP scenarios

The two CAP scenarios produce opposite trade effects, reflecting the differing policy mechanisms driving productivity and sustainability support. In the Prod&Inv scenario, the expansion of domestic supply in most sectors is driven by productivity-enhancing interventions. These interventions stimulate production, leading to an increase in exports and reduction in imports. As a result, the overall EU agri-food trade balance improves. Conversely, in the Env&Clim scenario, the decline in production, attributed mainly to the productivity losses derived from the shift of CAP support towards more sustainable practices, causes an increase of imports, reduction in exports, and a worsening of the trade balance.

Under the Prod&Inv scenario overall production increases, resulting in a rise of exports by EUR 1 279 million (+0.7%) (Figure 37). However, this pattern is not uniform. Notably, crop categories show significant increases in production and exports, including cereals (+2.0%, mainly driven by wheat) fruits and nuts (+3.4%), and vegetables, roots and pulses (+2.8%). In contrast, the other sectors show only minimal increases in exports.

Conversely, under the Env&Clim scenario, total agri-food exports decrease by EUR 821 million (-0.4%), with almost 90% of the reduction concentrated in the livestock (-EUR 205 million, -1.8%), meat (-EUR 343 million, -1.6%), and dairy sectors (-EUR 127 million, -0.9%). These decreases are due to the production declines in all dairy and meat sectors (Figure 37), triggered by the policy push towards climate neutrality and more sustainable production. In contrast, the crops and other processed food sectors show only limited impacts.

Figure 37. EU's extra-EU exports changes by commodity (Prod&Inv and Env&Clim vs baseline, 2040)

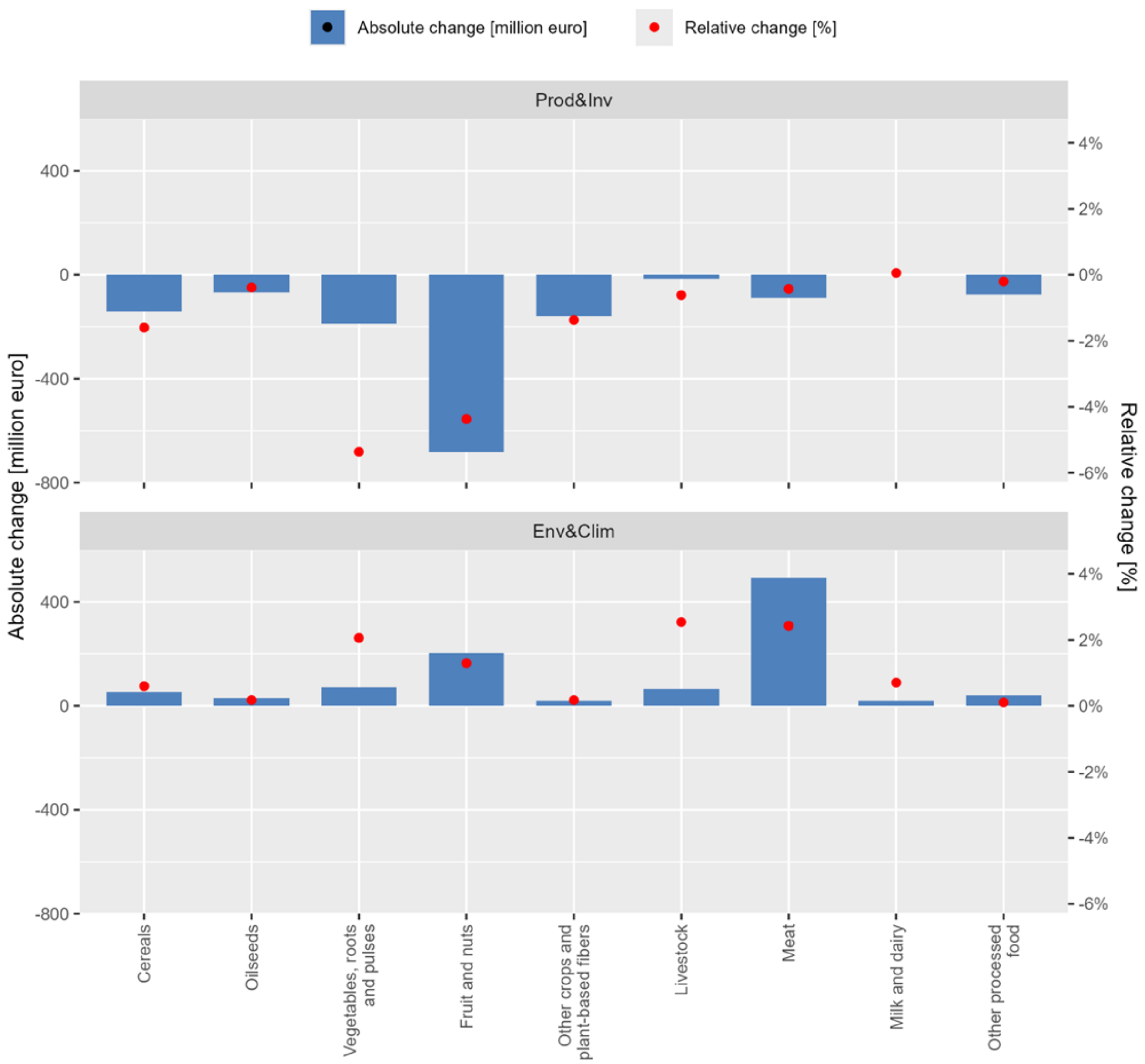


Source: MAGNET projections

The extra-EU agri-food imports (Figure 38) again follow a pattern closely tied to changes in domestic production, with imports increasing when production falls and decreasing when production increases. Under the Prod&Inv scenario, the increase in domestic production is followed by a fall in imports by EUR 1 419 million (-1.2%), led by the drop in imports of fruits and nuts (-EUR 681 million, -4.3%) and vegetables, roots, and pulses (-EUR 189 million, -5.3%).

As already highlighted for production and exports, the Env&Clim scenario presents opposite trends, with agri-food imports increasing by EUR 997 million (+0.8%). This increase is spread across most of the agri-food commodities, with the largest increases occurring in the meat sector (+EUR 493 million, +2.4%), particularly beef imports (+EUR 305 million, +2.9%).

Figure 38. EU's extra-EU imports changes by commodity (Prod&Inv and Env&Clim vs baseline, 2040)

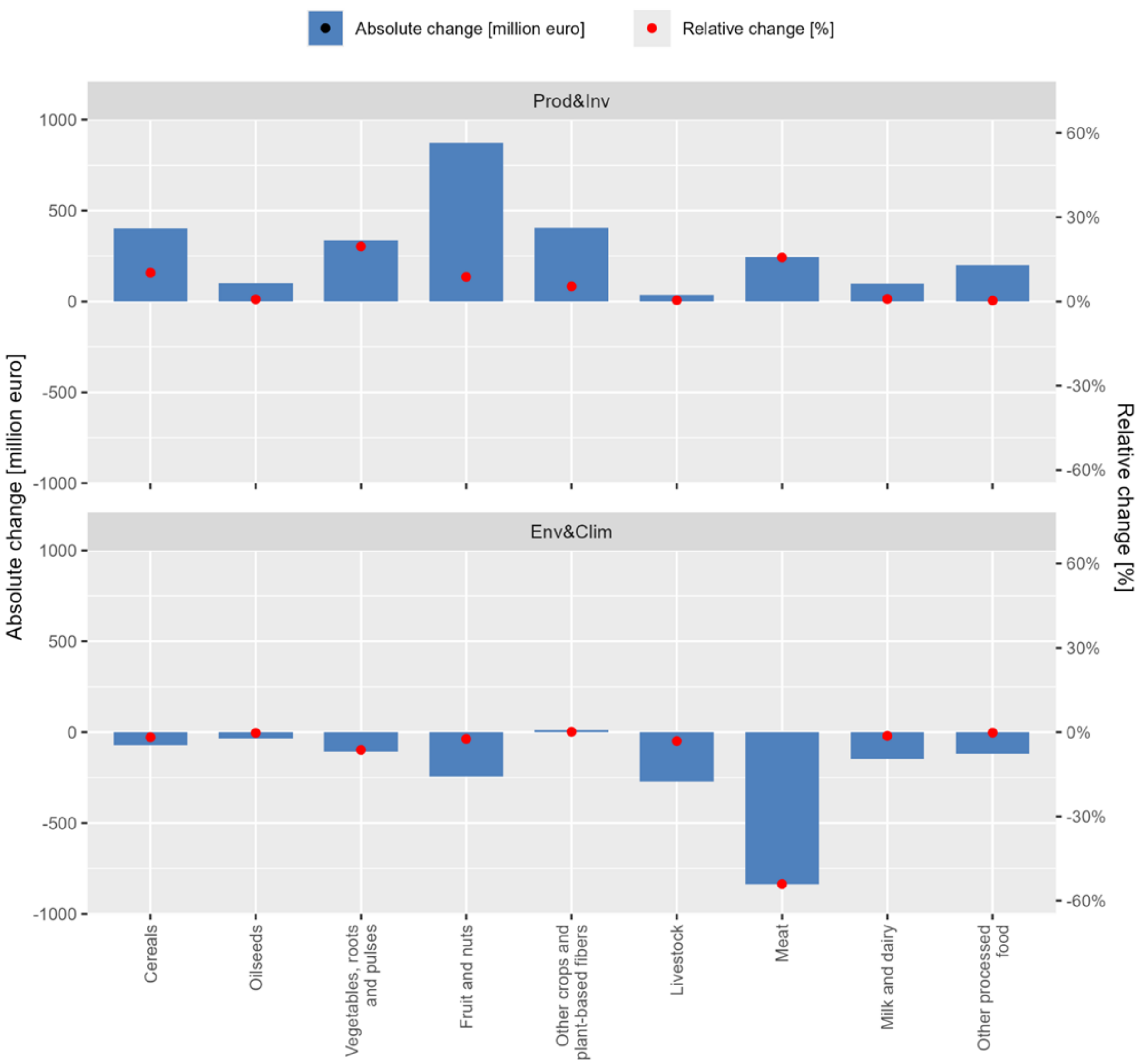


Source: MAGNET projections

As a consequence of the changes in imports and exports, the Prod&Inv results in a further improvement in the EU's agri-food trade balance, with an increase of EUR 2 698 million (+4.1%). This increase is mainly driven by the crop sector, especially cereals (+10.2%), vegetables, roots and pulses (+19.6%) and other crops (+5.3%) and, particularly in absolute terms, by fruits and nuts (EUR 874 million, +8.8%) (Figure 39).

Finally, under the Env&Clim scenario the impact on the EU trade balance is negative, although to a much smaller extent than in the NoCAP scenario. In the Env&Clim scenario, the EU's total agri-food trade balance deteriorates by EUR 1 819 million (-2.8%), with the largest decrease occurring in the meat sector (-EUR 836 million, -54.1%[12]), particularly in the beef sector (-EUR 407 million, -6.0%) (Figure 39).

Figure 39. EU agri-food trade balance changes by commodity (Prod&Inv and Env&Clim vs baseline, 2040)

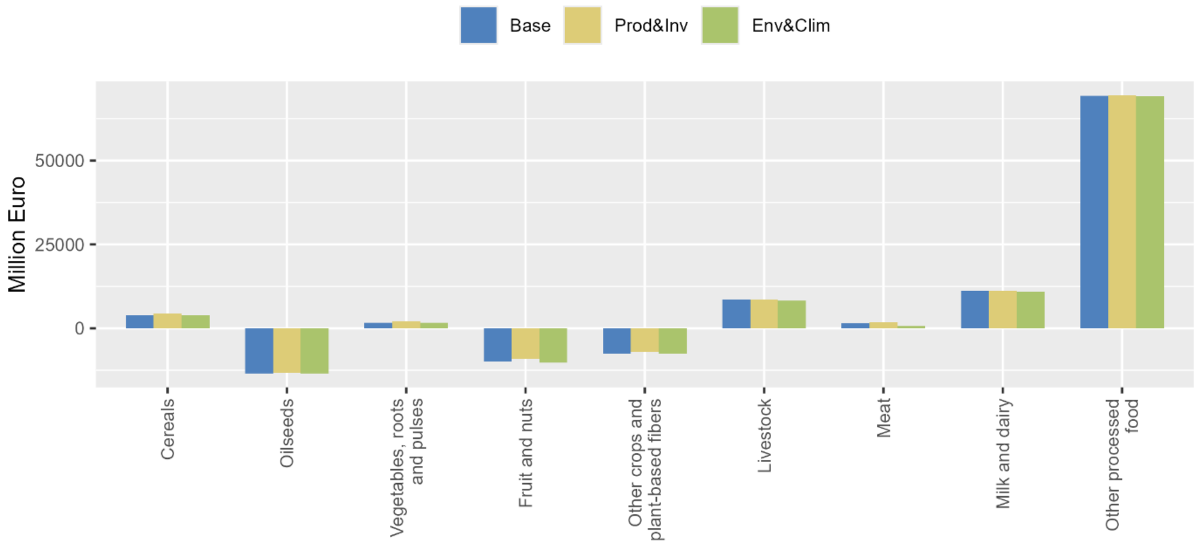


Source: MAGNET projections

Figure 40 compares the net trade position in the baseline and both the Prod&Inv and Env&Clim scenarios. Overall, the trade balance under both scenarios remains at similar levels as the baseline for all commodity categories, with the more relevant absolute changes occurring in fruits and nuts under the Prod&Inv scenario, and in meat products under the Env&Clim scenario.

12 This high percentage change occurs because the aggregate trade balance for all meat categories is small but positive in the baseline. When it turns slightly negative under the Env&Clim scenario, the relative change appears substantial, even though the variation in absolute terms remains minimal.

Figure 40. EU's trade balance by commodity (Prod&Inv, Env&Clim and baseline, 2040)



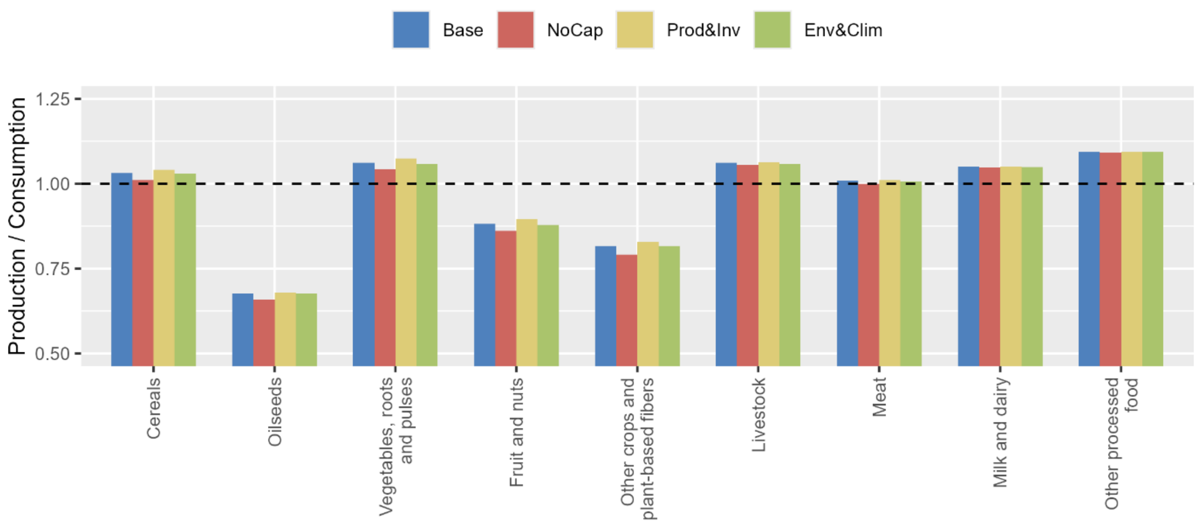
Source: MAGNET projections

5.3 Overall impacts on self-sufficiency

NoCAP scenario

Figure 41 shows that the NoCAP scenario leads to a decline in EU self-sufficiency ratios for almost all commodity groups, which can be attributed to decreases in the EU's agri-food production, despite modest increases in overall agri-food exports. Crops and plant-based commodities are the most affected categories. However, for both cereals and vegetables, roots and pulses, the production level remains above the consumption level, resulting in a self-sufficiency ratio of more than 1. Consequently, only oilseeds, fruits and nuts, and other crops and plant-based fibres, i.e. sectors that already exhibit trade deficits in the baseline, remain below self-sufficiency.

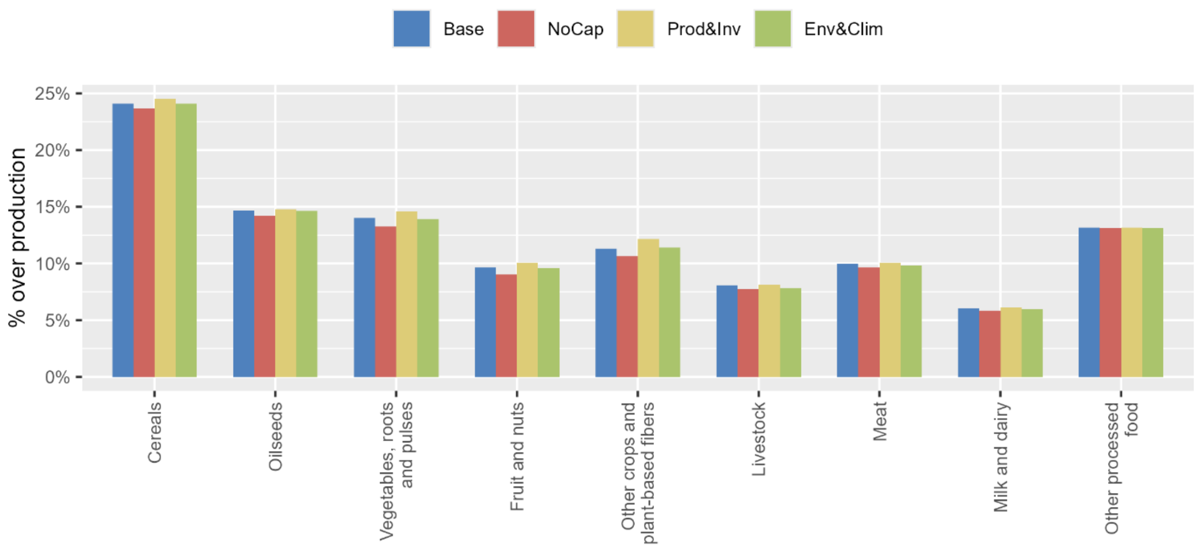
Figure 41. EU's agri-food self-sufficiency changes by commodity (scenarios and baseline, 2040)



Source: MAGNET projections

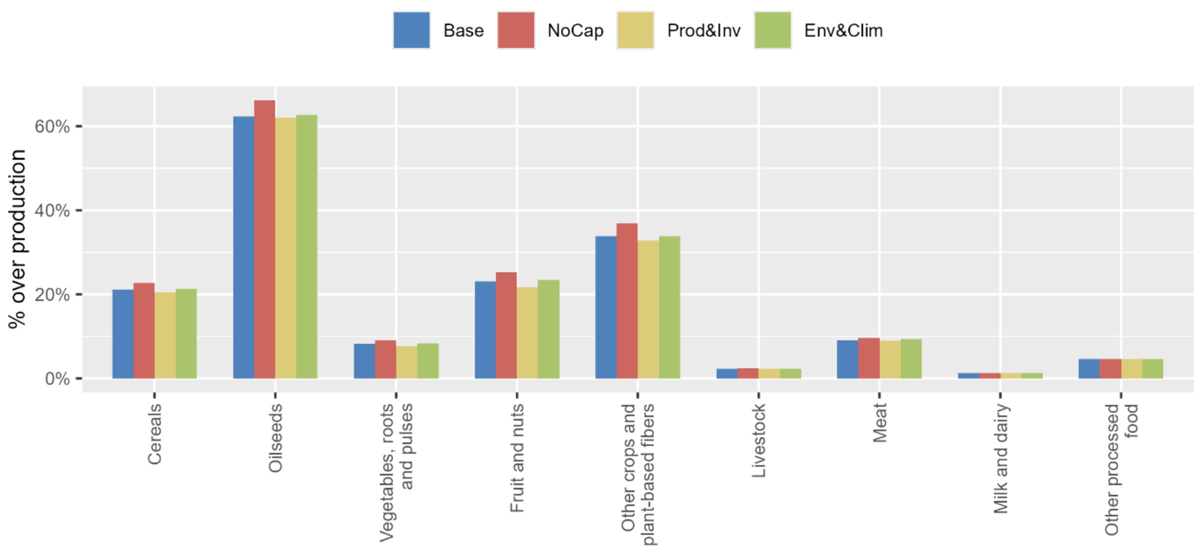
Examining exports and imports as a share of domestic production provides additional context to the self-sufficiency indicators for the EU. The export-to-production ratio, which exceeds 20% only for cereals, slightly decreases under the NoCAP scenario for all commodity groups (Figure 42). In contrast, the import-to-production ratio shows some increases in response to the NoCAP scenario (Figure 43). Although the overall impact is very limited for many sectors, some sectors such as oilseeds, and other crops and plant-based fibres, show higher increases with a rise of around 3%. This aligns with the overall production declines in these sectors and indicates an increased reliance on external suppliers to meet domestic demand.

Figure 42. Exports as a share of domestic production by commodity (scenarios and baseline, 2040)



Source: MAGNET projections

Figure 43. Imports as a share of domestic production by commodity (scenarios and baseline, 2040)



Source: MAGNET projections

CAP scenarios

Under both CAP scenarios, the EU's agri-food self-sufficiency levels remain largely stable or show only minor deviations from the baseline (Figure 41). In the Prod&Inv scenario, self-sufficiency slightly increases in the cereals, vegetables, roots and pulses, and fruits and nuts sectors. This is due to a decline in imports in these commodity groups, driven by productivity-enhancing measures that expand domestic production and reduce import dependence. For the other sectors self-sufficiency remains unchanged, as simultaneous increases in both production and exports offset any significant shifts. Conversely, changes are more marginal in the Env&Clim scenario, with self-sufficiency levels remaining rather stable across most commodity groups. As productivity-enhancing interventions from Pillar 2are reduced, and environmental constraints on production increase, domestic production decreases. However, since export volumes also decline proportionally, the self-sufficiency ratios remain relatively unaffected. Trends in export and import shares relative to production (Figure 42 and Figure 43) mirror (and explain) the self-sufficiency patterns. In the Prod&Inv scenario, the export-to-production ration remains stable or slightly increases for certain sectors due to enhanced productivity. In the Env&Clim scenario, declines in production and exports occur together, keeping the export share largely unchanged. However, import dependence increases slightly for certain commodity groups, particularly for fruits and nuts, as reduced domestic supply requires increased imports.

