Redirecting Agricultural Subsidies to Achieve Global Sustainability Goals

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Abstract

Achieving a sustainable global food system requires a concerted effort by the international community, with the World Trade Organization (WTO) playing a pivotal role as a platform for international dialogue and negotiation. However, despite a decline in average domestic support levels among OECD countries post the Uruguay Round Agreement on Agriculture, reforms have stagnated since 2008. Trade wars and the impact of COVID-19 have led to increased support levels, with global agricultural subsidies reaching approximately $600 billion annually, primarily concentrated in a few countries. In parallel, repurposing agricultural subsidies increasingly emerges as a crucial step to address the intricate challenges facing global food systems: ensuring food security, promoting nutrition, safeguarding environmental sustainability, and supporting livelihoods.

Using MIRAGRODEP, a world Computable General Equilibrium model, this paper explores the need of reducing and removing trade-distorting domestic support within the WTO's agricultural negotiations. Different policy scenarios are developed and their