6 Results: Gross farm income, GDP, and labour

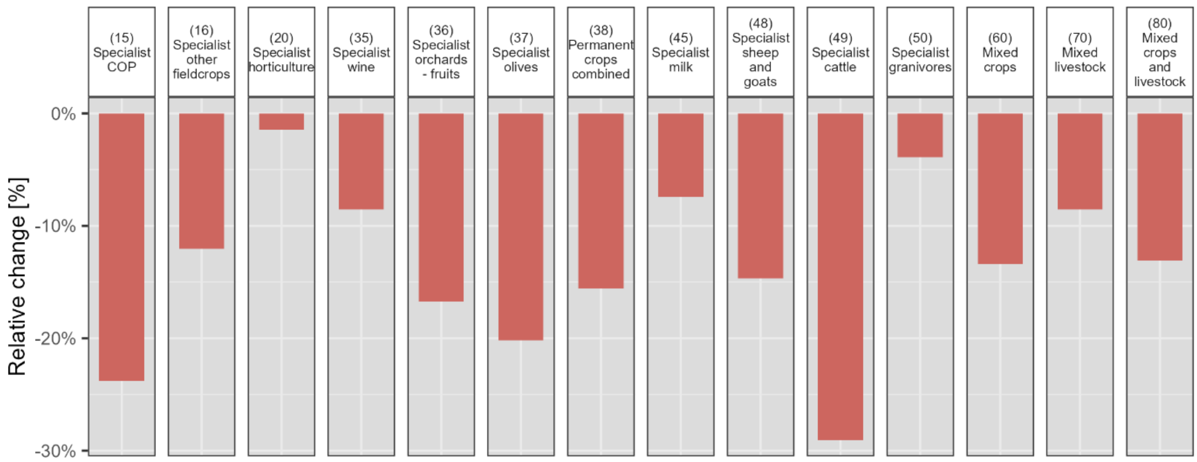
This chapter presents scenario impacts on gross farm income (Section 6.1), the wider macroeconomic impacts on GDP and the share of agri-food value added (Section 6.2), and the consequent labour market dynamics within the agri-food sector (Section 6.3).

6.1 Gross farm income

NoCAP scenario

In the NoCAP scenario, there is a general decrease in gross farm income, which is the net effect of two opposing factors: the removal of the GAEC obligations and the removal of CAP payments. The removal of GAEC-related constraints grants farmers greater flexibility when choosing which crops to plant. Thus, in line with modelling assumptions, farmers prioritise crops with the highest returns, without needing to comply with rules related to crop diversification, rotation, or maintaining a mandatory share of land under non-productive uses (e.g., fallow). This increased flexibility adds approximately 11.4 billion EUR to gross farm income across the EU, attributable solely to the removal of the GAECs included in this modelling exercise. However, the CAP payments amount to 49.5 billion EUR, significantly outweighing the gains of the GAECs removal. Therefore, the net effect of the NoCAP scenario is a projected net reduction of gross farm income of approximately 11% relative to the baseline. Figure 44 shows the net changes in the aggregated farm income across the different farm types in the EU.

Figure 44. Gross income changes by farm specialisation (NoCAP vs baseline, 2040)



Source: IFM-CAP projections

To disentangle the impact of removing CAP payments from GAEC management practices, Table 9 shows the relative importance of CAP payments in farmers' income in the baseline. Farms specialised in arable crops (TF 15 and 16), Specialist olives, Specialist sheep & goats, and Specialist cattle show the highest dependence on CAP payments. Consequently, these farm types experience the most pronounced income reductions when direct support is withdrawn.

Table 9. CAP payments as a share of farm gross income (baseline 2040)

Farm specialization	%		Farm specialization	%
(49) Specialist cattle	37.9%		(80) Mixed crops and livestock	14.0%
(15) Specialist COP	22.4%		(38) Permanent crops combined	12.3%
(37) Specialist olives	19.3%		(70) Mixed livestock	9.9%
(16) Specialist other fieldcrops	17.9%		(45) Specialist milk	8.7%
(48) Specialist sheep and goats	15.5%		(35) Specialist wine	7.4%
(36) Specialist orchards - fruits	14.4%		(50) Specialist granivores	5.5%
(60) Mixed crops	14.2%		(20) Specialist horticulture	1.9%

Source: IFM-CAP projections

The removal of CAP payments would increase the number of farms with a negative gross margin, which serves as a proxy indicator for potential farm exits. Table 10 presents the change (in percentage points) in the share of farms with negative gross margins under the NoCAP scenario compared to the baseline. The most affected farm types are permanent crop farms, with crops such as apples and citrus fruits, with an increase by 12 percentage points in the number of farms with negative income. Specialist cattle farms are also among the most affected (+11 percentage points), whereas dairy farms are comparatively less affected by the withdrawal of CAP support.

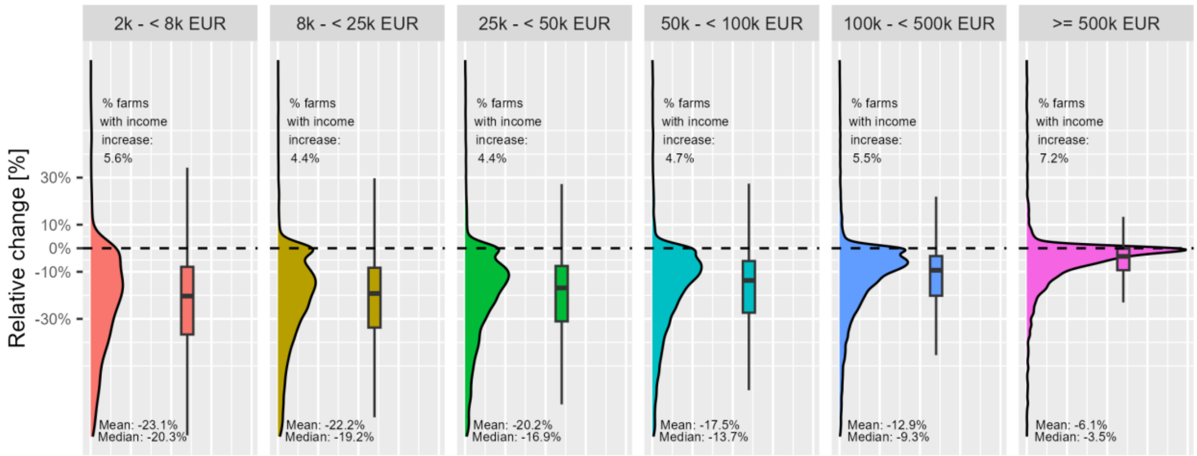
Table 10. Change in share of farms with negative gross margins (NoCAP vs baseline, 2040)

Type of farm	**Change** (in percentage points)
(15) Specialist COP	3
(16) Specialist other fieldcrops	3
(20) Specialist horticulture	2
(35) Specialist wine	1
(36) Specialist orchards - fruits	12
(37) Specialist olives	5
(38) Permanent crops combined	3
(45) Specialist milk	0
(48) Specialist sheep and goats	2
(49) Specialist cattle	11
(50) Specialist granivores	2
(60) Mixed crops	3
(70) Mixed livestock	1
(80) Mixed crops and livestock	4

Source: IFM-CAP projections

Farm financial vulnerability also varies by economic size. The number of farms with negative income decreases as farm size grows. Farms with negative gross margin are mainly farms belonging to smaller economic size classes (below 50k EUR total output). Figure 45 shows the distribution of the impacts on gross income by economic size of the farms. Small farms are disproportionally affected by the loss of CAP support, experiencing greater income reductions (average -23%) compared to larger farming businesses (average -6%).

Figure 45. Gross income changes by economic size class (NoCAP vs baseline, 2040)

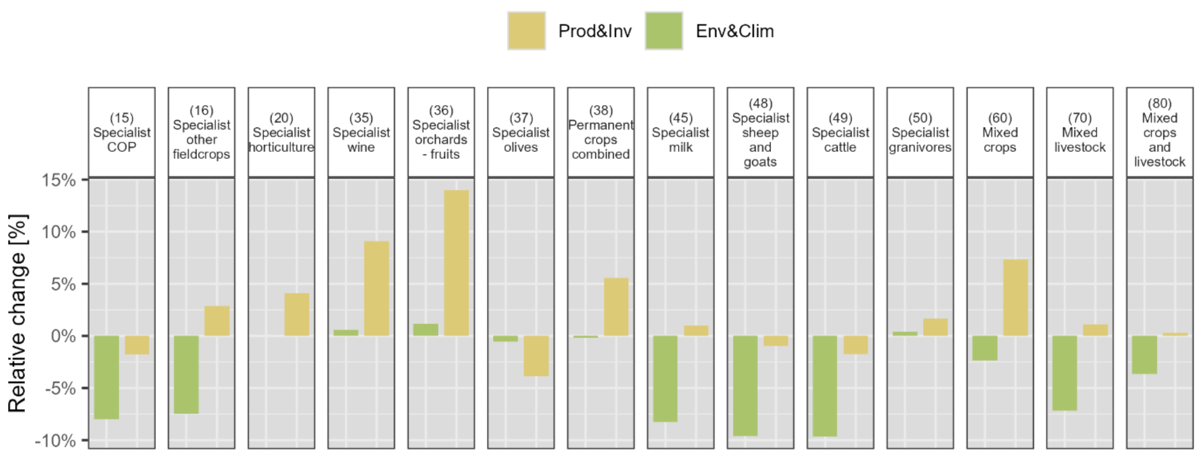


Source: IFM-CAP projections

CAP scenarios

The two CAP scenarios considered in this study lead to contrasting effects on farm income for most farm specializations (Figure 46). The Prod&Inv scenario, in which CAP payments are allocated towards productivity-increasing measures, leads to higher gross income across most farm specializations. Income gains are most notable among farms with permanent crops. Conversely, the Env&Clim scenario, which shifts more CAP budget towards Eco-schemes and ENVCLIM measures, results in lower income for almost all farm types. The exceptions are wine and fruit farms, and farms raising granivores, which experience marginal income gains under this scenario. Farms specialised in cattle, and sheep and goats are the most negatively affected by the Env&Clim scenario, with projected income declines of 9.7% and 9.6%, respectively.

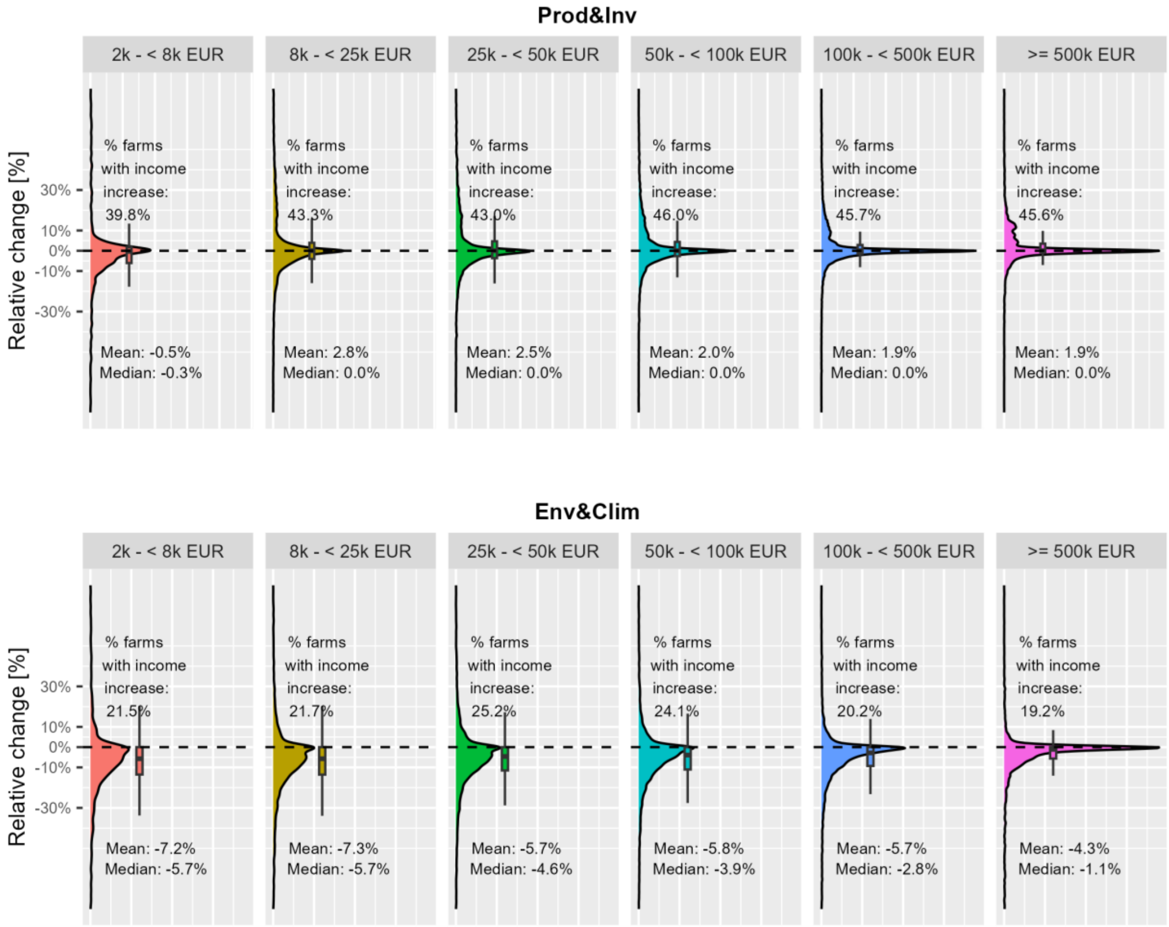
Figure 46. Gross income changes by farm specialisation (Prod&Inv and Env&Clim vs baseline, 2040)



Source: IFM-CAP projections

Figure 47 shows the distribution of income impacts across farm economic size classes. In the Prod&Inv scenario, income changes are clearly more concentrated around zero, indicating smaller overall impacts compared to the Env&Clim scenario. The income effect is negative (-0.5% on average) for the smallest size class, and positive on average for all other farm categories. In IFM-CAP, the increase in the INVEST budget is modelled as an expansion in the number of farms eligible for INVEST payments. These payments are assumed to enhance productivity among recipient farms. The probability of a farm receiving INVEST support is estimated using a propensity score matching approach, which identifies FADN farms with similar characteristics to those already receiving INVEST support and are thus more likely to benefit from future allocations. This targeting pattern, combined with a concurrent reduction in other CAP payments, contributes to a slight average income decline for the smallest farm size class in the Prod&Inv scenario (although 40% of farms in this size class nonetheless experience an income increase). In the Env&Clim scenario, income effects are more dispersed and skewed towards losses. Farms in the biggest size category (>500,000 EUR) are the least affected on average by an income reduction, while the smallest farm size classes are the most affected. Nonetheless, some farms would see their income increasing in this scenario, mostly farms specialized in permanent crops, but they represent a small proportion of farms in each economic size class (20% in the smallest size class and 17% in the biggest size class).

Figure 47. Gross income changes by economic size class (Prod&Inv and Env&Clim vs baseline, 2040)



Source: IFM-CAP projections

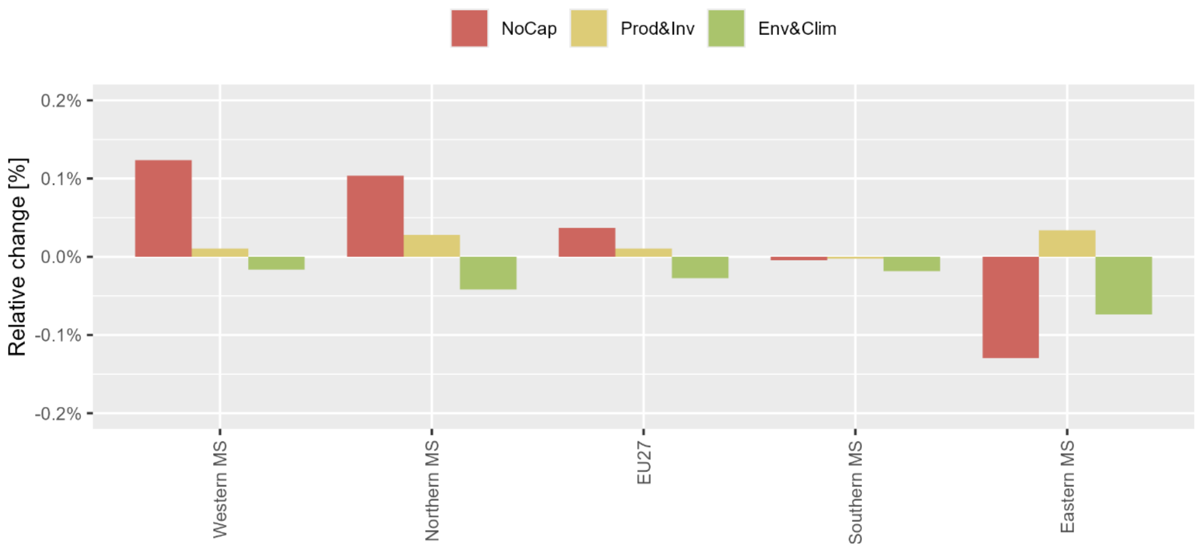
Overall, the Env&Clim scenario results in larger income effects than the Prod&Inv scenario in IFM-CAP. However, the mechanisms behind these changes are complex and income variations arise from multiple factors. In Env&Clim, income declines primarily come from the reductions in BISS (cut by 80% in Env&Clim, compared to 7% in Prod&Inv) and coupled support (CIS), alongside the added costs or constraints from meeting stricter environmental requirements. In contrast, the Prod&Inv scenario mainly generates gains through yield increases and cost reductions for the subset of farms that newly receive INVEST support, limiting the breadth and depth of its overall impact (see also Annex 4.3 for more information on the IFM-CAP modelling approach).

6.2 Overall impacts on GDP and the share of agri-food value added

Overall impacts on GDP

Figure 48 illustrates the impact of removing the CAP and of the two CAP scenarios on GDP relative to the baseline at the EU level and across four geographical groupings. At the aggregate EU level, the removal of the CAP leads to a marginal increase in GDP (+0.04%). However, the impacts vary significantly across MSs, reflecting differences in economic structure, CAP dependency, and resource reallocation dynamics, as well as modelling assumptions about allocation of tariff revenues to MSs rather than to the EU budget. In general, the most pronounced effects are for Western and Northern MSs (typically net contributors to the CAP) exhibit modest positive impacts slightly exceeding +0.1%, while Eastern MSs (generally net beneficiaries) experience the largest GDP decrease with an average decline of 0.13%. In essence, net contributor countries could benefit from the removal of the CAP as they could redistribute the funds to more productive domestic uses, whereas net beneficiary countries suffer net losses even if they redistribute the forgone CAP funds efficiently, given the overall decline in available resources. Ultimately, the reallocation of financial resources to other sectors has a slightly net positive effect on the EU's GDP, with services or manufacturing activities registering slight increases in value added under the NoCAP scenario.

Figure 48. GDP changes by EU geographical blocks (scenarios vs baseline, 2040)



Source: MAGNET projections

Regarding the CAP scenarios, the overall GDP impact is generally more limited in absolute terms compared to the NoCAP scenario, but more evenly distributed across MSs. The Prod&Inv scenario leads to a GDP level slightly above the baseline (+0.01%), with Eastern MSs being the most positively affected group (+0.04%). Northern and Western MSs also have slightly higher levels of GDP (+0.02% and +0.01%, respectively), while Southern MSs see virtually no change in their GDP.

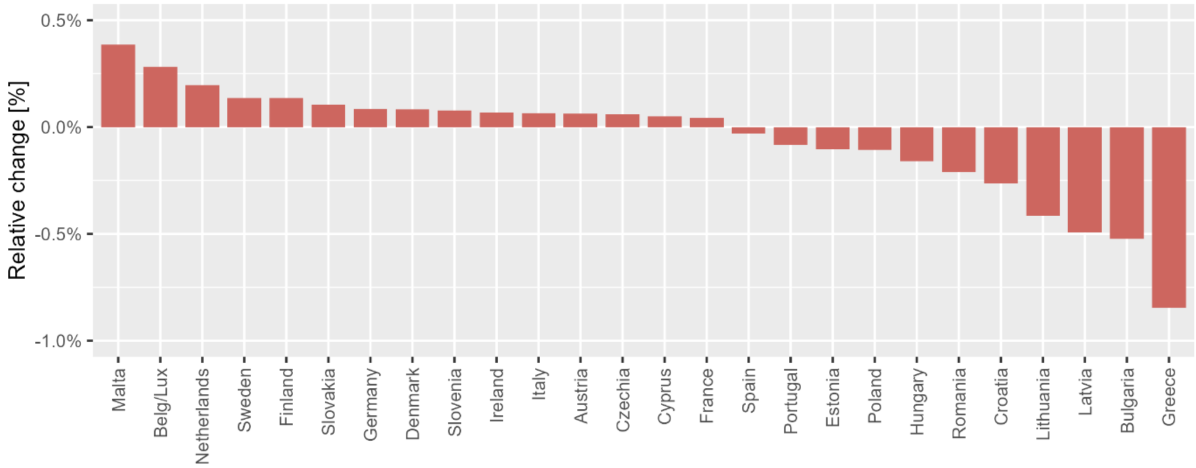
Conversely, the Env&Clim scenario leads to a slightly negative impact on the EU GDP (-0.02%). This impact is observed across all geographical groupings, with the Eastern MSs being the geographical area that experiences the largest decline (-0.07%), followed by Northern MSs (–0.04%), while

Western and Southern MSs see smaller GDP reductions (approximately 0.015%). Further details on these changes at the MSs level follow in the subsequent sections.

NoCAP scenario

A more granular analysis at the MS level (Figure 49) reveals considerable heterogenity in GDP impacts under the NoCAP scenario. The effects range from a -0.8% GDP reduction in Greece (the most negatively affected MS) to small increases of 0.3% in Malta and 0.25% in Belgium and Luxemburg.

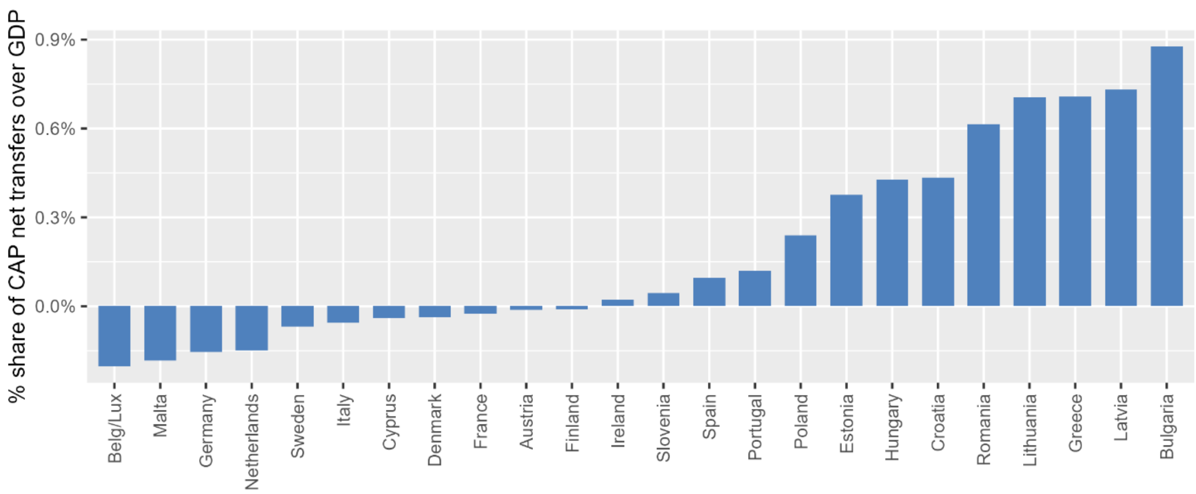
Figure 49. GDP changes by MS (NoCAP vs baseline, 2040)



Source: MAGNET projections

The impact of removing the CAP reveals the redistributive effects of this policy. Indeed, the MSs most negatively affected are typically those that receive larger net CAP transfers relative to their GDP in the baseline (Figure 50). Conversely, the MSs with net contributions to the CAP, predominantly Western EU MSs, are able to reallocate the released fiscal resources to other sectors of their economies. Additionally, these MSs may gain market share in certain agri-food sectors at the expense of those MSs that lose competitiveness following the removal of CAP payments.

Figure 50. Net CAP transfers as a share of GDP (baseline 2040)

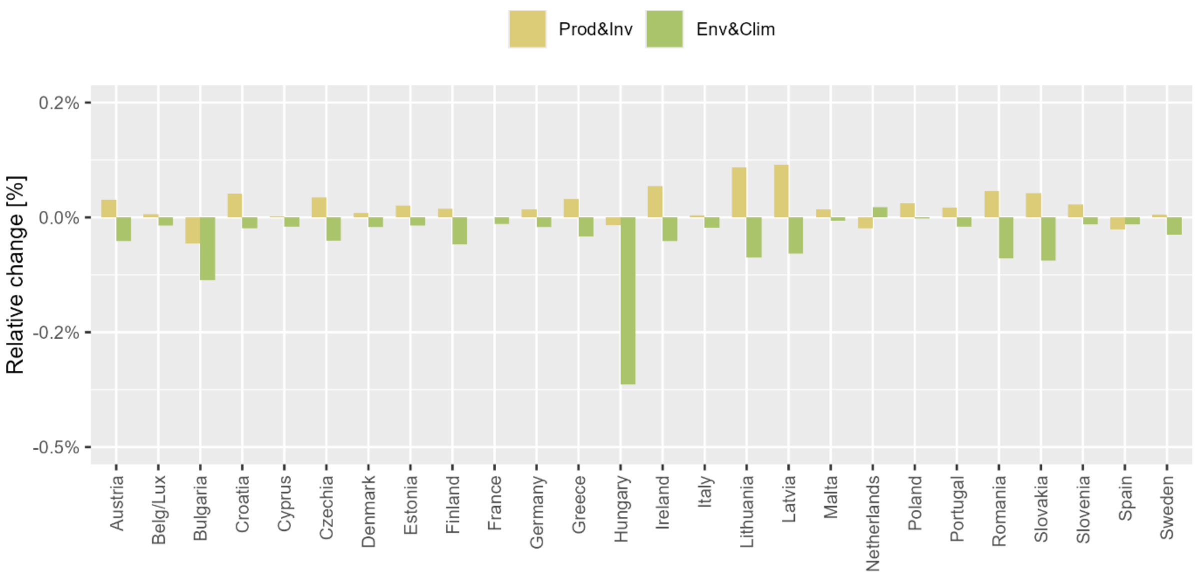


Source: MAGNET projections

CAP scenarios

Figure 51 shows the impact on GDP under the two CAP policy scenarios. In general, the impact on GDP of these two scenarios are marginal for most MSs (ranging between –0.1% and +0.1%), yet, as anticipated in Figure 48, Eastern MSs display stronger impacts on average in both scenarios, but in different directions, following the orientation of the scenarios. In the Prod&Inv scenario, most MSs experience GDP growth, as CAP funding is redirected towards investment-driven productivity improvements. Eastern MSs benefit the most, as productivity improvements in their agricultural activities translate into broader economic growth. In contrast, under the Env&Clim scenario, most MSs see a slight reduction in their GDP levels, more pronounced in Central and Eastern MSs. The magnitude of the impact depends on the composition of the CAP budget, national co-financing, productivity effects, and related to these factors, the relative loss of competitiveness compared to other MSs.

Figure 51. GDP changes by MS (Prod&Inv and Env&Clim vs baseline, 2040)



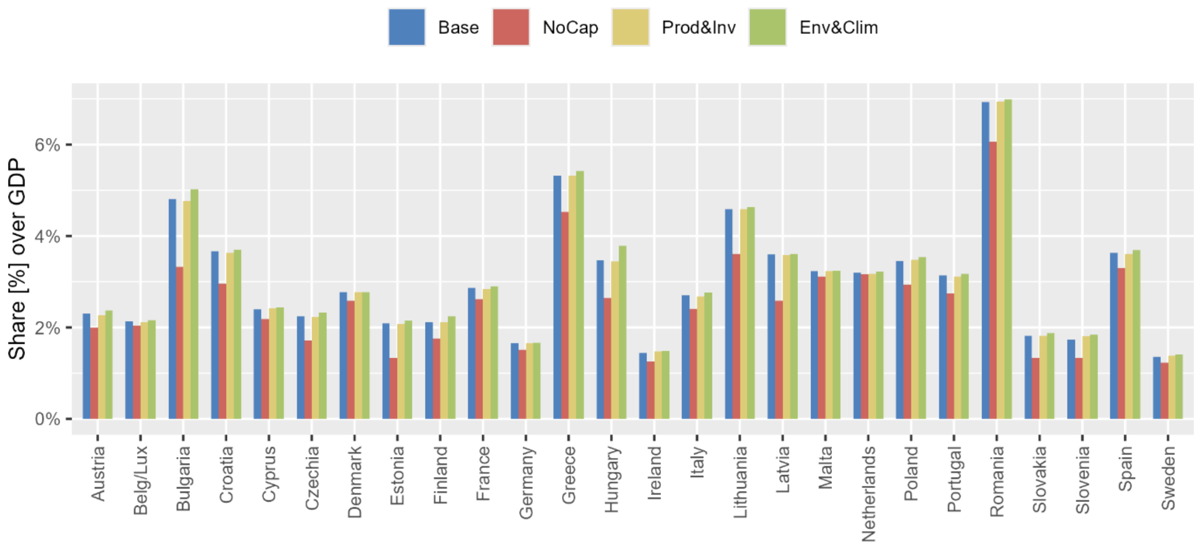
Source: MAGNET projections

Share of agri-food value added over GDP

Under the NoCAP scenario, those MSs whose economy is more dependent on the agricultural sector experience a significant reduction in the share of value added from agri-food production relative to GDP (Figure 52). In Bulgaria, the agri-food sector's contribution to GDP declines from 4.8% in the baseline to 3.3% in the NoCAP scenario. In Romania, the importance of the agri-food sector would diminish to 6.1% of GDP (compared to 6.9% in the baseline), while in Greece, the contribution of the agri-food sector would fall from 5.3% to 4.5%. At the EU level, the share of value added from agri-food production over GDP declines from 2.6% in the baseline to 2.4% in the NoCAP scenario.

Under the CAP scenarios, no significant changes are observed in the share of agri-food value added over GDP, therefore remaining approximately at the same level in all MSs. This suggests that while the scenarios differ in policy directions, neither scenario induces major shifts in the relative economic role of the agricultural sector across MSs.

Figure 52. Share of agri-food value added over total GDP by country (scenarios and baseline, 2040)



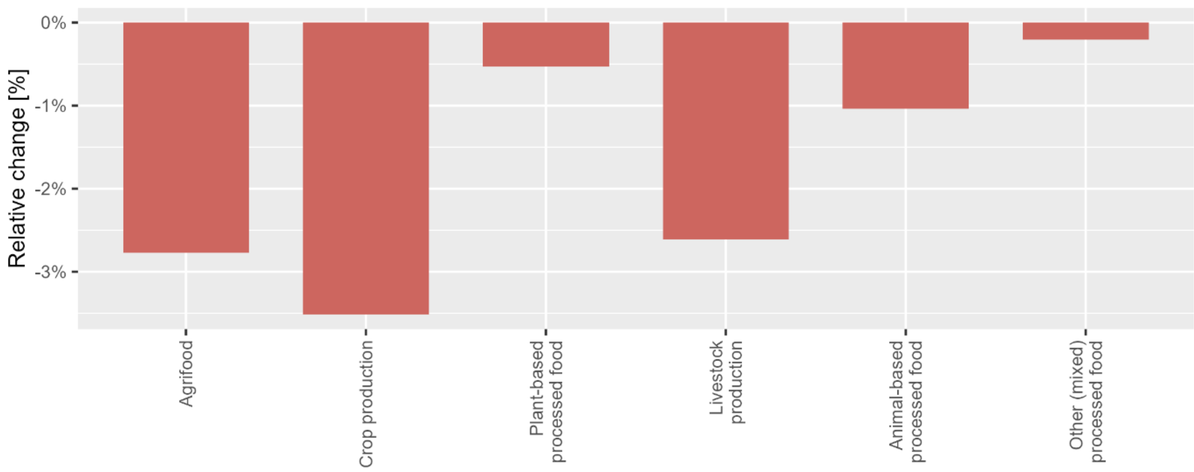
Source: MAGNET projections

6.3 Labour

NoCAP scenario

Consistent with its impact on production, the NoCAP scenario has a negative outcome for the labour market. The overall decrease in the agri-food sector employment at the EU level is estimated to be around 2.8%. Based on Eurostat data on employment in agriculture this is equivalent to a reduction of approximately 250,000 jobs. Crop production is the most affected sector with a decline in employment of 3.5%, followed by a 2.6% decrease in the livestock sector (Figure 53). Employment in the animal-based processed food sector is projected to decrease by approximately 1.0%, while the plant-based processed food sector and the mixed sector would register reductions of around 0.5% and 0.2%, respectively.

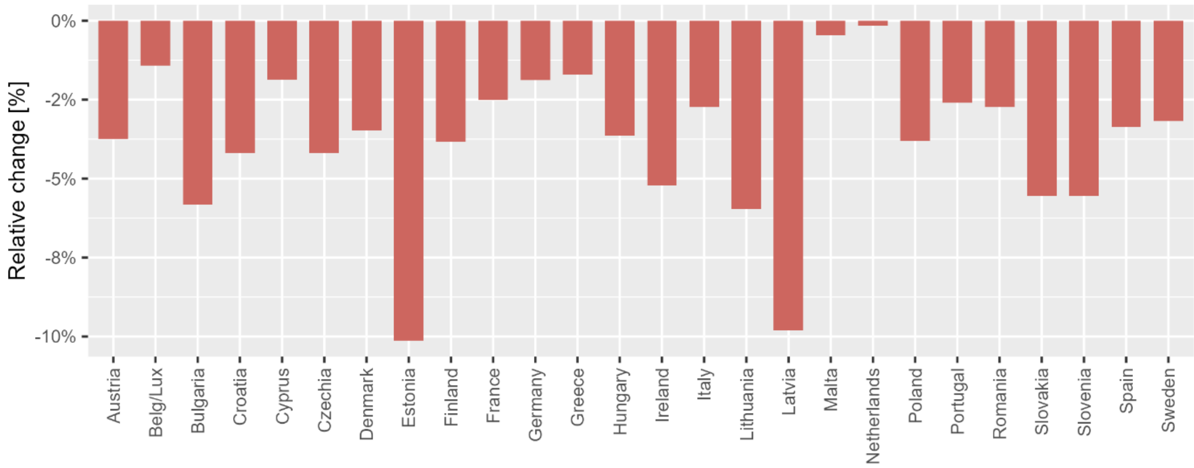
Figure 53. EU agri-food jobs changes by commodity (NoCAP vs baseline, 2040)



Source: MAGNET projections

As shown in Figure 54, the NoCAP scenario's impact on the agri-food labour market is negative but heterogeneous across MSs. In general, Eastern MSs experience the largest decreases in employment, with Estonia and Latvia showing the most pronounced reductions. These effects are mainly driven by the contraction in crop production in most Eastern MSs because of a higher reliance on CAP support and, therefore, bigger impacts from the CAP removal.

Figure 54. Agri-food jobs changes by MS (NoCAP vs baseline, 2040)



Source: MAGNET projections

CAP scenarios

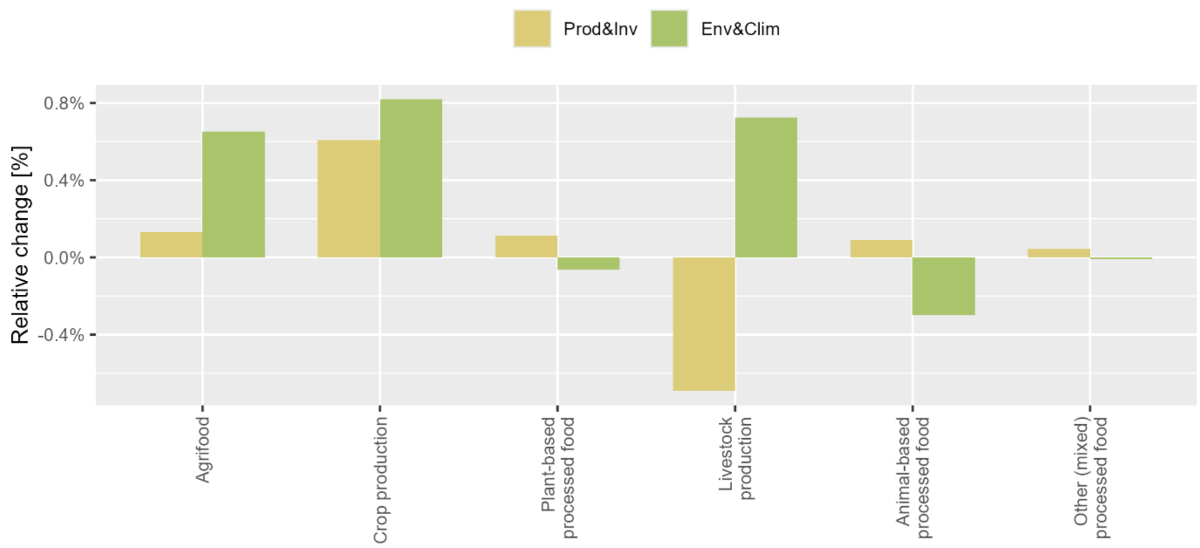
The changes in the agri-food sector employment under the CAP scenarios are largely determined by production and productivity dynamics, as shaped by the main assumptions in each scenario.[13]

Overall, impacts on agri-food employment under the CAP scenarios are moderate, reflecting a balance between productivity improvements and sectoral reallocation effects. As shown in Figure 55, in the Prod&Inv scenario, total employment in the agri-food sector shows a small increase, slightly above +0.1% at the EU level. However, this minor aggregate variation masks some changes in intra-sectoral employment structure. While livestock production activities decline by 0.7% (approximately –28,000 jobs), this effect is offset by increases in other agri-food activities, with crop production employment rising most (+0.6%, 45,000 jobs). These employment changes are below the production changes in the MAGNET simulations, which suggests labour productivity improvements. These productivity gains are linked to the reallocation from environmental payments (Eco-schemes and Pillar 2 agri-environmental payments) towards investment support, which has a positive effect on factor productivity (see Section 2.3.2 on productivity effects in MAGNET). The increase in the number of persons employed in crop production activities (as opposed to the decrease in livestock production ones) can be also attributed to higher payments for sectoral interventions, which are particularly relevant in absolute terms for fruit- and vegetable-related categories. As a result, these sectors register high growth in production, with a subsequent increase in land demand and employment growth. In contrast, the Env&Clim scenario results in a net increase in employment of 0.65% (+90,000 jobs), primarily driven by crop (+0.8%, 60,000 jobs) and livestock production (+0.7%, 30,000 jobs). These employment expansions in the Env&Clim scenario

13 However, relevant also for the results in the NoCAP scenario, some differences occur compared to the production changes as calculated with the CAPRI model, as MAGNET covers the entire agri-food sector, including food processing, which represents an important share of total agri-food employment.

are driven by the increase of environmental payments, which results in less intensive farming practices, reducing reliance on capital inputs and increasing the use of other production factors, especially in the livestock sector.

Figure 55. EU agri-food jobs changes by commodity (Prod&Inv and Env&Clim vs baseline, 2040)

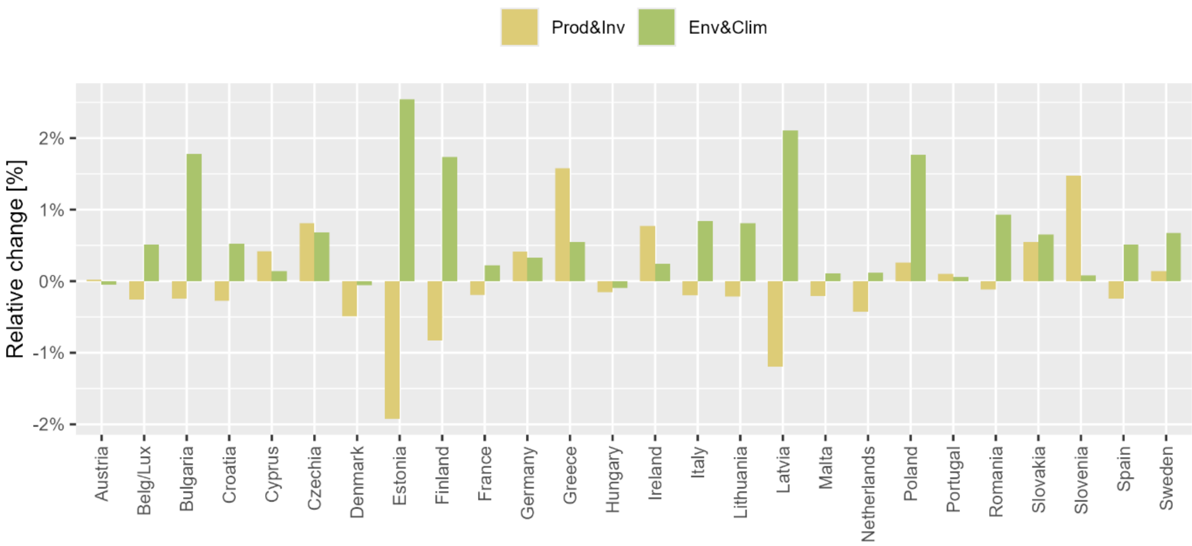


Note: The category "Agrifood" is the aggregate of the five categories shown in this chart. Therefore, it corresponds to the number of persons employed in crop and livestock production, as well as food processing activities.
Source: MAGNET projections

At the MS level, Figure 56 illustrates the divergent employment impacts under the CAP scenarios. In the Prod&Inv scenario, the employment effects are mixed. Notable employment reductions occur in the three MSs Estonia (-1.9%), Latvia (-1.2%), and Finland (-0.8%). These MSs have in common a low exposure to sectoral interventions, meaning CAP budget reallocations mainly affect the Pillar 2 payment structures, rather than directly influencing production. Thus, the increase in payments under the Prod&Inv scenario is not concentrated in products covered by sectoral interventions, but in investments leading to an increase in productivity across all agri-food activities. The reduction in the number of workers in this sector is explained largely by the livestock and animal-based commodities, even when production in these sectors is not decreasing, suggesting that productivity gains rather than output reductions are driving job losses. By contrast, the three MSs that increase their agri-food employment the most are Czechia (+0.8%), Slovenia (+1.5%), and Greece (1.6%). In general, the employment growth in these MSs is driven by the fruit- and vegetable-related sectors, which benefit disproportionally from increased sectoral interventions.

In the Env&Clim scenario, employment increases in almost all MSs (up to 2.5% in Estonia), particularly in those MSs for which a stronger reduction is observed in the Prod&Inv scenario. In these MSs, the main driver of employment changes is again related to the livestock sector due to the adoption of less intensive farming practices and higher labour intensity under environmentally oriented practices. Apart from Estonia, other MSs experiencing notable job growth are Belgium and Luxembourg, Czechia, Poland, Romania, and Sweden. Meanwhile, employment changes in crop and plant-based commodities are particularly notable in Czechia, Germany, Italy, Poland, Romania, and Spain.

Figure 56. Agri-food jobs changes by MS (Prod&Inv and Env&Clim vs baseline, 2040)



Source: MAGNET projections

7 Results: Environmental impacts

This chapter presents scenario impacts across a range of environmental indicators, including changes in utilized agricultural area (Section 7.1), GHG emissions from agriculture (Section 7.2), nitrogen surplus (Section 7.3), crop diversity (Section 7.4), pressure on water resources (Section 7.5), and farm input intensity (Section 7.6).

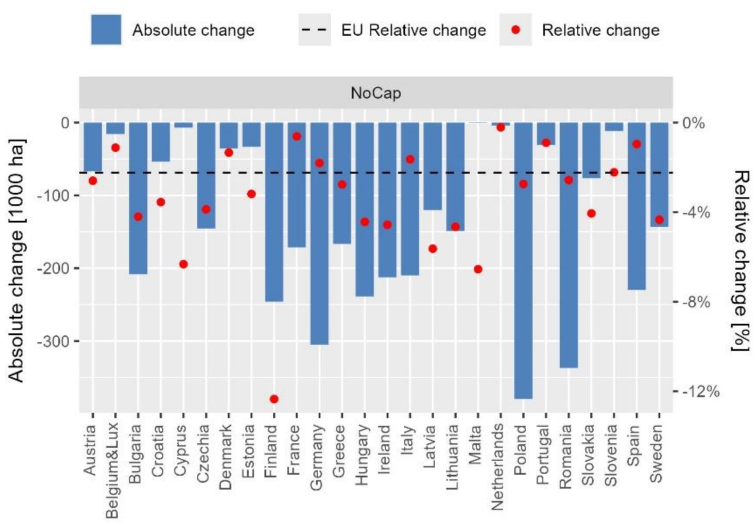
7.1 Land use

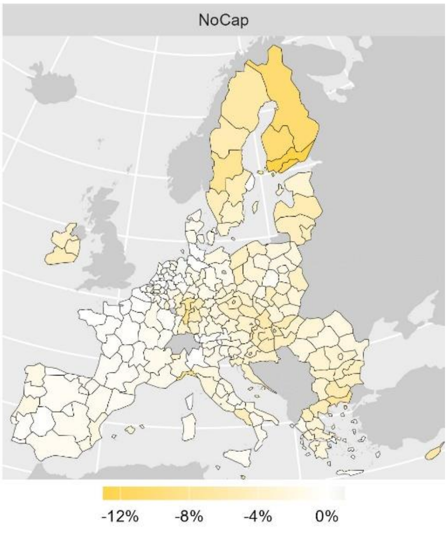
NoCAP scenario

In the NoCAP scenario, the significant changes in production result in a 2.2% decline in the EU's utilized agricultural area (UAA), equivalent to approximately –3.6 million ha. In absolute terms, the largest decline occurs for cereals, with a reduction of 1.2 million ha (-2.5%), driven primarily by considerable decreases in areas of wheat (-3.8%) and barley (-2.5%). Oilseeds area is reduced by 121 thousand ha (1.1%). With the removal of BISS and coupled support for protein crops, the most pronounced relative reductions are indicated for areas dedicated to soybeans and pulses, decreasing by -15% and 11%, respectively, reflecting a shift away from these comparatively less profitable crops in the absence of CAP support.

Figure 57 shows that most MSs experience land abandonment under the NoCAP scenario. In relative terms, Finland faces the most substantial decline in UAA (-12%, -245 thousand ha), followed by Cyprus and Malta (about -6%, albeit from relatively small absolute values in the baseline), Latvia (-5.6%), Lithuania (-4.7%), and Ireland (-4.6%). In absolute terms, UAA reductions are largest in Poland (-380 thousand ha, -2.7%) Romania (-337 thousand ha, -2.6%), and Germany (-305 thousand ha, -1.8%).

Figure 57. Utilized Agricultural Area changes by MS and NUTS2 (NoCAP vs baseline, 2040)





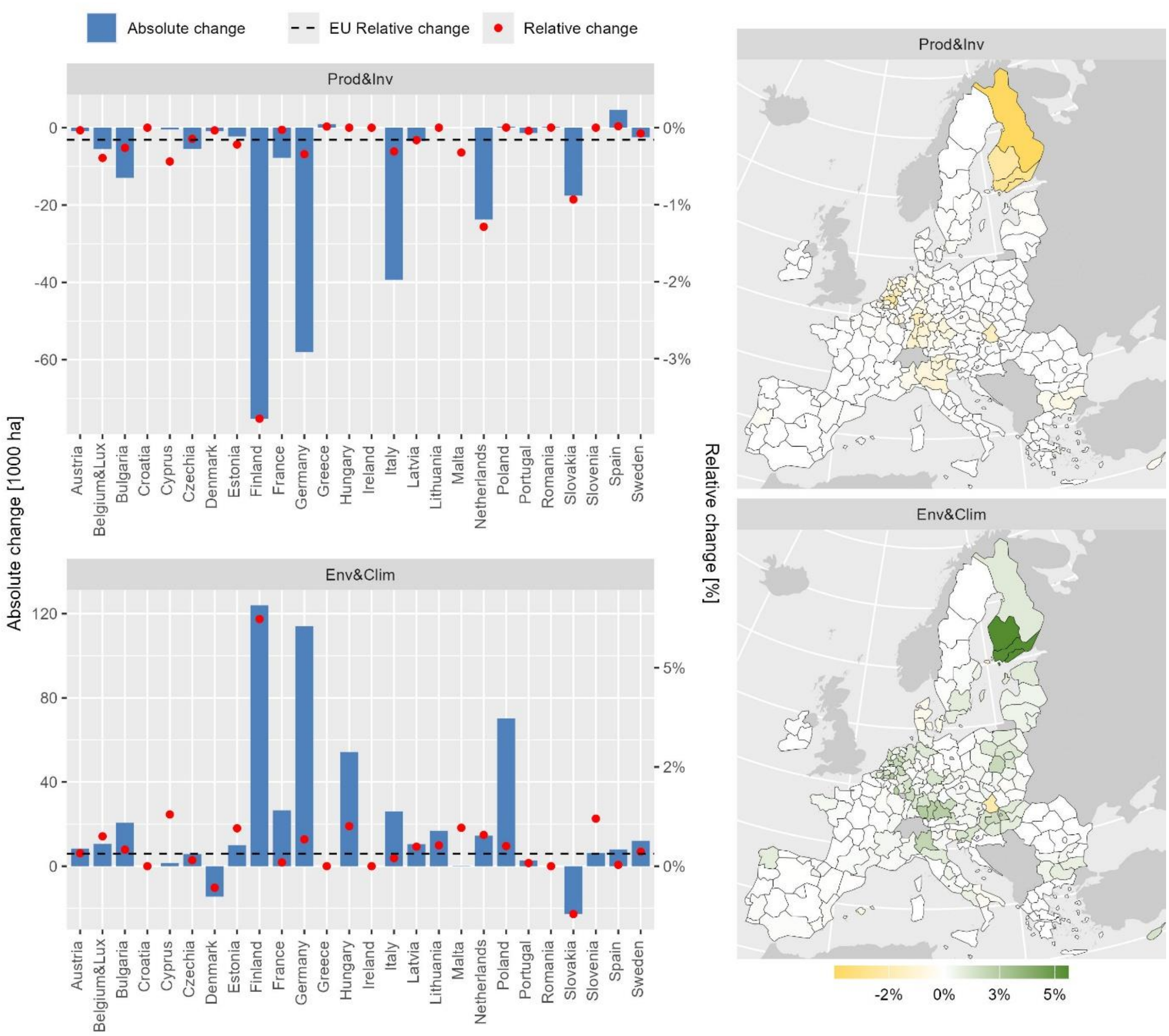
Source: CAPRI projection

At NUTS 2 level, land abandonment in relative terms is particularly pronounced in the Finish regions Etelä-Suomi, Länsi-Suomi, and Pohjois-Suomi (with UAA reductions between -17% and -10%), Liguria (-10%) in Italy, Karlsruhe in Germany and North Middle Sweden (-8% each). All these reductions are primarily due to decreases in cereals area following the CAP payments removal. Eastern Macedonia and Thrace in Greece shows an UAA reduction of 7%, which is mainly due to reduced cotton area. In absolute terms, the largest regional UAA reductions are projected for Ireland's Southeast and Eastern (-124 thousand ha) and Border, Midlands and Western regions (-89 thousand ha) with almost equal contributions from declines in cereals and fodder areas. These reductions are followed by the before mentioned Finish regions, which lose between 85 and 65 thousand ha of UAA.

CAP scenarios

In the Prod&Inv scenario, following the enhanced CAP focus on productivity and investment and their associated assumed yield increases, the EU's UAA is projected to decrease by 0.2% (-252 thousand ha). Most MSs show some degree of UAA abandonment, as the productivity gains allow for the same or higher production levels on a smaller area (see section 4.1 for production impacts). The largest absolute reductions in UAA are projected for Finland (-75 thousand ha), Germany (-58 thousand ha), Italy (-39 thousand ha), and the Netherlands (-24 thousand ha). Conversely, Spain, Greece, Poland, and Romania show minor increases in UAA, but they are not significant (below 0.02%) (Figure 58).

Figure 58. UAA changes by MS and NUTS2 (Prod&Inv and Env&Clim vs baseline 2040)



Source: CAPRI projection

The Env&Clim scenario shows an overall decrease in EU UAA by 0.3% (-505 thousand ha). However, the environmental emphasis of the scenario leads to an increase in UAA in many MSs, as farmers try to partially compensate for the assumed negative impacts on yields associated with the scenario. This increase is mainly driven by expansions in cereals area, with most MSs showing an increase in UAA, particularly Finland (+124 thousand ha, +6.2%), Germany (+114 thousand ha, +0.7%), Poland +70 thousand ha, +0.5%). Slovakia (-23 thousand ha; -1.2%) and Denmark (-14 thousand ha, -0.5%) are the only two MSs with decreases in UAA, which in both cases is mainly the result of reduced fodder activities, following the decrease in livestock production (see section 4.2).

7.2 Agriculture GHG emissions

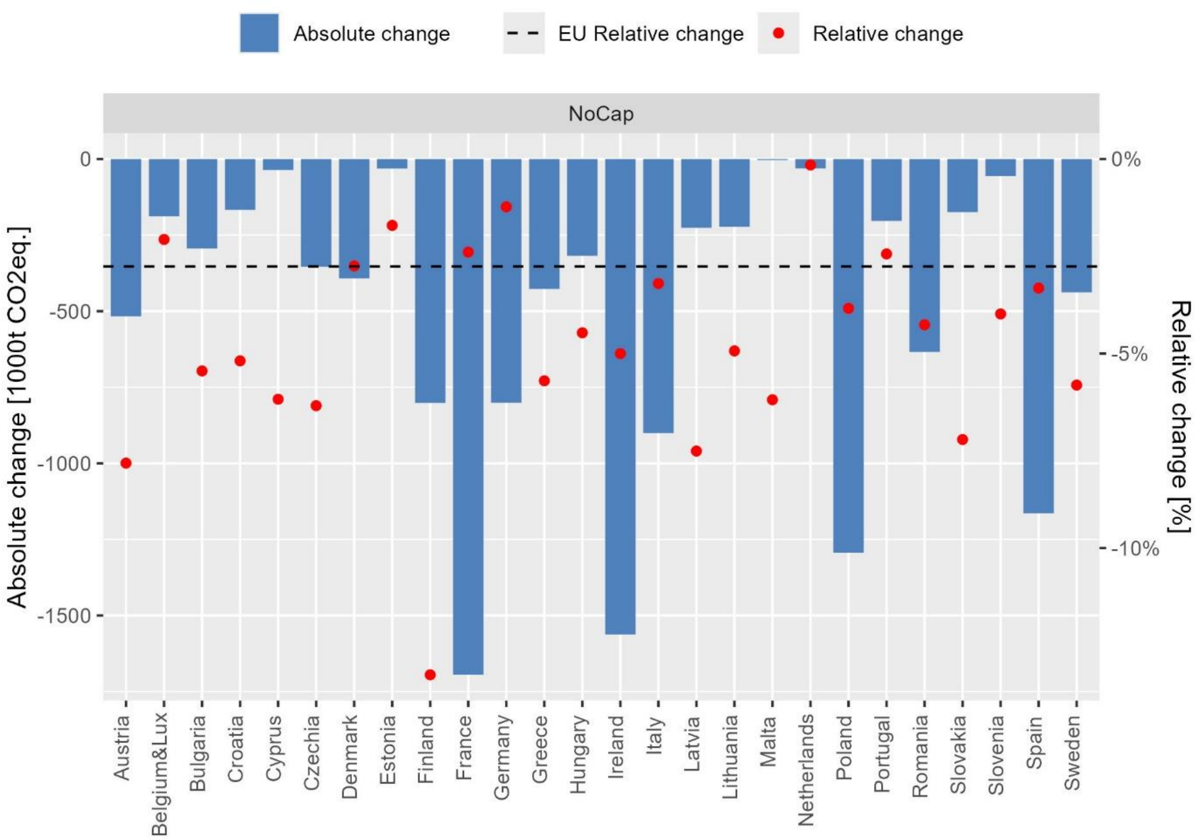
NoCAP scenario

Following the reduction in agricultural production levels under the NoCAP scenario, EU agriculture GHG emissions (non-CO2 emissions, measured in CO2 equivalents) decrease by 3.3% (-12.4 MtCO2e), which is a direct consequence of the decline in production levels. With both UAA and livestock numbers decreasing, methane emissions decrease by 1.8% and nitrous oxide emissions by 5.9%. The biggest contributions to agriculture emissions decline in absolute terms come from decreases in methane emissions from enteric fermentation (-1.8%) due to the decrease in the livestock herd, the reduction of nitrous oxide emissions from crop residues (-7%) and of mineral fertiliser application (-4.7%) mainly due to the decline in cultivated area, followed by nitrous oxide emissions from manure application (-3.9%) and management (housing and storage, -4.8%). Most MSs show a decrease in GHG emissions, with the highest relative agricultural emission decreases projected for Finland (-13%), Austria (-7.8%), Latvia (-7.5%), and Slovakia (-7.2%). However, in absolute terms, France (-1.7 million tonnes, -2.4%), Ireland (-1.6 million tonnes, -3.8%), Poland (-1.3 million tonnes, -3.8%), and Spain (-1.2 million tonnes, -3.3%) experience the largest decreases in agriculture GHG emissions.

The decreases in EU emissions in the agriculture sector are subject to substantial emissions leakage, as agricultural production in the rest of the world increases to compensate for increased EU imports and decreases in EU exports. As EU agricultural production is relatively emission-efficient compared to most other world regions, the agriculture emissions reductions in the EU are more than offset by a 20.6 MtCO2e increase in emissions in non-EU countries (emission leakage of 166%)[14], leading to an overall net increase in global emissions by 8.2 MtCO2e (+0.2%) (Figure 60).

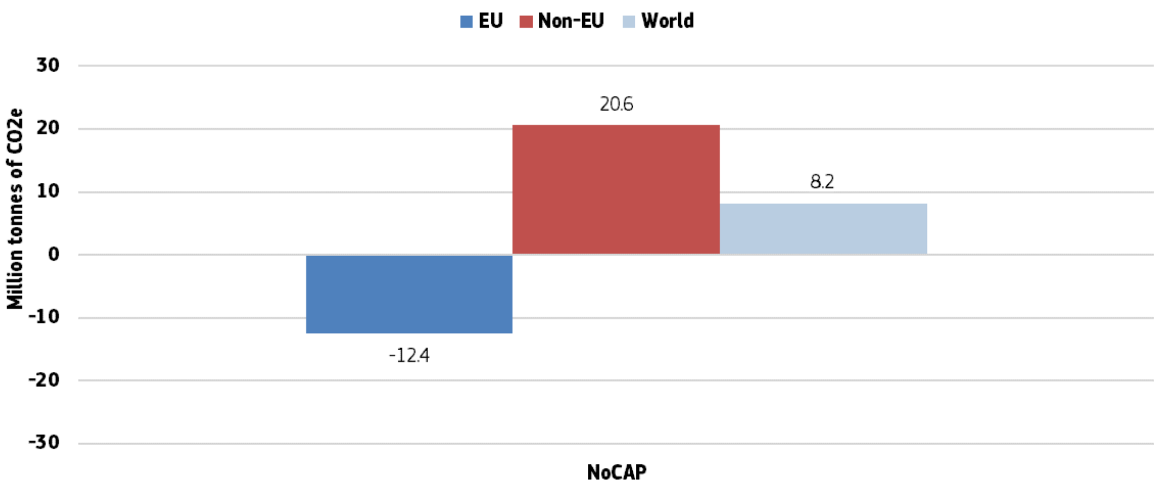
[14] Leakage in percentage terms is calculated as emission increase outside the EU divided by emission decrease in the EU.

Figure 59. GHG emissions in agriculture changes by MSs (NoCAP vs baseline, 2040)



Source: CAPRI projections

Figure 60. EU and global agriculture (non-CO2) GHG emissions changes (NoCAP vs baseline, 2040)



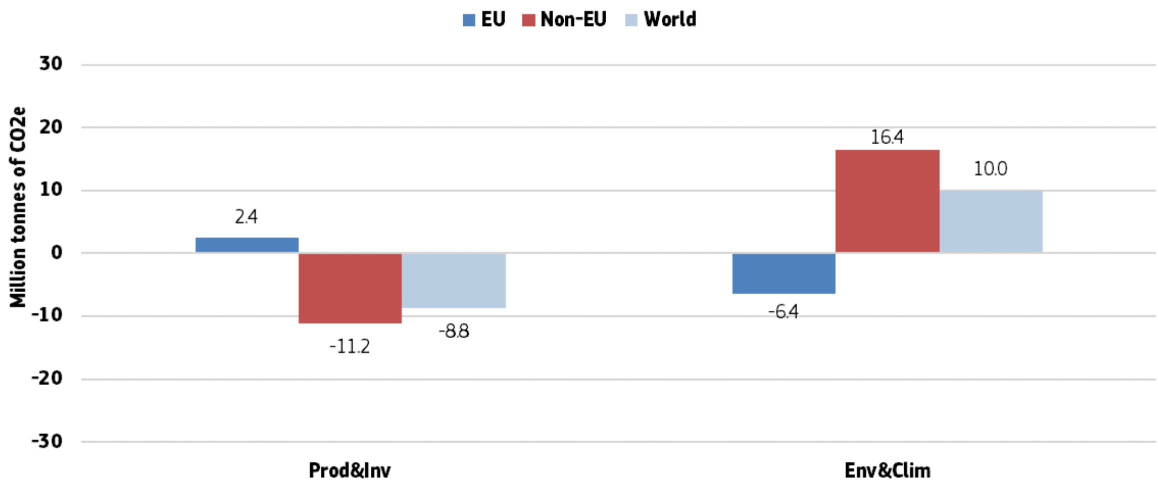
Source: CAPRI projections

CAP scenarios

Following the increase in agricultural production levels under the Prod&Inv scenario, EU agriculture GHG emissions show an increase in emissions by approximately 2.4 MtCO2e (+0.5%) compared to the baseline. As the EU increases its production and exports, non-EU countries decrease their production, which leads to a decrease in non-EU agriculture emissions by 11 MtCO2e (-0.2%) compared to the baseline (leakage gain). As a result, global GHG emissions from the agriculture sector are projected to decrease by almost 9 MtCO2e (-0.2%) (Figure 61).

Conversely, and again following mainly the production changes in the EU, in the Env&Clim scenario, EU agriculture emissions decrease by about 6.4 MtCO2e (-1.7%) compared to the baseline. To compensate for the increase in EU imports and decrease in EU exports, agricultural production in non-EU countries increases, with an associated increase in non-EU agriculture emissions of 16.4 MtCO2e (+0.3%) compared to the baseline, which leads to a net increase in global agriculture emissions of 10 MtCO2e (+0.2%). As in the NoCAP scenario, this substantial emission leakage can be explained by the relative GHG emission efficiency of the EU agricultural production, which has generally lower emission coefficients than the agricultural production in most non-EU countries.

Figure 61. EU and global agriculture GHG (non-CO2) emissions changes (Prod&Inv and Env&Clim vs baseline 2040)



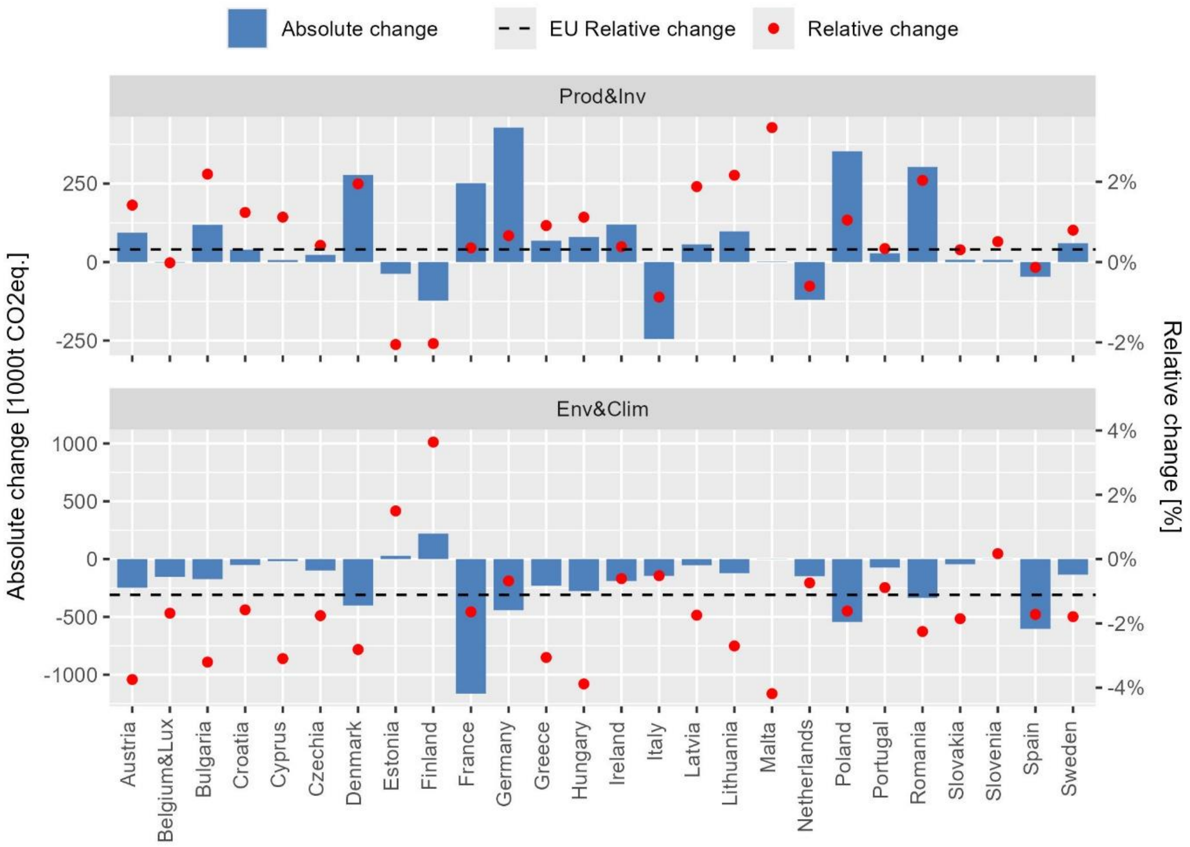
Source: CAPRI projections

Agriculture GHG emissions show heterogeneous trends across MSs in both CAP scenarios, reflecting the diverse production dynamics and sectoral shifts within the national agricultural sectors. In the Prod&Inv scenario (Figure 62), most MSs show a moderate increase in agriculture emissions (between slightly above zero and 3% in Malta) due to the increase in production quantities. In absolute terms, the increase in agriculture GHG emissions is largest in Germany (429 thousand tonnes CO2e, +0.7%), Poland (353 thousand tonnes CO2e, +1%); and Romania (303 thousand tonnes CO2e, +2%). These emission increases are the net results of opposing emission changes in the crop and livestock sectors. For example, in Germany, methane emissions from enteric fermentation decrease due to a decline in animal numbers in the dairy herd. However, this decrease is outweighed by increases in nitrous oxide emissions from manure application (mainly due to an increase in the number of animals for pig fattening), and mineral fertilizer application and crop residues, which increase due to higher productivity and related profitability under the Prod&Inv scenario. Thus, while some MSs with declining livestock production experience reductions in methane emissions, these are often counterbalanced or exceeded by increases in crop-related emissions, particularly those associated with intensified fertilizer use.

In the Env&Clim scenario (Figure 62), most MSs show a moderate decline in agriculture GHG emissions (ranging from slightly below zero to –6% in Portugal), driven by reduced production levels. In absolute terms, the largest decreases are observed in France (–1.16 million tonnes CO2e,

–1.6%), Spain (–604 thousand tonnes CO2e, –1.7%), and Poland (–544 thousand tonnes CO2e, –1.6%). In France, both the crop and livestock sectors contribute to the decline in emissions. Notable reductions occur in nitrous oxide emissions from crop residues and mineral fertilizer use, as well as from grazing and methane emissions from enteric fermentation. These reductions are primarily driven by decreases in beef and dairy production, as well as in fodder cultivation and grazing activity.

Figure 62. GHG emissions in agriculture changes by MS (Prod&Inv and Env&Clim vs baseline 2040)



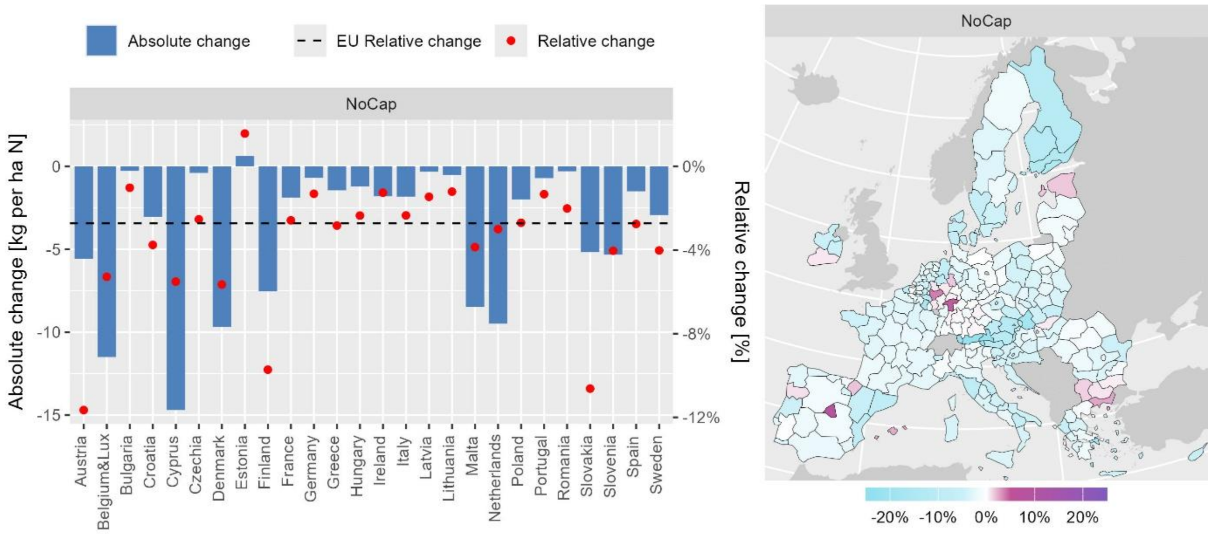
Source: CAPRI projections

7.3 Nitrogen surplus

NoCAP scenario

In the EU, the NoCAP scenario leads to a 4.9% reduction in total nitrogen surplus (Figure 63), an average decrease of 2.7% nitrogen surplus per ha. The reduction primarily occurs due to reduced gaseous N-losses from manure and N-surplus at soil level as a direct consequence of declining production. Livestock reductions lead to important nitrogen surplus declines in several regions with existing N-surplus issues in the baseline, such as Noord-Brabant, Limburg and Gelderland in the Netherlands, West Vlaanderen in Belgium, Catalonia in Spain, and also some Danish regions. While N-surplus generally decreases in the NoCAP scenario due to the production declines, minor increases might also occur in regions where N-surplus is not characterised by high N-surpluses in the baseline (Figure 63) (e.g., Communidad de Madrid and Navarra in Spain, or Köln and Darmstadt in Germany). The only exception occurs in the Southern and Eastern region of Ireland, a region with high surplus already in the baseline, where the NoCAP scenario leads to an increase of 1.3 kg/ha, mostly in N-surplus at the soil level, which is attributable to an increase in more intensive grass and grazing activities that partially counteract a general production decrease in the Irish livestock sector.

Figure 63. N-surplus changes by MS and NUTS2 (NoCAP vs baseline, 2040)



Source: CAPRI projections

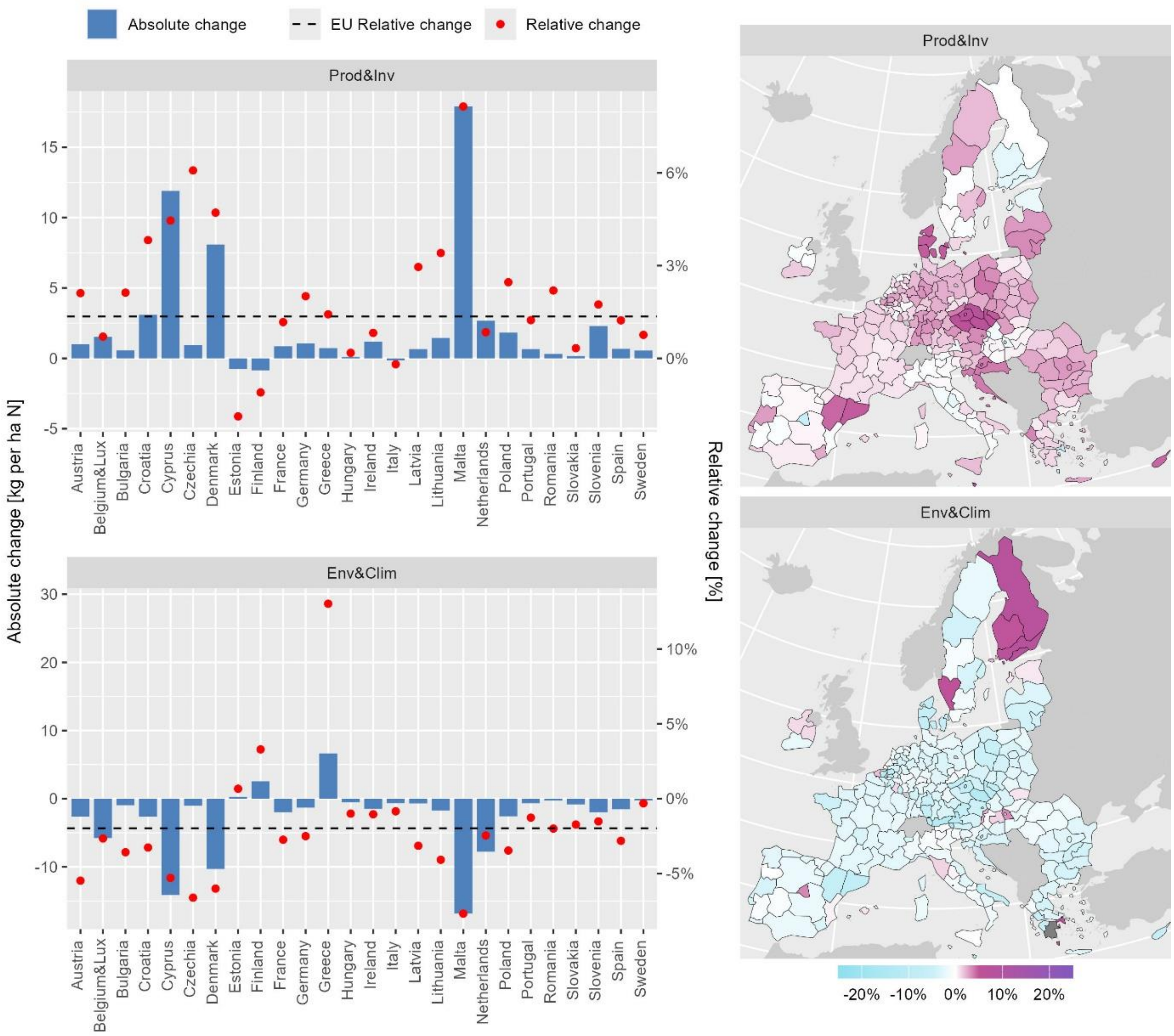
CAP scenarios

Under the Prod&Inv scenario a total EU N-surplus increase slightly by 1.2%, and also N-surplus per ha is indicated, on EU average, to increase by 1.4% (Figure 64). The increase follows production increases and is primarily due to N-surplus at soil level and increased gaseous nitrogen losses from manure and mineral fertilizer. Most MS show an increase in N-surplus compared to the reference scenario. Estonia, Finland and Italy are exceptions, experiencing a decrease in N-surplus under this scenario, following the same production pattern.

The Env&Clim scenario leads to a 1.7% reduction in total EU N-surplus, and an average decrease of 2% nitrogen surplus per ha. The reduction primarily occurs due to reduced N-surplus at soil level and gaseous N-losses from manure and mineral fertilizers as a direct consequence of declining production. However, here again Finland, Estonia, and Greece show the opposite trend, indicating an increase in N-surplus under this scenario as a consequence of the production increase discussed in section 4.

Looking at the regional level, the Prod&Inv scenario leads to slight increases in N-surplus per ha UAA in several regions already experiencing the highest nitrogen surpluses in the baseline scenario, further exacerbating environmental problems. This is particularly evident in the Netherlands (Noord-Brabant, Gelderland, Limburg and Flevoland, with increases between 18 and 5 kg/ha), Catalonia in Spain (8 kg/ha), and Oost-Vlaanderen and Antwerpen in Belgium (7 kg/ha). These increases are mostly driven by N-surpluses at soil level and N-losses from manure due to increased supplies in some crop and livestock categories in these regions. Denmark also experiences an increase of 8 kg/ha, driven by a 2% increase in all primary agricultural outputs and a consequent increase in N-surplus at soil level. Conversely, the Env&Clim scenario generally leads to N-surplus reductions in in those regions with the highest N-surplus in the baseline, indicating an improvement in this environmental indicator. It is important to highlight that most regions with problematic N-surplus levels in the baseline (>150 kg of N per ha UAA) see improvements. For instance, Antwerpen and Oost-Vlannderen in Belgium decrease both by 24 kg N/ha under this scenario, while Noord-Brabant and Gelderland in the Netherlands see a decrease of 24 and 15 kg N/ha, respectively, and Catalonia in Spain shows a decrease of 12 kg N/ha. An exception is the West-Vlaanderen region in Belgium, where N-surplus increases by more than 10 kg N/ha UAA. Increases in other regions and MSs are generally minor and do not occur in areas with existing N-surplus issues.

Figure 64. N-surplus changes by MS and NUTS2 (Prod&Inv and Env&Clim vs baseline, 2040)



Source: CAPRI projections

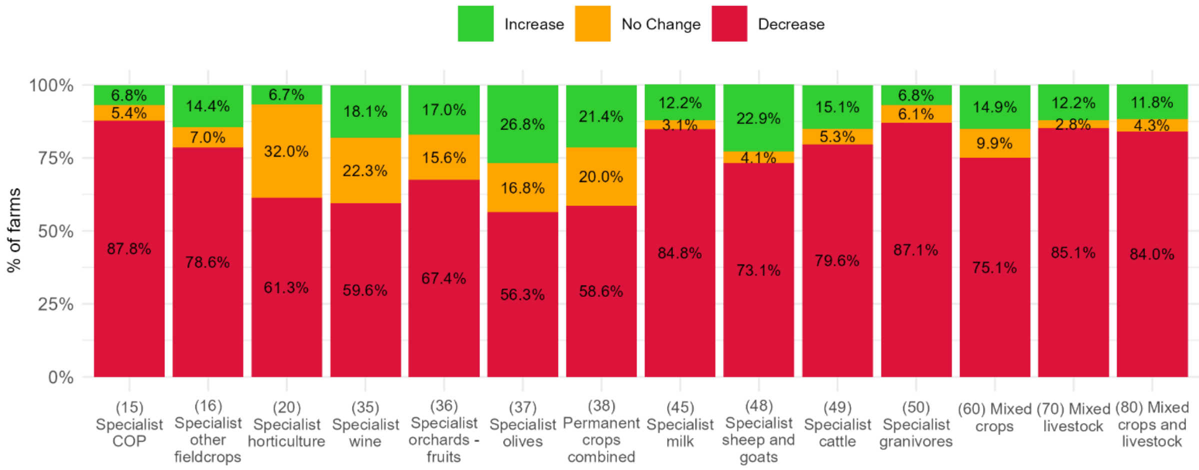
7.4 Crop diversity

To measure the diversity of crops cultivated on a farm, we use the Shannon index. A higher Shannon index indicates a more diverse combination of crops, which can serve as a proxy for a higher level of biodiversity across the farm's UAA.

NoCAP scenario

To assess the impacts of removing the CAP on crop diversity, we estimate the net share of agricultural land with increase or decrease in the Shannon index. When comparing the NoCAP scenario with the baseline, the positive impact of GAEC 7 (applied in the baseline but absent in the NoCAP scenario) on crop diversity becomes evident, with 56-88% of farms within each farm type reducing the variety in their crop mix in the NoCAP scenario (Figure 65). The results are consistent with the proportion of farms adopting GAEC 7 in each farm specialization (reported in Table 5), with Specialist COP, Specialist other fieldcrops, Specialist milk, and Specialist granivores having the highest adoption rates under the baseline.

Figure 65. Share of farms with or without changes in the Shannon index by farming type (NoCAP vs baseline, 2040)



Source: IFM-CAP projections

CAP scenarios

The impact of the CAP scenarios on crop diversity strongly depends on the level of payments allocated to environmentally friendly practices. In the Prod&Inv scenario, where eco-scheme and ENVCLIM payments are reduced, 17 to 41% of farms (depending on the farm specialization) experience a decline in their crop diversity index. Nevertheless, more than half of the farms in the Specialist orchards-fruits and Mixed livestock increase their crop diversity score, reflecting heterogeneity in regional and sectoral responses. Conversely, in the Env&Clim scenario, where a larger proportion of the CAP budget goes into supporting environmental-friendly practices, the majority of farms across all farm types increase their crop diversity (59.1-87.7% of farms, depending on the farm type). The proportion of farms decreasing their crop diversity is very low (less than 7%), expect for farms specialized in olives and other permanent crops.

Figure 66. Share of farms with or without changes of Shannon index by farming type (Prod&Inv and Env&Clim vs baseline, 2040)

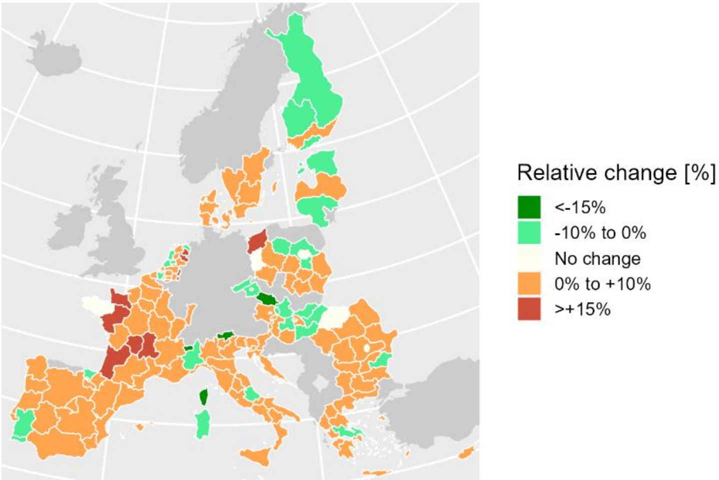
Source: IFM-CAP projections

7.5 Pressure on water resources

NoCAP scenario

Land allocation in this scenario is mostly affected by the removal of GAECs, especially GAEC 8, which in the baseline scenario mandates the maintenance of non-productive features, such as fallow land. Without this constraint, previously fallow areas are brought into production in the NoCAP scenario, which leads also to an increase in irrigated area by 3% at the EU level (Figure 67). This expansion in irrigated land is associated with increased water requirements for irrigation in many regions. The map below shows the percentage change in theoretical water needs at the NUTS2 level, based on the changes in irrigated area. It is important to note that we assume no changes to irrigable area at the farm level (i.e., the maximum number of hectares that could be irrigated is constant across scenarios), and therefore the implications for water abstraction for irrigation could be bigger than reported here, if investments in irrigation infrastructure leads to the expansion of irrigated area. The potential increase in water abstraction for irrigation intensifies pressure on MSs already experiencing water availability challenges, especially Greece, Romania, Malta, and Cyprus (as indicated by their Water Exploitation Index, plus[15]). Additionally, increased agricultural water use could intensify inter-sectoral competition for water resources in countries such as Greece, Cyprus, and Spain, where agriculture already accounts for the majority of total water abstraction[16].

Figure 67. Theoretical water needs for irrigation changes by NUTS2 (NoCAP vs baseline, 2040)



Note: irrigated areas are not reported by Germany in FADN.
Source: IFM-CAP projections

CAP scenarios

The changes in irrigated area between the Prod&Inv scenario and the baseline are not significant (+0.01% in total irrigated area). However, we are assuming no changes in irrigable land. If investment support in this scenario would be used by farmers for improving irrigation infrastructure, the actual expansion in irrigated area could be more pronounced. In contrast, in the Env&Clim scenario, irrigation water requirements are reduced (Figure 68), as irrigated area decreases by 4%. This reflects changes in the farmers' production decisions, influenced by CAP support being more concentrated on environmental conditionality, which reduce the cultivation of water-intensive crops. Moreover, total water needs may even decline further when accounting for reduced demand in livestock production (e.g. drinking water, cleaning), following the reduction in livestock numbers as reported in Section 4.3.

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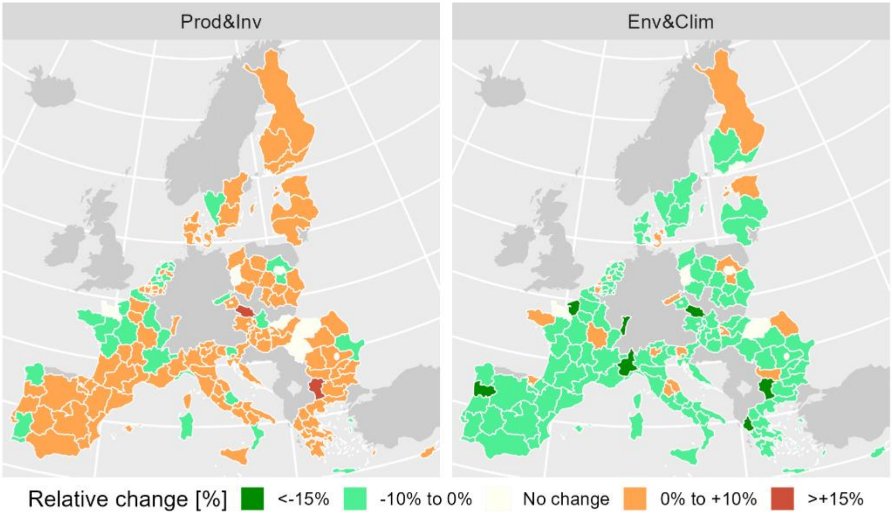
15 Eurostat Water Exploitation Index, plus (WEI+): https://ec.europa.eu/eurostat/databrowser/view/sdg_06_60/default/table?lang=en

16 Eurostat Annual Freshwater Abstraction by source and sector: https://ec.europa.eu/eurostat/databrowser/view/env_wat_abs__custom_15274124/default/table?lang=en

Figure 68. Theoretical water needs for irrigation changes by NUTS2
(Prod&Inv and Env&Clim vs baseline, 2040)



Note: irrigated areas are not reported by Germany in FADN.

Source: IFM-CAP projections

7.6 Farm input intensity

NoCAP scenario

Farm input intensity is assessed following the methodology of the of the Common Monitoring and Evaluation Framework (CMEF) indicator on Farming Intensity.[17] In IFM-CAP farms are classified into intensity categories based on estimated input volumes per hectare of UAA. The inputs considered are fertilizers, pesticides, other crop protection products, and purchased feed, encompassing both crop and livestock production.

In a subsequent step, the distribution of UAA is considered using a ranked input intensity approach (bivariate approach) Three intensity classes (low, medium, high) are then defined by deriving the associated input levels corresponding to the 33rd (q33) and 66th (q66) UAA quantiles. A farm input intensity is classified as "high" if its input level is greater than the intensity value associated with the Q66 of UAA quantile. As can be seen in Table 11, the number of crop and mixed farms with high input intensity increases under the NoCAP scenario, accompanied by a decrease in the number of farms with low input intensity. Furthermore, the area under high-input intensity increases in crop farms, whereas the number of more extensively farmed area decreases. This shift reflects the removal of incentives for extensive practices and reduced viability of lower-input systems in the absence of CAP support.

[17] See https://agridata.ec.europa.eu/Qlik_Downloads/InfoSheetEnvironmental/infoC33.html and https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicators

Table 11. Changes in the number and area of high- and low-intensity farms (NoCAP vs baseline, 2040)

Farm type	Cost	Intensity	Farms	Area
Crop sector	Mineral fertilizers and pesticides	High	1.0%	2.5%
		Low	-1.3%	-1.8%
Animal sector	Purchased feed	High	0.0%	0.1%
		Low	0.1%	-0.1%
Mixed	Mineral fertilizers and pesticides	High	2.9%	0.0%
		Low	-2.9%	0.0%
	Purchased feed	High	-0.1%	3.6%
		Low	-0.3%	-2.4%

Source: IFM-CAP projections

CAP scenarios

Table 12 shows the results of the two CAP scenarios on farm input intensity. Their impacts on farm intensity diverge significantly. The Prod&Inv scenario, which emphasises investment and sectoral payments to enhance productivity, results in a moderate increase in farms and area with high input intensity. Conversely, the Env&Clim policy scenario fosters lower input intensity, given its stronger support for more extensive practices (e.g., organic farming), resulting in considerable extensification across farm types. Accordingly, the number and area of high-input farms declines significantly, while low-input systems expand. This reflects the effectiveness of environmental targeting in steering farmers towards less input-intensive production systems.

Table 12 Changes in the number and area of high- and low-intensity farms (Prod&Inv and Env&Clim vs baseline, 2040)

Farm type	Cost	Inten-sity	Area		Farms	
			Prod&Inv	Env&Clim	Prod&Inv	Env&Clim
Crop sector	Mineral fertilizers and pesticides	High	0.6%	-5.6%	0.8%	-4.9%
		Low	-0.5%	4.5%	-0.8%	5.7%
Animal sector	Purchased feed	High	0.4%	-3.0%	0.2%	-8.7%
	Purchased feed	Low	-0.4%	1.7%	-0.4%	5.0%
Mixed	Mineral fertilizers and pesticides	High	0.3%	-4.1%	-0.1%	-6.0%
		Low	0.0%	4.4%	0.9%	6.3%
	Purchased feed	High	0.4%	-1.7%	0.4%	-2.3%
		Low	-0.4%	3.4%	-0.5%	1.6%

Source: IFM-CAP projections

8 Conclusions

The Scenar 2040 study assesses the medium-term impacts of broad "what if" scenarios assuming alternative trajectories for the CAP, offering quantitative insights to inform future policy considerations for the EU agricultural sector.

The study, notably through the two alternative CAP scenarios, highlights the heterogeneity introduced with MS choices under their current CSPs, reflecting diverse initial conditions in terms of payment allocations across interventions, and their implications for the scenario analysis. Compared to previous CAP periods, MSs have greater flexibility in determining national co-financing rates, which has led to differences in co-financing rates across MSs. While both CAP scenarios maintain EU budget neutrality, national co-financing changes according to the shifts towards Pillar 2 interventions supporting productivity/investment or environment/climate. As we assume that MSs retain their current CSP-specific co-financing shares, the financial burden of national co-financing is unevenly distributed across MSs in the two CAP scenarios. This effect is particularly pronounced in the Env&Clim scenario, where reliance on Pillar 2 interventions is higher and leads to a substantial, 11% overall increase in Total Public Expenditure due to higher national co-financing contributions. In practice, such budget shifts would likely prompt adjustments to national co-financing rates to mitigate financial burdens. However, if MSs retain autonomy over both co-financing rates and budget allocation, disparities across CSPs and their resulting impacts on agriculture and the single market could further increase. Overall, the scenarios highlight the growing diversity within the CAP and its national CSPs.

The NoCAP scenario results underscore the essential role of the CAP in underpinning the EU agricultural landscape and its broader socio-economic and environmental interlinkages. The results indicate that the removal of the CAP could have considerable economic, environmental, and social impacts, with significant heterogeneity across farms, regions, MSs, and sectors.

The results of the Prod&Inv and Env&Clim scenarios reveal contrasted outcomes, with both scenarios showing impacts aligned with their respective scenario narratives. The Prod&Inv scenario results in higher competitiveness and overall production increases across various sectors, driven by higher support for investments and improved yields assumed under this scenario. However, the gains are not evenly spread between MSs and farm types and sizes, with some experiencing income disparities and land abandonment. Larger farms see their production increasing consistently across many production sectors, most pronounced in arable and in permanent crops. Midsized farms also experience notable production increases in certain sectors, whereas small farms (2k–8k EUR standard output) show little or no increases, except in permanent crops. While enhanced production contributes to greater EU self-sufficiency and improved trade balances, the environmental costs include an increase in nitrogen surpluses and GHG emissions at the EU level. Nonetheless, the net global effect is a reduction in global agriculture GHG emissions, as the more emission-efficient EU production replaces less efficient non-EU production.

Conversely, the Env&Clim scenario places greater emphasis on CAP support towards environmental sustainability, which results in a decline in production and higher producer prices, particularly for meat and dairy products. The assumed decrease in yields become the dominant driver of these trends. The Env&Clim scenario shows a more uniform negative production effect. Effects are most pronounced for meat and milk producers, where production reductions tend to deepen with farm size, except for the largest farm size class (≥500k EUR standard output), which shows the smallest impacts. Arable farms also experience production declines, with smaller farms being more negatively affected, whereas permanent crops are least impacted and remain relatively stable across size classes. While this scenario achieves environmental improvements in the EU, such as lower nitrogen surpluses and reduced agriculture GHG emissions, it may increase global challenges, as non-EU countries for example see an increase in agriculture GHG emissions due to shifts in production.

The analysis further illustrates critical structural trade-offs. The expansion of production under the Prod&Inv scenario reduces per-unit costs, lowers domestic prices and strengthens EU competitiveness in global markets. However, it also intensifies concerns regarding environmental pressures. In contrast, the contraction in production under the Env&Clim scenario raises domestic prices, benefiting extensive producers but potentially increasing reliance on imports and reducing competitiveness in international markets. As such, these results underscore the fundamental structural trade-offs between intensification and extensification strategies. Productivity-focused approaches tend to enhance resource-use efficiency and limit herd and area expansion, thereby maximizing output per unit of input. Conversely, environmentally focused policies often promote extensification, which, despite reducing per-hectare or per animal environmental pressures, often require larger livestock and area bases to sustain output levels, which tends to raise pressures per unit of output. This structural trade-off is likely to persist even with approaches enabling more sustainable intensification.

Overall, policy measures can significantly affect production and price dynamics, particularly in sectors characterised by longer production cycles, higher direct income support, and less flexible supply chains. Nevertheless, our results indicate that core market fundamentals remain the primary determinants of production outcomes across the scenarios. These fundamentals include factors such as demand elasticities, trade patterns, and inherent production efficiency. Consequently, while policy choices can significantly influence the distribution and intensity of effects, they do so within the constraints of these broader structural parameters.

A potential caveat in the interpretation of these results relates to the inherent assumptions regarding technological change and its potential to enable sustainable intensification. The scenarios may not fully capture the transformative potential of specific technological and management-based sustainable farming options. These approaches could facilitate more sustainable productivity increases than implicitly assumed, potentially enabling a greater decoupling of agricultural growth from environmental pressures. The analysis might not fully account for the diverse pathways and rates of adoption of such technologies across farms and regions, nor fully model their nuanced impacts on both yields and environmental indicators. Further main uncertainties associated with the report's findings include the potential impacts of additional climate change, market volatility, and future policy uncertainty.

In conclusion, the Scenar 2040 results highlight the importance of nuanced policy design accommodating the heterogeneous needs and vulnerabilities within the EU’s agricultural sector, and the need to address sectoral viability, environmental sustainability, and broader socio-economic outcomes. This requires ensuring that policy instruments are not only effective in achieving stated objectives at the EU level, but that they address the diverse national and regional contexts and conditions across the EU, and consider the broader implications at the global level, as demonstrated by the implications on emission leakage.

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List of abbreviations

ANC	Natural or other area-specific constraints
ASD	Area-specific disadvantages resulting from certain mandatory requirements
BISS	Basic income support for sustainability
CAP	Common Agricultural Policy
CAPRI	Common Agricultural Policy Regionalised Impact (model)
CGE	Computable General Equilibrium
CIS	Coupled Income Support
CIS-YF	Complementary income support for young farmers
CMEF	Common Monitoring and Evaluation Framework
CO2	Carbon dioxide
CO2e	Carbon dioxide equivalents
COOP	Cooperation
CRISS	Complementary redistributive income support for sustainability
CSP	CAP Strategic Plan
DG AGRI	Directorate General for Agriculture and Rural Development
EAFRD	European Agricultural Fund for Rural Development
EAGF	European Agricultural Guarantee Fund
Env&Clim	Environment and Climate (scenario)
ENVCLIM	Environmental, climate-related and other management commitments
EU	European Union
EUR	Euro
FADN	Farm Accountancy Data Network
GAEC	Good agricultural and environmental condition
GDP	Gross domestic product
GHG	Greenhouse Gas
GTAP	Global Trade Analysis Project
ha	Hectares
IFM-CAP	Individual Farm Model for Common Agricultural Policy Analysis (model)
iMAP	integrated Modelling Platform for Agro-economic Commodity and Policy Analysis
INSTAL	Setting up of young farmers and new farmers and rural business start-ups

INVEST	Investments, including investments in irrigation
JRC	Joint Research Centre
kg	Kilogramme
KNOW	Knowledge exchange and dissemination of information
MAGNET	Modular Applied GeNeral Equilibrium Tool (model)
MS	Member States (of the EU)
Mt	Million tonnes
MTO	Medium-Term Outlook for agricultural markets
N	Nitrogen
NoCAP	No Common Agricultural Policy (scenario)
NUTS	Nomenclature of Territorial Units for Statistics
PE	Partial Equilibrium
Prod&Inv	Productivity and Investment (scenario)
RISK	Risk management tools
t	Tonnes
UAA	Utilized agricultural area

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Annexes

Annex 1. The evolution of the CAP

The Common Agricultural Policy (CAP), launched in 1962, established common support, rules and guidelines for Member States (MSs) to support the farming sector in the aftermath of war and famine. The CAP's goals are defined in Article 39 of the Treaty on the Functioning of the European Union (formerly Article 33 of the Treaty Establishing the European Community): increase agricultural productivity, stabilise agricultural markets, ensure a fair standard of living for the agricultural community, and ensure food availability for consumers at reasonable prices. As Europe's socio-economic landscape evolved, the CAP also had to evolve to respond to emerging challenges, including market volatility, shifts in supply and demand, changing consumer preferences, environmental protection, climate change, and the necessity for sustainable development. These adaptations involved multiple revisions and reforms of the CAP aimed at aligning agricultural support with broader societal and environmental goals.

Initially, the CAP comprised the Common Market Organisations (CMOs) for pigmeat, poultry, cereals, wine, and fruit and vegetables, along with the European Agricultural Guidance and Guarantee Fund (EAGGF). The CMOs involved the creation of a single market for agricultural products, with common price levels (including guaranteed minimum prices) and trade policies. With the 1992 MacSharry reform, the CAP shifted from market towards producer support. This reform scaled down market price support and introduced direct payments for agricultural producers based on the area of land cultivated or number of livestock maintained. The aim was to close the widening gap between supply and demand, control agricultural expenditure, and transition from a market support system to direct income support for farmers, thereby starting decoupling support from production levels. Additionally, the reform sought to compensate farmers for reductions in price support and align the CAP more closely with the emerging need for environmental stewardship by introducing the first agro-environment schemes to promote sustainable farming practices.

Agenda 2000 introduced a two-pillar structure to the CAP, Pillar 1 containing direct payments to farmers and reduced agricultural market regulation measures, while support for rural development became the second pillar of CAP. The reform included a further decoupling of subsidies from production, reinforcing the shift towards income support while introducing eco-conditionality, and widened the CAP towards a more comprehensive strategy for agriculture and rural development, aiming to enhance agricultural competitiveness, foster alternative income sources in rural regions, and strengthen social cohesion. Introducing the aim of sustainable agriculture, the 2003 Mid Term Review (Fischler reform) provided greater flexibility for MS by aiming for a full decoupling from production volumes of most direct payments (Single Farm Payments), making farms more market-oriented, and further reducing distortions in agricultural production and trade. Extended implementation of cross-compliance mechanisms linked direct payments to mandatory obligations of maintaining good agricultural and environmental conditions and adhering to standards for environmental protection, food safety, and animal health. A modulation mechanism allowed for the transfer of funds between the two CAP pillars to reinforce rural development. In 2007, the European Agricultural Guarantee Fund (EAGF) replaced the EAGGF, the European Agricultural Fund for Rural Development (EAFRD) was introduced, and a single Common Market Organization (CMO) replaced the previous 21 individual CMOs. The 2009 'Health Check' further decoupled support by gradually reducing the remaining payments coupled to production, increased modulation to further reorient first pillar funds towards rural development. The CAP 2014-2022 framework maintained the two-pillar structure with increased flexibility between the two pillars and introduced compulsory "greening measures", including crop diversification, maintaining permanent grassland, and creating ecological focus areas.

The latest CAP reform, implemented for the 2023-2027[18] programming period, aims to support the EU's farming sector in addressing both local and global challenges. The current CAP seeks to further improve the sustainable development of farming, food and rural areas. This includes fostering a competitive, smart, resilient, and diversified agriculture to ensure long-term food security. Furthermore, it aims to contributing to the European Green Deal's Farm to Fork and Biodiversity strategies and climate change targets, as well as strengthening rural areas. The reform enhances subsidiarity and flexibility by allowing each MS to develop its own national CAP Strategic Plan (CSP), combining CAP funding and policy measures designed for the period 2023-2027 to contribute to 10 specific policy objectives. The interventions planned in the CSPs build around national needs and capabilities while maintaining the policy's overall 'common' character. The 2023-2027 CAP delivery model aimed thus to establish a unified and common framework for both CAP funds, combined under single CSPs. Specifically, the CAP encompasses direct payments and sectoral interventions financed through the EAGF, and rural development interventions financed through the EAFRD and co-financed by MS. MS are required to commit significant resources to green and sustainable objectives, which translate into structural changes such as: (i) enhanced conditionality requirements for direct payments with strengthened statutory management requirements (SMR) and good agricultural and environmental condition (GAEC) standards; (ii) the allocation of at least 25% of the budget for direct payments to Eco-schemes to incentivise climate and environmentally friendly farming and animal welfare improvements; and (iii) additional voluntary commitments supported under Rural Development, with at least 35% of funds allocated to measures supporting climate, environment, biodiversity and animal welfare.[19]

Annex 2. Changes in the EU budget for CAP payments and Total Public Expenditure in the scenarios

The following two tables present the changes in the EU budget for CAP payments and Total Public Expenditure in the two policy scenarios.

[18] The current CAP was intended to cover the 2021-2027 period. However, due to protracted discussions among the co-legislators, the current CAP policy period officially started on 01 January 2023, and will last for five years.

[19] For more information on the CAP and its development, see for example https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-glance_en, and https://www.consilium.europa.eu/en/policies/cap-introduction/timeline-history-of-cap/

Table 13. EU budget for CAP payments and Total Public Expenditure changes (Prod&Inv 2040)

<table>
<tr><th></th><th>BISS</th><th>CRISS</th><th>CIS-YF</th><th>Eco-schemes</th><th>CIS</th><th>Sectoral interventions</th><th>ENVCLIM</th><th>ANC</th><th>ASD</th><th>INVEST</th><th>INSTAL</th><th>RISK</th><th>COOP</th><th>KNOW</th><th>Total public expenditure*</th></tr>
<tr><td>Austria</td><td rowspan="26">-7%</td><td>122%</td><td rowspan="26">No change</td><td rowspan="26">-50%</td><td rowspan="26">No change</td><td>300%</td><td rowspan="26">-50%</td><td rowspan="26">No change</td><td rowspan="26">No change</td><td>104%</td><td rowspan="13">-67%</td><td>N/A</td><td rowspan="26">-75%</td><td>100%</td><td>-1.0%</td></tr>
<tr><td>Bel-Lux</td><td>20%</td><td>124%</td><td>20%</td><td>N/A</td><td>20%</td><td>-4.4%</td></tr>
<tr><td>Bulgaria</td><td>56%</td><td>300%</td><td>54%</td><td>100%</td><td>100%</td><td>1.8%</td></tr>
<tr><td>Croatia</td><td>35%</td><td>300%</td><td>41%</td><td>100%</td><td>100%</td><td>0.7%</td></tr>
<tr><td>Cyprus</td><td>64%</td><td>300%</td><td>30%</td><td>N/A</td><td>100%</td><td>0.4%</td></tr>
<tr><td>Czechia</td><td>61%</td><td>300%</td><td>45%</td><td>N/A</td><td>100%</td><td>-3.1%</td></tr>
<tr><td>Denmark</td><td>N/A</td><td>300%</td><td>257%</td><td>N/A</td><td>N/A</td><td>1.8%</td></tr>
<tr><td>Estonia</td><td>200%</td><td>300%</td><td>108%</td><td>100%</td><td>100%</td><td>5.4%</td></tr>
<tr><td>Finland</td><td>200%</td><td>300%</td><td>126%</td><td>N/A</td><td>100%</td><td>-0.3%</td></tr>
<tr><td>France</td><td>55%</td><td>292%</td><td>41%</td><td>70%</td><td>100%</td><td>-0.2%</td></tr>
<tr><td>Germany</td><td>113%</td><td>300%</td><td>129%</td><td>100%</td><td>100%</td><td>2.9%</td></tr>
<tr><td>Greece</td><td>86%</td><td>300%</td><td>80%</td><td>N/A</td><td>100%</td><td>0.9%</td></tr>
<tr><td>Hungary</td><td>69%</td><td>300%</td><td>66%</td><td>100%</td><td>100%</td><td>-2.6%</td></tr>
<tr><td>Ireland</td><td>156%</td><td>300%</td><td>300%</td><td>N/A</td><td>N/A</td><td>100%</td><td>-0.8%</td></tr>
<tr><td>Italy</td><td>20%</td><td>109%</td><td>20%</td><td rowspan="12">-67%</td><td>20%</td><td>20%</td><td>-3.2%</td></tr>
<tr><td>Latvia</td><td>130%</td><td>300%</td><td>104%</td><td>100%</td><td>100%</td><td>0.3%</td></tr>
<tr><td>Lithuania</td><td>70%</td><td>300%</td><td>66%</td><td>100%</td><td>100%</td><td>0.7%</td></tr>
<tr><td>Malta</td><td>N/A</td><td>300%</td><td>30%</td><td>N/A</td><td>100%</td><td>3.8%</td></tr>
<tr><td>Netherlands</td><td>20%</td><td>228%</td><td>20%</td><td>20%</td><td>20%</td><td>-2.8%</td></tr>
<tr><td>Poland</td><td>100%</td><td>300%</td><td>111%</td><td>100%</td><td>100%</td><td>2.6%</td></tr>
<tr><td>Portugal</td><td>20%</td><td>166%</td><td>20%</td><td>20%</td><td>20%</td><td>-0.2%</td></tr>
<tr><td>Romania</td><td>83%</td><td>300%</td><td>71%</td><td>100%</td><td>100%</td><td>1.1%</td></tr>
<tr><td>Slovakia</td><td>75%</td><td>300%</td><td>65%</td><td>100%</td><td>100%</td><td>0.5%</td></tr>
<tr><td>Slovenia</td><td>160%</td><td>300%</td><td>84%</td><td>N/A</td><td>100%</td><td>7.1%</td></tr>
<tr><td>Spain</td><td>25%</td><td>241%</td><td>20%</td><td>N/A</td><td>20%</td><td>-0.9%</td></tr>
<tr><td>Sweden</td><td>202%</td><td>314%</td><td>303%</td><td>N/A</td><td>116%</td><td>13.3%</td></tr>
<tr><td>EU27</td><td rowspan="2">-7%</td><td>70%</td><td rowspan="2">No change</td><td rowspan="2">-50%</td><td rowspan="2">No change</td><td>206%</td><td rowspan="2">-50%</td><td rowspan="2">No change</td><td rowspan="2">No change</td><td>69%</td><td rowspan="2">-67%</td><td>41%</td><td rowspan="2">-75%</td><td>80%</td><td>0.2%</td></tr>
<tr><td>EU27 (desired)</td><td>67%</td><td>214%</td><td>64%</td><td>50%</td><td>100%</td><td></td></tr>
</table>

* Changes in Total Public Expenditure are only due to changes in the budget a MS spends on national co-financing.

Notes: Bel-Lux = BE-Flanders, BE-Wallonia, and Luxembourg; N/A: If a MS does not include a specific type of intervention in its current CSP (e.g. Denmark does not implement KNOW), it is assumed that this intervention is also not applied by the MS in the scenario (indicated as N/A in the table).

Table 14. EU budget for CAP payments and Total Public Expenditure changes (Env&Clim 2040)

	BISS	CRISS	CIS-YF	Eco-schemes	CIS	Sectoral interventions	ENVCLIM	ANC	ASD	INVEST	INSTAL	RISK	COOP	KNOW	Total public expenditure*
Austria	-80%	No change	50%	50%	-100%	No change	105%	52%	50%	No change	50%	N/A	50%	50%	**19.5%**
Bel-Lux			150%	101%			146%	250%	50%		50%	N/A	142%	150%	**20.2%**
Bulgaria			150%	105%			151%	191%	50%		70%	150%	142%	150%	**20.2%**
Croatia			50%	58%			86%	50%	50%		50%	50%	50%	50%	**3.8%**
Cyprus			150%	50%			142%	250%	50%		50%	N/A	67%	150%	**10.5%**
Czechia			50%	78%			80%	50%	50%		50%	N/A	50%	50%	**14.2%**
Denmark			N/A	222%			290%	250%	250%		230%	N/A	230%	N/A	**2.3%**
Estonia			150%	91%			134%	N/A	50%		50%	150%	94%	150%	**5.4%**
Finland			50%	74%			117%	88%	N/A		50%	N/A	50%	50%	**26.7%**
France			114%	101%			131%	105%	N/A		92%	111%	107%	150%	**6.8%**
Germany			61%	94%			120%	51%	50%		50%	50%	77%	50%	**6.3%**
Greece			77%	97%			119%	99%	50%		73%	N/A	80%	84%	**4.9%**
Hungary			150%	134%			166%	N/A	228%		230%	150%	230%	150%	**22.9%**
Ireland			75%	94%			118%	94%	N/A		N/A	N/A	55%	50%	**21.4%**
Italy			64%	97%			121%	84%	50%		50%	92%	72%	50%	**16.2%**
Latvia			150%	95%			131%	N/A	50%		50%	150%	97%	150%	**3.5%**
Lithuania			114%	94%			122%	110%	50%		50%	150%	69%	150%	**2.9%**
Malta			150%	50%			70%	108%	N/A		50%	N/A	50%	150%	**7.2%**
Netherlands			50%	80%	N/A		83%	N/A	N/A		50%	50%	50%	50%	**4.7%**
Poland			150%	105%	-100%		148%	128%	N/A		137%	150%	135%	150%	**10.8%**
Portugal			N/A	94%			122%	103%	50%		50%	141%	79%	135%	**5.1%**
Romania			50%	97%			124%	96%	N/A		50%	79%	84%	50%	**3.2%**
Slovakia			50%	73%			99%	62%	50%		50%	50%	50%	50%	**9.0%**
Slovenia			50%	50%			112%	89%	50%		50%	N/A	50%	50%	**15.8%**
Spain			150%	115%			192%	250%	250%		230%	N/A	204%	150%	**9.2%**
Sweden			150%	103%			138%	134%	N/A		50%	N/A	132%	150%	**27.0%**
EU27	-80%	No change	**99%**	**101%**	-100%	No change	**127%**	**102%**	**135%**	No change	**102%**	**96%**	**100%**	**95%**	**10.9%**
EU27 (desired)			100%	101%			128%	103%	100%		100%	100%	100%	100%	

* Changes in Total Public Expenditure are only due to changes in the budget a MS spends on national co-financing.

Notes: Bel-Lux = BE-Flanders, BE-Wallonia, and Luxembourg; N/A: If a MS does not include a specific type of intervention in its current CSP (e.g. Hungary does not implement ANC), it is assumed that this intervention is also not applied by the MS in the scenario (indicated as N/A in the table).

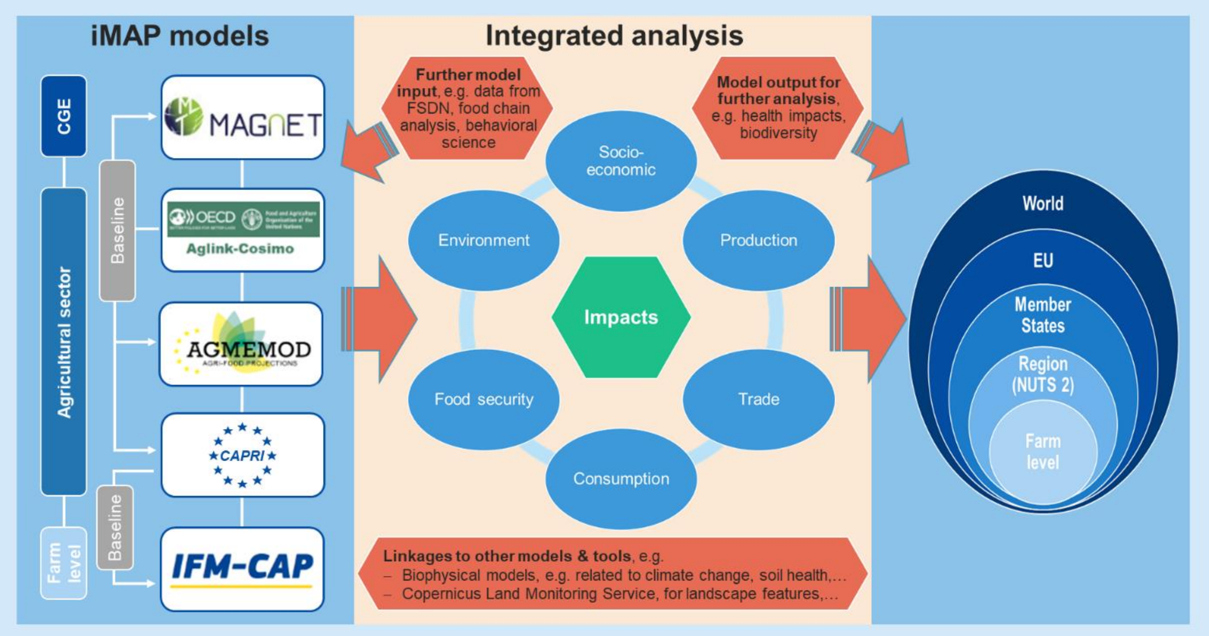
Annex 3. Modelling framework and description of the models

The iMAP modelling platform

The integrated Modelling Platform for Agro-economic Commodity and Policy Analysis (iMAP) was established by the JRC in 2005 to provide in-house policy support to the European Commission, primarily supported by DG AGRI. To address policy needs, iMAP assesses a wide range of policies and topics relevant to the agricultural and food sectors, including baseline projections, policy scenario impact assessments, what-if analyses, counterfactual analyses, and evaluations of exogenous shocks (M'barek et al. 2012, M'barek and Delincé 2015, Barreiro-Hurle et al. 2024).

IMAP relies on a set of core models, including MAGNET, Aglink-Cosimo, AGMEMOD, CAPRI and IFM-CAP.[20] The integrated policy analysis approach, based on these core models, is illustrated in Figure 1. The iMAP models use harmonised baselines, aligning key external drivers - macroeconomic assumptions, population trends, and policy frameworks - through the process of constructing the Medium-Term Outlook for agricultural markets (MTO, DG AGRI, 2023). Consistency in these inputs is critical to avoid discrepancies in simulation results (beyond those rooted in different model structures and approaches). For example, assumptions applied in Aglink-Cosimo inform MAGNET, AGMEMOD, and CAPRI, while CAPRI's price and yield trends guide IFM-CAP. This integrated approach combines strengths of different models, addressing variations in scale, sector coverage, spatial resolution, product disaggregation, representation of farming practices, and indicator coverage (Fellmann et al. 2023).

Figure 69. Integrated policy analysis based on the core iMAP models



Source: Fellmann et al. (2023, p.4)

The representation of policy instruments varies across the iMAP models, with each model focusing on specific aspects and implementing the policies depending on the model type and structure. The

20 For more details on the models and links to model documentations see: https://datam.jrc.ec.europa.eu/datam/mashup/IMAP/

iMAP models are well equipped to analyse the impacts of the CAP on agricultural markets, farm incomes, land use patterns, environmental indicators (including GHG emissions) and overall sustainability, as the models were specifically developed for this kind of analysis (Fellmann et al. 2023). To facilitate a harmonised implementation of the CSPs across the iMAP models, the JRC created a "Master file of the CAP Strategic Plans of the EU Member States", which includes the information necessary for integrating the approved CSPs into the models, as well as for conducting additional analyses (Isbasoiu and Fellmann 2023, 2024).

Models used for this study

For the Scenar 2040 study, we employ the Computable General Equilibrium (CGE) model MAGNET, the Partial Equilibrium (PE) model CAPRI, and the Farm-Level model IFM-CAP. The inclusion of these three distinct models allows the assessment of a wide range of factors and impacts across different scales, from global markets to individual EU farm types. Within this section, the three models and their main features are briefly described. In compliance with the EU's Better Regulation Agenda[21], their description and use for policy impact assessments is also publicly described in MIDAS.[22]

MAGNET

Modular Applied GeNeral Equilibrium Tool (MAGNET) is a recursive dynamic, economy-wide global CGE simulation model (Woltjer and Kuiper 2014). The MAGNET model is ideal for conducting comprehensive assessments that consider economic, social, and environmental factors over a medium to long-term period. It is particularly useful for evaluating the effects of various policies, including those related to agriculture, trade, land use, circular economy and more, on a national and global scale, with a special emphasis on their impact on sustainability, agricultural production and prices, income, nutrition, and food security.

The MAGNET development is led by Wageningen Economic Research. Other consortium members include the Thünen Institute and JRC. It is one of the models listed in the Modelling Inventory and Knowledge Management System of the European Commission (MIDAS) and one of the central components of iMAP (Fellmann et al., 2023, Barreiro-Hurle et al., 2024). The model is employed in analysis with a wide range of policy focus. Some examples include M'barek et al. (2017) on the CAP reform, Sartori et al. (2019, 2024) for land issues, Philippidis et al. (2020) on sustainability assessment with a focus on sustainable development goals (SDGs), Ferrari et al. (2021, 2024) for the cumulative economic impact of trade agreements on EU agriculture, and de Jong et al. (2023) for investigating impacts of food waste reduction in the EU. Additionally, the MAGNET consortium is involved in several European Commission research projects, including BioMonitor, BATModel, Brightspace, and Lamasus.

The MAGNET model employs economic optimization principles to model the behaviour of consumers and producers in response to changes in prices, assuming that producers operate with constant returns to scale and zero long-run profits. The model ensures that supply and demand are balanced in factor and commodity markets, resulting in equilibrium prices. Additionally, the model includes accounting equations that guarantee consistency between the value of income, expenditures, and

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[21] Better Regulation: why and how

[22] Modelling Inventory and Knowledge Management System of the European Commission (MIDAS), see also Acs et. al. (2019), Di Benedetto et al. (2023).

output, and that the current account (exports minus imports) and capital account (savings minus investments) are in balance, thereby closing the macroeconomic loop.

The MAGNET model is built upon the well-established and widely used Global Trade Analysis Project (GTAP) framework, which consists of a comprehensive input-output accounting structure. The GTAP model simulates the behaviour of households, firms, and governments in the global economy, assuming that households seek to maximize their utility, firms minimize costs, and all agents respond to market prices (Corong 2017). The model allocates income to various uses, including private and government consumption, savings, and investment, to maximize regional welfare. Producers employ factors of production (i.e. land, skilled and unskilled labour, capital and natural resources) that are supplied by the household. The model also incorporates international trade, including bilateral trade flows between regions, trade barriers, and the option to source commodities from local or imported sources. Total income is calculated by combining factor income and tax revenues (Aguiar et al. 2019).

A key feature of the MAGNET model is its modular design, which allows for flexibility and customization. This design enables users to choose from a range of extensions and adaptations to tailor the model to their specific policy question. For this study, the core MAGNET model has been enhanced with several modules that improve the representation of nutrients (Rutten et al. 2013) bio-based sectors (Philippidis et al. 2018), CAP (Boulanger et al. 2021), and environmental footprints and virtual trade (Philippidis et al. 2021). This broad coverage of MAGNET allows for in-depth analysis including trade-offs and synergies that comes with different policy questions.

The core model uses version 11c of the GTAP database with a benchmark year of 2017. The database is aggregated to 46 sectors and 40 regions, including all EU member states and candidate countries. Additional model modules apply extra data. The baseline scenario follows main medium-term agricultural outlook 2023-2035 indicators.

CAPRI

The agro-economic model CAPRI (Common Agricultural Policy Regional Impact Analysis) is a partial equilibrium, comparative static, global multi-commodity, agricultural sector model (Britz and Witzke, 2014). CAPRI operates through an iterative process, integrating two primary components: (i) highly detailed and disaggregated supply modules specific to the EU agricultural sector, and (ii) a global market model focusing on agricultural commodities.

The EU regional supply models are developed using a positive mathematical programming (PMP) approach, chosen for its capacity to flexibly capture important interactions within production activities and with the environment (Heckelei et al. 2012). Each representative regional farm model is designed to maximise profit within constraints related to land availability, nutrient balances, and policy mandates. This optimisation process lays the foundation for a thorough understanding of agricultural dynamics at regional, Nomenclature of Territorial Units for Statistics (NUTS) 2 level. CAPRI features a dedicated feed module that specifies the input allocation for feed. This allocation specifies the quantity, measured in kilograms, of various feed categories (such as cereals, rich protein, rich energy, feed based on dairy products, and other feed) or individual feeding materials (such as fodder maize, grass, fodder from arable land, straw, and milk for feeding) used per animal activity level. The input allocation for feed considers the nutrient requirements of animals and is formulated based on requirement functions. The input coefficients governing the allocation of feeding materials are carefully calibrated to ensure that the energy, protein, and other essential nutrient requirements of the animals are adequately met. Furthermore, post-implementation, these coefficients undergo evaluation to ensure congruence with regional fodder production levels and the overall demand for feed at the national level, the latter derived from comprehensive market balances.

The regional supply models are linked with a global multi-commodity model of the agricultural markets, employing a sequential calibration approach. The integration of EU agricultural supply dynamics with global market dynamics enables capturing price feedback resulting from simulated policy changes. The market model is a static, deterministic, partial, spatial model with comprehensive global coverage. It encompasses approximately 60 primary and secondary agricultural products across roughly 80 countries worldwide. International trade is modelled based on the Armington assumption, which differentiates goods by their place of origin, covering bilateral trade flows and establishing consumer preferences for import demand according to historical trade patterns. Moreover, bilateral import prices are derived through the consideration of trade policy measures at the border, including tariffs, tariff-rate quotas (TRQs), variable levies, and the entry-price system for fruits and vegetables. Where relevant, further market measures like public intervention and export subsidies are also implemented. This detailed modelling approach ensures a nuanced representation of international trade dynamics within the agricultural sector.

CAPRI has been frequently used to analyse the impacts of different agricultural, climate change, environmental, and trade-related policies and scenarios upon agricultural production, prices and income, trade, as well as environmental aspects. Such ex-ante impact assessments include, for example, the removal of the EU quota systems for milk (Witzke et al. 2009) and sugar (Burrell et al. 2014), possible EU trade deals (Himics et al. 2018) and trade disruption scenarios (Thom et al. 2023), climate change impacts (Shrestha et al. 2013, Blanco et al. 2017, Hristov et al. 2023) and mitigation in the agricultural sector in the EU (Van Doorslaer et al. 2015, Fellmann et al. 2018, 2021, Himics et al. 2020, Stepanyan et al. 2023, Nordin et al. 2025) and at global level (Hasegawa et al. 2018, Van Meijl et al. 2018, Frank et al. 2019), CAP greening measures (Gocht et al. 2017), the impact of landscape features on natural pest control (Klinnert et al. 2024), dietary change scenarios (Latka et al. 2021, Himics et al. 2022, Rieger et al. 2023), scenarios related to an EU protein transition (Hristov et al. 2024), livestock density limits (Bielza et al. 2025), and possible future pathways for the CAP (M'barek et al. 2017).

IFM-CAP

As CAPRI, the IFM-CAP (Individual Farm Model for Common Agricultural Policy Analysis) model (Kremmydas et al. 2022) is also a comparative static model based on a positive mathematical programming approach. However, its main difference is that the IFM-CAP model simulates the behaviour of individual farms instead of regions: it can be pictured as a template model consisting of individual farm models — one for each of the 79,156 individual farms included in the Farm Accounting Data Network (FADN) in 2020. The individual farm models all share the same structure but use different farm-specific parameters that determine their eligibility for specific policy measures. IFM-CAP encompasses all FADN activities for crops (arable crops, vegetables, and permanent crops, fodder and grassland, fallow) and livestock (cattle, pigs, small ruminants, poultry, and other animals), providing comprehensive geographical and production coverage across the EU.

Simulating the individual FADN farms makes IFM-CAP representative of the effects of CAP policy on commercial farms in the EU[23].

IFM-CAP simulates a farmer's decision-making process for resource allocation across various crop and livestock activities as an optimization problem. Each FADN farm selects the level of crop and livestock activities that maximizes its expected income utility. This expected utility is calculated as the expected gross income minus the risk premium, representing the uncertainty in farm decision-making. All CAP decoupled and coupled payments, as well as payments dependent on eligibility rules and compliance with environmental measures, are included in the farm's expected income.

The decision problem includes also technical constraints related to resource endowments, production relationships, and policy. For example, a farm's overall activity area cannot exceed the available land in the reference year, and there are constraints related to feed requirements and supply for livestock. The model also incorporates technical constraints for the CAP 2023-2027 (enhanced conditionality and Eco-schemes). The model utilises data directly from the FADN database or estimates using FADN and other variables. The observed crop and animal activity levels, subsidies, and activity costs are based on the model's base year (currently 2020), while time series data (2012-2020) are used to calculate expected yields and prices. In addition, specific characteristics of farms, such as resources endowments, production relationships or policy support can be used to construct scenarios or simulations. IFM-CAP provides several economic (e.g. land allocation, herd sizes, animal feed composition, production, intermediate use, CAP payments, gross farm income) and environmental indicators (e.g. biodiversity, soil erosion risk, nitrogen surplus, GHG emissions). These indicators are available both at farm level, allowing to explore the distributional impacts, and as averages at various aggregation levels (Member State, farm type, economic size, and any combination).

Overall, the IFM-CAP model is particularly suitable to analyse farm-specific patterns and policies such as voluntary measures, and to report on the distribution of impacts, as demonstrated in recent applications to analyse the CAP legal proposal (Petsakos et al. 2023), the Green Deal's organic target (Kremmydas et al. 2023, 2025), and EU protein transition scenarios (Hristov et al. 2024).

Annex 4. Model-specifics for implementing the CSPs

Annex 4.1: MAGNET

The representation of CAP payments in the MAGNET model has undergone significant enhancements over time. For the 2023-2027 programming period, the implementation predominantly follows the guidelines of the JRC Scenar 2030 study (M'barek et al. 2017) and builds upon previous studies and evaluations related to CAP payments implementation within the MAGNET framework (Boulanger and Philippidis 2014, 2015).

The approach involved generating updated time series for CAP direct payments and rural development interventions, which were then integrated into the MAGNET model. All payments are

[23] A commercial farm is defined as a farm large enough to provide a main activity for the farmer and a level of income sufficient to support his or her family. In practical terms, to be classified as commercial, a farm must exceed a minimum economic size. Because of the different farm structures across the European Union, a different threshold is set for each Member State. This means that small, non-commercial farms are not included. Overall, FADN covers approximately 90% of the EU total utilised agricultural area (UAA).

now captured by the model, utilizing data from both the CSPs Master file (Isbasoiu and Fellmann 2023) and the CATS (Clearance of Accounts Audit Trail System) database.

The CAP module within the MAGNET model is designed to simulate changes in the CAP budget, both in absolute and relative terms. This module considers the two pillars of the CAP budget: market support (direct payments) and rural development. Both are further divided into different types of measures. The module allows for modifying the composition within each pillar, changing the distribution of funds between them, as well as the overall CAP budget. This enables simulating various policy scenarios, and analysing their effects on the agricultural sector, including aspects such as production, trade and income, as well as in the broader economy.

The market support (Pillar 1) measures consist of both coupled and decoupled payments. The latter also includes green payments, such as the Eco-schemes in the CAP 2023-2027, to support sustainable farming practices. The model provides flexibility to adjust the degree of coupling and decoupling to reflect policy changes and their expected impacts on the agricultural sector as well as other aspects such as food security or nutrition. In MAGNET, decoupled payments are considered as payments to production factors and can be allocated according to two main criteria: i) assigned to land, which is the option that better guarantees that the payments are fully decoupled or ii) assigned to more than one production factor, which can influence production decisions. The remaining payments (coupled direct payments, market measures, and additional direct transfers, among others) are specifically linked to their corresponding output, input, and endowment subsidy variables within each agricultural activity.

As for the rural development (Pillar 2) measures, the CAP module defines five categories of payments: i) Human capital investments (e.g. training, support to young farmers, or advisory services); ii) Physical capital investments (investments on infrastructure, adding value of agricultural and forest-based products, modernization of farm facilities, and others); iii) Agro-environmental subsidies (such as Nature 2000 or forest-environment payments); iv) Subsidies to areas with natural or other area-specific constraints (ANC); and v) Wider rural development measures (diversification of economic activities, promoting rural tourism, village renewal, etc.).

In general, agro-environmental subsidies and ANC measures are tied to the land factor, while the remaining measures are linked to other factors, according to their nature (land, capital, skilled and unskilled labour, or other relevant inputs). Additionally, the CAP module of the MAGNET model also allows for the consideration of potential effects of payments on the productivity of the factors to which they are associated, which can have either positive or negative impacts.

The module also includes an assumption about a mechanism to handle the common financing of the CAP budget. From the perspective of own resources, 80% of each EU MS’s tariff revenue is collected (the remaining 20% is assigned to administrative costs). The proportion of this tariff revenue that finances the CAP budget is extrapolated based on the CAP share within the EU budget expenditure.

The model also accounts for the UK rebate mechanism and other retroactive correction mechanisms agreed upon by the EU members. The net position of each member state is calculated by considering their pre-rebate net contribution, the UK rebate impact and the allocation of lump sum payment costs across EU member states. Following the UK's departure from the EU in 2020, the mechanism for financing the UK rebate system has been adapted in MAGNET. Prior to the exit, Member States contributed to the rebate based on their GDP shares, with Austria, Germany, the Netherlands, and Sweden contributing only 25% of their share. After the departure, the UK rebate system is being phased out in the MAGNET model, with the costs of retroactive transfers distributed among the remaining 27 EU Member States according to the same criteria as above. Additionally, in the 2021-2027 financial framework Austria, Denmark, Germany, the Netherlands, and Sweden will continue receiving lump sum rebates to account for their high relative contributions to the common own-resources system. These transfers are assumed by the remaining member states based on their GDP value shares.

In the MAGNET model, Common Market Organisation instruments, such as production quotas, are also considered even when not directly modelled. In fact, the production of agricultural commodities in the EU27 has been adjusted in the baseline following the projections from the MTO 2023 (DG AGRI 2023).

To analyse the CAP in detail, the module requires significant data support to accurately capture the structure and distribution of different classes of CAP payments across various agricultural activities and Member States. This includes data on the split of market support payments (decoupled and coupled programs), knowledge of the types of rural development expenditures, and their concordance with definitions in MAGNET. In the updated version of MAGNET, the Clearance of Accounts Audit Trail System (CATS) database is used to establish the baseline of CAP payments. To achieve this, a detailed examination of Pillar 1 and Pillar 2 payments in the CSPs was conducted to identify the relevant economic drivers within the MAGNET model. This task built on the work of Boulanger et al. (2023), which provided an inventory of the EU's domestic support payments for 2017 as represented in version 11 of the GTAP database. However, while market support payments in this database were sourced from CATS, the rural development payments were derived from OECD data. For consistency, the use of CATS data is preferred for establishing the baseline of all CAP payments in the MAGNET model. Therefore, the recent developments for MAGNET consisted of gathering information from the Pillar 2 payments from CATS for 2017. As these payments are grouped into 20 categories, a mapping was created between the 20 measures recorded in CATS, the 8 principal categories of the CAP, and the 5 categories within the MAGNET model. This mapping was used to create new databases of CAP payments for MAGNET, which underwent a series of consistency checks and cleaning procedures.

Modelling EU decoupled payments in MAGNET

The modelling of market support payments within MAGNET is complex, particularly for decoupled Single Farm Payments (SFP), as the impact of decoupling on agricultural production is not fully empirically known. Despite not being conditioned to production decisions, these payments may still indirectly influence farmers' behaviour through various channels. A literature review conducted by Boulanger et al. (2016, 2021) identified some mechanisms for which decoupled support can affect production decisions. For instance, decoupled payments provide a stable income that could lead farmers to make riskier production choices, potentially increasing input use and output. Additionally, farmers facing liquidity constraints might use the SFP to stimulate investment in their operations. Other potential impacts on production can be explained by income and wealth effects, which can reduce the quantity of agricultural labour. The structure of agricultural production could be influenced by decoupled payments, as they may keep more farms in business. Finally, direct payments can be also leaked to other parts of the economy (e.g. via capitalization into land rents).

The structure of the decoupled payments in MAGNET has been designed with consideration for the potential indirect effects of decoupled support. These payments are considered as factor payments, i.e., they are assigned to specific production factors, such as land, labour, and capital. As previously indicated, these payments can be allocated in two ways: (i) only to land (fully decoupled), or (ii) according to all production factors (partially decoupled). The first option results in strictly decoupled payments, with no cross-commodity effects. In contrast, if the allocation criterion includes other production factors, such as labour and capital, production effects will occur. This is because labour and capital are not specific to the agriculture sector, and changes in the rewards to these factors would imply movement between agricultural and non-agricultural sectors, resulting in production distortions.

There is no conclusive evidence to what degree the SFP are linked to production factors other than land. In addition, the representation of decoupled payments in MAGNET is further complicated considering that a portion of the SFP is conditional upon practices that benefit the environment (e.g. crop diversification, maintaining permanent grassland, etc.). In the CAP 2023-2027, these payments correspond to Eco-schemes. As mentioned before, these payments can also have a negative effect on productivity.

The allocation of decoupled payments to production factors in MAGNET for the current study is based on some coupling criteria determined from empirical studies. These criteria aim to reflect the extent to which decoupled payments may have indirect effects on production in each Member state. To achieve this, the following allocation rules have been established: (1) The Eco-schemes are incorporated into the model by allocating a default percentage of the SFP as a uniform rate payment to the land factor across all agricultural activities. Member States must spend at least 25% of direct payments in Eco-schemes. The final proportion will be specific for each country, depending on the amount spent in this concept according to the CSPs, but with an expected minimum of 25%. (2) An additional share of payments is also allocated to land, in terms of capitalization of land rents by owners. For this study, we use the estimates of Baldoni and Ciaian (2023), which calculate capitalization rates for the Member States between 9% and 46%. (3) The remaining portion of the SFP is allocated across the factors of production, allowing indirect effects to be captured based on the specific factor mix of each agricultural activity.

Annex 4.2: CAPRI

With every CAP reform, the premium module of the CAPRI model has evolved to address new complexities, ensuring its ability to model new payment schemes and features. This adaptability ensures the model accurately reflects the evolving CAP and projects its potential impacts on the agricultural sector.

The current CAP has led to significant changes to both the budget and the structure of policy measures. CAPRI provides detailed coverage of the various decoupled and coupled payments in Pillar 1 of the current CAP, as well as major payments in Pillar 2. The premium module of CAPRI has been adapted, modified, and updated to incorporate the CAP payments from the CSPs Master file (Isbasoiu and Fellmann 2023). Consequently, the model now integrates the interventions and planned unit amounts (PUAs) for all direct payments and certain rural development interventions that can be modelled (such as Environmental, climate-related and other management commitments; Natural or other area-specific constraints).

The CSPs implementation process within CAPRI accurately reflect the details and characteristics of interventions under the current CAP. The model's high level of disaggregation, encompassing production activities and division at the NUTS 2 regional level, facilitates an accurate representation of the CSP payments. About 1000 PUAs for direct payments and 5000 PUAs for ENVCLIM were matched to the corresponding CAPRI production activity. Decoupled area payments are allocated to eligible land and then attributed to agricultural activities, while coupled income support is explicitly modelled by assigning the payments to activities eligible for that specific type of support.

Additional mappings associated with the CSPs Master file involve linking intervention types to the corresponding interventions and PUAs, matching these to the territorial scope (national or regional levels) in which they are paid, and associating them with their respective budgets, outputs, units of measurement, and other relevant parameters. In the case of ANC payments, for instance, each PUA was mapped to the corresponding type of area to which it applies: mountain areas, areas with natural constraints, and areas with specific constraints.

For both pillars, the CAPRI model integrates the unit amounts per unit of measurement, outputs (at PUA level and intervention level when available) and EU contributions. In the case of Pillar 2, CAPRI's reporting was expanded to account for co-financing and top-ups, enabling the distinction between contributions from the EU and national budgets.

The new CAP also required an update of the data used in the CAPRI module developed in 2021, which links payments from environmental programs to endogenous mitigation technologies. In this context, the JRC developed a new and more detailed list of farm practices compared to the formerly used. This classification is organized into three tiers, with the level of detail for farming practices increasing from Tier 1 to Tier 2 and Tier 3. To facilitate the identification of classified farming practices, they are grouped into thematic sections, such as plant protection, fertilization and soil amendments, soil management, grassland and grazing, among others.

The JRC performed a labelling exercise to systematically identify and label which interventions and planned unit amounts (for Eco-schemes and ENVCLIM) require specific farm practices. As in the previous exercise covering the 2014-2020 reporting period, the differentiation between obligatory and optional commitments was considered. The labelling exercise was conducted partly by internal JRC staff from JRC.D4 and JRC.D5, with additional support from an external network of partners from seven countries: Hungary, Czech Republic, Slovakia, Denmark, Poland, Croatia, and Latvia. A reassessment and streamlining exercise has been done together with the European Helpdesk, who carried out a similar exercise in parallel.

The implementation of the CSPs in CAPRI allows running scenarios with or without activating the mitigation technologies. The new set of farm practices has been linked to the main CAPRI mitigation technologies represented by: no tillage, conservation tillage, winter cover crops, peatland restoration (fallow), other precision farming practices, nitrification inhibitors, limitations on the timing of fertilizer application, buffer strips, limits on livestock units per hectare, limits on the application of mineral fertilizers per hectare, limits on the application of manure per hectare, limits on the application of total nitrogen per hectare, amendment of biochar to arable crops, rotational grazing, substitution of urea by other fertilizers, high efficiency manure application techniques to reduce ammonia emissions, housing measures to reduce ammonia emissions, low and high efficiency covers to reduce ammonia emissions during manure storage, air purification, manure acidification and cooling, anaerobic digestion, hedges and trees in rows, other woody landscape features, field margins, flowering strips, feed with reduced nitrogen content, management practices to reduce methane emissions in rice production.

Conditionality is implemented in CAPRI at the extent possible. Specifically, the model incorporates four GAECs as outlined in Table 15. Notably, GAEC 4 is automatically accounted for through the integration of mitigation technologies and their links to farming practices. Crop diversification is represented using the Shannon's Diversity Index, although this is only applicable to annual crops.

Table 15. GAECs implemented in CAPRI

	GAEC name
GAEC 1	Maintenance of permanent grassland based on a ratio of permanent grassland in relation to agricultural area
GAEC 4	Establishment of buffer strips along water courses
GAEC 7	Crop rotation in arable land except for crops grown under water
GAEC 8	Minimum share of arable land devoted to non-productive areas and features, and on all agricultural area, retention of landscape features and ban on cutting hedges and trees during the bird breeding and rearing season

Source: Own elaboration

Annex 4.3: IFM-CAP

IFM-CAP uses farm-level data from FADN for the year 2020 that refers to the former CAP (2014/20). On the contrary, the simulations for the baseline refer to a projection of the current CAP (CAP 2023/27) in 2040, and the scenarios refer to changes in the baseline policy. Thus, IFM-CAP includes a module for projecting the policy support of each farm of the FADN-2020 into the current CAP. Once the FADN-2023 becomes available after 2026, the projections will be updated with the actual data.

The IFM-CAP policy module projects all Pillar 1 and Pillar 2 payments. The modelling of Pillar 1 payments is characterised by a greater degree of detail, whereas that of Pillar 2 is more general (as FADN data is more comprehensive for Pillar 1 payments than Pillar 2).

It is assumed that FADN comprises solely active farmers and that these farms will not undergo a change in status. Consequently, any alteration to the level of payments resulting from a modification to the definition of active farmer is not taken into account. Furthermore, it is assumed that the regime of entitlements, unless explicitly stated in the CSPs, will remain unaltered.

The modelling of **BISS** is contingent upon the specific approach to convergence and territorialisation that each MS adheres to within the context of CAP2023/27. The concept of convergence pertains to the unit value of the BISS, whereas territorialisation concerns the delineation of the geographical area to be remunerated and the applicable unit value. It is possible to combine the concepts of convergence and territorialisation, whereby the former is applied within the confines of a designated territory. In formulating our projections, the following options for the previous and current CAP were considered (see Table 16).

Table 16. Convergence and territorialisation approaches adopted by MSs in CAP2014 and CAP2023

Convergence		**Territorialisation in CAP 2023/27 (Regionalisation)**		
CAP 2014/20	**CAP 2023/27**	**No Territories**	**Administrative**	**Non-Administrative**
100%	100%	BG, CY, CZ, DE, EE, HU, LT, MT, NL, PL, RO, SE, SI, SK	FI, LV (only in CAP 2023)	AT
Not 100%	100%	HR, PT, LU, DK	FR-COR	EL
Not 100%	85%	BE-FL, BE-WA, IE, IT	FR-NAT, ES	ES

Note: We represent the MSs with their NUTS0 codes; BE-FL is Flanders and BE-WA is Wallonia

For the MS in the non-administrative territorialisation group, we assigned the land to the corresponding territories (regions according to the previous CAP's terminology). Most often, not all the land of a farm belongs to a single non-administrative territory. Thus, especially in the case of EL (presence of entitlements) and of ES (combination of administrative and non-administrative regions), the allocation of land to regions was a cumbersome process.

Regarding convergence, for the MSs that converge to 100% until the end of CAP 2023/27, we apply a uniform unit value across all farms, as stated in the CSPs. This value can be different from farm to farm if territorialisation exists, depending on the territory that the farms and/or land belongs to. For the MSs that converge to 85% by the end of the CAP2023, we simulate the convergence. We assume that the reported unit value in FADN2020 is the starting point of the convergence. The endpoint of the convergence is the 85% of the regional or national average, as reported in the CSPs.

For the current CAP, in contrast with the previous one, the Small Farmers scheme is part of the BISS. It is applicable only to the following MSs: MT, LV, CZ, PT, BG. For these MSs, for the farms that we have observed a payment related to the small farm scheme in FADN2020, we keep this payment. However, farms receiving payments from the small farmers scheme, will not get BISS, CRISS or coupled payments.

Furthermore, the IFM-CAP includes information regarding the capping and degressivity of payments, which are applied exclusively to the estimated BISS payment per farm. In instances where labour costs are deemed to be a significant factor, the total BISS amount is adjusted by deducting the reported wages and the imputed value of family labour. Table 17 provides a detailed account of the specifications pertaining to our estimations of capping and degressivity.

Table 17. Policy implementation for capping and degressivity

MS	Degressivity (reduction coefficient)	Capping (threshold)	Subtraction of Labour Costs
IE	60,000 - 100,000: 85%	100,000	No
LT	No	100,000	Yes
AT	No	100,000	Yes
LV	No	100,000	Yes
BG	No	100,000	Yes
ES	60,000 - 75,000: 25% 75,000 - 90,000: 50% 90,000 - 100,000: 85%	100,000	Yes
SK	60,000 - 100,000: 85%	100,000	Yes
BE-FL	60,000 - 100,000: 85%	100,000	No
BE-WA	60,000 - 75,000: 30% 75,000 - 100,000: 85%	100,000	No
PT	>100,000: 50%	No	No
SI	60,000 - 160,000: 35% 160,000 - 260,000: 45% 260,000 - 360,000: 55% >360,000: 65%	No	No

However, the estimations of capping and degressivity have only been used for the scenario building. In the actual IFM-CAP simulations, the value of capping and degressivity are re-calculated based on the farm results. That means that a farm that was below the capping thresholds in FADN 2020, if in the baseline or scenario simulation has a high increase of payments, will be subject to capping. In that aspect, capping and degressivity are endogenous in IFM-CAP.

Regarding **CRISS**, all MSs, except DK and MT, apply it. ES, EL and AT apply the CRISS together with the territorialisation. The modelling of the CRISS takes into account the UAA of each farm and the related policy specification (Table 18).

Table 18. Data used for the modelling of the CRISS

MS	Range	UA	Max no. of ha	Exclusion of farms based on physical farm size
BE-FL	0-30	52.76	30	
BE-WA	0-30	143.00	30	
BG	0-30	126.08	30	over 600 ha
CZ	0-150	153.90	150	
DE	1-40; 41-60	UA1 69.16; UA2 41.49	60	
EE	1-10; 10-130	UA 1 10.00; UA2 23.23 - 24.22	130	
IE	0-30	43.14	30	
EL	AL 2-11; PC 1-4; PG 1-17	Complex UA1 138.00; UA2 116.00; UA3 177.00	Complex	depending on territory; min & max
ES	Complex	Complex design	Complex	
FR	0-52	48.00	52	
HR	0-30	110.22	30	
IT	0-14	81.70	14	below 0.5 ha and over 50 ha
CY	0-30	27.87	30	
LV	3.01-30; 30.01-100	UA1 56.00; UA2 12.	97	
LT	1-10; 10-20; 20-30; 30-50	UA1 75.00; UA2 81.00; UA3 95.00; UA4 108.00	50	over 500 ha
LU	0-30; 30-70	UA1 30.0; UA2 70.0	70	
HU	1-10; 10-150	UA1 79.99; UA2 40.00	150	over 1,200 ha
NL	0-40	46.00 - 54.00	40	
AT	0-20; 20-40	UA1 44.0; UA2 22.0	40	
PL	0-30	40.15	30	over 300 ha
PT	0-20	120.00	20	over 100 ha
RO	1-50	54.16	50	over 50 ha
SI	0-8.20	28.17	8.2	
SK	1-100; 101-150	UA1 80.00; UA2 40.00	150	
FI	0-50	17.89	50	
SE	0-150	15.50	150	

Source: DG AGRI

For **coupled payments**, the implementation details of the CIS are much more specific than the available information in FADN. For example, in Bulgaria, support is given for a small herd of milk cows in a mountain area in one case and for milk cows under a specific animal management mode in another. In Czechia, support is provided for fruit species with very high labour intensity in one case and for fruit species with high labour intensity in another. As in the above examples, in many cases coupled payments depend on the livestock breed, the age, the grazing conditions, etc. FADN data does not provide this level of information, so it is impossible to know if an FADN farm is eligible or not to receive those coupled payments.

Thus, we cannot apply the coupled payments of the CSPs directly into the farm model. Instead, we use the already estimated coupled payments per farm (as in FADN2020 – corresponding to CAP2014/20), and scale them according to the scaling of the coupled payment budget between the previous and the current CAP. We estimate the scaling factors as the ratio of the budget between the CAP2014 and CAP2023, per payment category (beef and veal, milk and milk products, etc.) and per MS. The scaling factors used are shown in Table 19.

Table 19. Scaling factors for the different categories of coupled payments

MS	B&M	S&G	Cereals	Cotton	F&V	Nuts	Olive	P&O	Rice	SB	Other
AT	1.36	1.20									
BE_FL	0.71										
BE_WA	0.88	1.69						0.00			
BG	0.99	0.93		0.98	0.94			0.96			
CY	1.39	0.00			0.80						
CZ	0.97	0.97			0.97			0.97		0.97	0.97
DE	0.00	0.00									
DK	1.00										0.00
EE	3.16	0.00	0.00		3.76						
EL	1.21	1.16	6.17	0.98	0.87	0.00		0.96	1.04	0.00	0.57
ES	1.22	0.90		0.98	1.57	1.00	0.00	1.15	1.16	1.01	0.00
FI	0.97	1.17	0.00		1.16			1.17		1.16	1.00
FR	0.92	0.95	1.05		1.80			1.85	1.06		1.09
HR	1.10	0.83			0.64			1.08		1.14	0.00
HU	0.93	0.92			0.96			0.93	0.92	0.92	
IE								2.33			
IT	1.02	0.40	1.17		2.55		0.18	2.51	2.27	0.93	
LT	1.28	1.18	0.00		1.40			1.05		1.03	1.20
LU	0.00				0.00			2.00			
LV	1.29	1.29	0.84		1.04			1.13			1.00
MT	0.98	1.45			1.00						
NL	0.00	0.00									
PL	0.95	0.95			0.89			1.10		0.82	0.95
PT	0.73	0.86	0.00	0.98	1.36			0.00	1.55		0.00
RO	1.18	1.20			0.82			1.00	0.89	0.97	1.86
SE	1.42										
SI	1.81	0.00	0.00		0.00			0.00			
SK	0.79	1.30			2.37			1.03		1.48	2.26

Legend: B&M, Beef and veal, Milk and milk products; S&G, Sheep and goat; F&V, Fruit and vegetables; P&O, Protein and oilseed crops; SB, Sugar beet

We also use the scaling factor approach for the **CIS-YF** (Complementary income support for young farmers). The implicit assumption is that the farms eligible for YF scheme in the CAP 2014 are also eligible in the CAP 2023. This is a necessary simplification because some farmers, at the time of our projections, will not be young anymore. However, due to the fact that it is not possible to identify the eligible farmers and because the aggregate results will not be far from reality, we chose to include the CIS-YF support.

Eco-schemes are a new feature of the current CAP and there is data scarcity related to the adoption by farms. Neither FADN2020 nor any other official data sources contain any related data. For this, we developed a probabilistic methodology to estimate the Eco-schemes payments for each FADN farm.

First, for each Eco-scheme planned unit amount (PUA), we define the conditions a farm needs to fulfil to apply for this measure (e.g., for an eco-scheme PUA related to permanent crops and pest control, only farms with permanent crops can apply). In other words, we mapped the subset of Eco-schemes that each FADN farm could potentially adopt and hence receive payment. Then, we ranked the farms for each eco-scheme according to its likelihood of adoption. We selected farm characteristics that increase the probability of a farm to adopt an Eco-scheme. For example, farms with low plant protection costs would be more probable to receive an Eco-scheme payment related to not using chemical pesticides. Finally, we used data related to the total Eco-scheme national budgets, the Eco-scheme specific payments per hectare or head and the available budget for the specific Eco-schemes.

With all this information, an optimization model was built and solved for each MS. The model maximizes the probability of farms to adopt Eco-schemes (based on the scores described in the previous paragraphs). The model uses binary variables for each FADN farm and eco-scheme PUA that correspond to the adoption of an eco-scheme by a farm. The key constraints in this model were:

- In each MS, the total Eco-schemes expenditure cannot be higher than the total Eco-scheme budget.
- For each PUA, the expenditure cannot be higher than a maximum threshold, set as 3 times bigger than the allocated Eco-scheme budget.
- The payment each farm will get from adopting Eco-schemes would be as close as possible to the target payment, equal to any Greening payment they were getting in the former CAP, plus any loss in direct payments (difference between BISS and BPS-SAPS);
- In countries where the number of PUAs is high, there is a limit in the number of Eco-schemes a single farm can adopt.
- For some countries (those where we have information on this: AT, BE, ES, LV) we ensure that Eco-scheme PUAs that are not compatible are not adopted by the same farm.
- All Eco-schemes PUAs need to be selected.

Regarding **sectoral interventions**, although in many cases they are paid to producer organisations and not directly to farmers, the budget is distributed among FADN farms based on their farm specialisation (e.g., sectoral payments for wine will go to farms in the TF14 category “Specialist wine” and those that have vineyards in their farm). The amount is based on their BISS allocation, taking into account the proportion of the total BISS payments in that farm specialization that the farm receives. The amount is then corrected in those cases with very high sectoral payment allocation (i.e., when the payment is bigger than 1.5 times the average for that type of farm, the sectoral payment is capped at that value. The difference is then redistributed to farms that are below the threshold).

Finally, for **Pillar 2 payments**, we also assume that farms that received a payment in the FADN2020 data, will do so in the future. Although in some cases this assumption may not be realistic (e.g., investments), there is no other way to identify the farms that will in fact get the payments in the current CAP, and again the aggregate results will not be far from reality. However, no conclusions can be made for the distributions of the Pillar 2 payments across farms. The scaling factors for Pillar 2 are as follows (.

Table **20**).

Table 20. Scaling factor for Pillar 2 payments (ration of Pillar 2 CAP2023 budget to that of CAP2014)

MS	Scale factor	MS	Scale factor
AT	0.92	HU	0.85
BE	1.04	IE	1.00
BG	0.85	IT	0.90
CY	1.26	LT	0.85
CZ	0.85	LU	0.85
DE	0.93	LV	0.85
DK	0.85	MT	1.39
EE	0.85	NL	0.85
EL	0.93	PL	0.85
ES	0.91	PT	0.93
EU	0.91	RO	0.85
FI	1.03	SE	0.85
FR	1.02	SI	0.91
HR	0.90	SK	0.96

In Table 21 we compare our projections with the official annual amount for the CAP budget. Overall, IFM-CAP projections get to a reasonable coverage of the CAP payments for the current CAP in the EU. For Pillar 1 payments, our projections are 97% of the official budget. For Pillar 2, we cover 80% of the budget.

Table 21. Coverage of IFM-CAP estimations for the EU and different CAP components

CAP component	CAP budget	IFM-CAP budget	Coverage
BISS	19,339,496,628	18,458,441,487	95%
CRISS	4,018,849,420	3,744,010,949	93%
ECO-SCHEMES	8,942,527,943	9,230,780,912	103%
CIS-YF	681,480,679	539,810,510	79%
CIS+COTTON	4,852,602,843	4,716,085,008	97%
SECTORAL	1,847,931,752	1,714,252,072	93%
Pillar 1	**39,682,889,265**	**38,403,380,938**	**97%**
Pillar 2	**21,427,478,784**	**17,142,688,525**	**80%**

Note: the CAP budget (Total Public Expenditure) refers to the average annual budget from the CSPs Master file (Isbasoiu and Fellmann 2023).

GAECs

IFM-CAP models GAECs as constraints related to the farm decision problem. Farms are obliged to apply the GAECs, leading to changes in their optimal production plans. We model GAEC 1, GAEC 6, GAEC 7 and GAEC 8. We have applied all the implementation details of those GAECs, including their exemptions and thresholds per MS. In Table 22, we summarize the IFM-CAP modelling assumptions.

Table 22. GAECs IFM-CAP modelling assumptions

GAEC	Modelling assumptions
GAEC 1 – Permanent Pasture	Permanent pasture cannot fall below 7% of the base year (2020) for each farm. We use the 7% farm-level limit because, at the regional level, some farms may reduce their grassland by more than 5% (the official regional threshold), but this will be balanced by other farms increasing their grassland.
GAEC 6 – Minimum soil cover	Minimum share of arable land with catch crops, mulching or winter cover. The share depends on the MS: 100%: CY, EL, ES, FR, HR, HU, IR, IT, PT 90%: BE, NL 85%: DK 80%: AT, BG, CZ, DE, LU, PL, RO, SI, SK 70%: SE 60%: LT, LV 50%: EE 33%: FI
	Minimum share of soil cover between trees. The share depends on the MS: 60%: LV 50%: AT, BG, CY, CZ, DK, EE, EL, ES, FR, HR, IT, LU, MT, NL, PL, PT, RO, SI, SK 30%: FI
GAEC 7 – Crop rotation	3 years' rotation (change the arable crop at least once every three years) (BE, BG, CY, CZ, DE, DK, EE, EL, FI, FR, HR, HU, IT, LT, LU, LV, MT, NL, PT, RO, SE, SI, SK) Farms that are exempted: <10ha of arable land; >75% of UAA with pasture; >75% of UAA with fallow.
	3 years' rotation and crop diversification of 70% (no crop should cover more than 70% of the arable land) (ES). Farms that are exempted: <20ha of arable land; >75% of UAA with pasture; >75% of UAA with fallow.
	3 years' rotation and crop diversification of 75% (AT and IR). Farms that are exempted: <10ha of arable land.
	3 years' rotation and crop diversification of 65% (PL).
GAEC 8 – Land elements	Landscape elements (including fallow land) in at least 4% of the arable area (AT, DE, DK, HR, IR, IT, LU, LV, MT, SI, FI, SE)
	Landscape elements (including fallow land) in at least 3% of the arable area, plus nitrogen fixing crops in 4% of the area. (BE, BG, CZ, EE, EL, ES, NL, PT, FR, CY, LT, HU, PL, RO, SK)

Organic conversion

IFM-CAP includes the effect of the agricultural land converted to organic management. For the baseline (2040), we assume an increase in the number of organic farms in comparison with the base year (2020), to reflect the effects of the Farm-to-Fork strategy or future policies promoting organic farming. For the Env&Clim scenario, we assume an even greater increase in organic farming, in line with the greater environmental ambition of this scenario. We give the share of organic land for each scenario in Table 23. The number of conventional farms that convert to organic is such to reach the additional share of organic land. For those farms, the IFM-CAP model applies the yield and cost gaps and the price premiums for these newly converted organic farms and rotation and livestock management constraints (Kremmydas et al. 2025). For the NoCAP and Prod&Inv scenarios, we assume no changes in organic farm numbers from the ones in FADN 2020.

The selection of conventional farms that will convert to organic is based on likelihood estimations (Kremmydas et al. 2023). The likelihood of conversion depends on the similarity of conventional farms with respect to organic ones: conventional farms more similar to organic ones are more likely to convert to organic farming. This assumption is consistent with the idea that farms that are already similar to exiting organic farms would need to make smaller adjustments to transition to organic production methods and at the same time capitalize on output price premiums and CAP organic support.

Table 23: Estimation of organic land shares for the scenarios

	Baseline	**Env&Clim**
Change in organic payment	-	+100%
Organic payments value (bil. EUR)	2.278[1]	4.556
Interpolated[2] share of organic land (%)	11.9%	18.9%
Additional share[3] (%)	+2.0%	+9%

Notes: [1] This is the organic payments value from the CSPs, as reported in the IFOAM report (IFOAM 2022).
[2] We performed a linear interpolation of the share of organic land in relation to the value of organic payments. The points that supported the interpolation were taken from Kremmydas et al. (2025); 1.611 billion EUR for 9.9% of organic land and 6.510 billion EUR for 25%.
[3] Additional share of organic land in comparison with the 9.9% share found in Kremmydas et al. (2025).

Annex 5. Baseline drivers

The main assumptions driving projections for the EU agricultural sector are derived from the "Medium-term Outlook for EU Agricultural Markets and Income 2023-2035" (DG AGRI 2023), which is itself based on the OECD-FAO Agricultural Outlook (OECD-FAO 2023). Both reports rely on specific projections of exogenous macroeconomic indicators — such as GDP growth, exchange rates, population growth, and crude oil prices — provided by the OECD, IMF, UN, and World Bank. The projections for agricultural markets within these frameworks are contingent on these exogenous variables, and assume standard weather conditions (DG AGRI 2023, OECD-FAO 2023).

In the following, we briefly summarise the main assumptions and drivers based on the MTO 2023 (DG AGRI 2023).

Macroeconomic environment

Global population growth is assumed at 0.8% annually, concentrated in low-income countries, particularly Sub-Saharan Africa (2.4% per year). The EU's population, however, is expected to decline annually by 0.1% after short-term growth driven by migration. This trend aligns with broader demographic shifts, including population declines in China, Japan and Korea.

Economic growth in the EU is expected to stabilise and grow by 1.4% annually. At the global level, GDP is projected to grow at an average of 2.5% annually by 2040, with significant variations across world regions. The Asia-Pacific region, especially China (4.6%) and India (3.4%), is expected to see the strongest GDP growth. Sub-Saharan Africa, and the Near East and North Africa, are also expected to grow above the global average, while growth in Latin America, the Caribbean, and OECD countries is projected to be lower.

Brent crude oil prices have been projected to increase, reaching USD 102 per barrel by 2035, despite short-term fluctuations. During recent years, the EU has shown resilience to energy shortages, with robust gas storage capacities. However, oil supply decisions by OPEC may introduce significant uncertainty.

Exchange rates, which directly impact the EU's trade competitiveness, remain difficult to project in the medium term due to currency market volatility, the euro's role in global trade, and geopolitical factors. Most exchange-rate forecasts are short-term, with the European Central Bank predicting a value of USD 1.09 for the EUR by 2025. In the medium term, a slight appreciation to USD 1.12 is expected.

Inflation in the EU surged beginning in late 2021, initially driven by post-COVID pandemic imbalance between global demand and supply and further intensified by the Russian invasion of Ukraine (UA). The inflation has eased lately and is expected to further decrease over the coming years as energy costs are expected to decline due to market developments and measures such as the REPowerEU plan and various national policies. While EU food-price inflation is expected to decrease, core inflation (excluding energy and food prices) is likely to keep overall inflation above 2% in the short term before stabilising around 2%.

Consumption trends

EU consumers have significantly increased their consumption of plant-based products over the past decade. The market for plant-based alternatives to meat and seafood has grown fivefold since 2011 and is expected to continue expanding. Despite this trend, animal protein is expected to remain dominant, comprising around 60% of protein consumption in the EU. The rise of flexitarian diets, driven by health and environmental concerns, is the primary driver behind the increasing demand for plant-based products, particularly among younger demographics in countries like Germany, Italy, and France.

Rising food price inflation in recent years has disrupted certain dietary trends. Although health and environmental concerns remain important, price sensitivity became the dominant factor, leading consumers to favour private brands, reduce purchases, and switch to alternative retailers. This price sensitivity is affecting demand for premium products, potentially slowing previously observed dietary shifts. However, the focus on healthy diets is likely to persist post-COVID, as reflected in the increasing demand for functional and fortified foods containing vitamins or probiotics.

Trade policies and agreements

The study takes into account current trade policies and agreements as ratified by the time of the analysis (Ferrari et al. 2024). As regards future EU enlargements, the suit of models operated by the JRC is not yet updated to account for future enlargements. Accordingly, possible new EU Member States are not considered in the modelling exercise. However, all scenarios assume for example a deeper integration of Ukraine through full trade liberalisation by 2040.

Climate change and agriculture

The EU agricultural sector faces significant environmental challenges due to climate change and competition for natural resources. Agriculture both contributes to and is severely affected by climate change. From 2011 to 2020, global temperatures were on average 1.09°C higher than in 1850-1900, with an increasing frequency and severity of extreme weather events such as heatwaves, heavy rainfall, and droughts. These changes threaten water security, slow agricultural productivity growth, and disrupt food security. A northward shift in agro-climatic zones is altering crop cultivation patterns. In all IPCC scenarios, near-term temperature increases (2021-2040) are projected to range from 1.2 to 1.7°C compared to 1986-2005, with significant impacts anticipated for western and central EU. Key climate indicators for agroecosystems, such as mean annual temperature and extreme drought frequency, show worsening trends. Currently, climate change is considered in the underlying MTO 2023 primarily based on past trends and expert knowledge regarding its impact on agricultural markets. Thus, the scenarios do not incorporate additional impacts that could arise from specific climate change assumptions as outlined by the IPCC (2022).

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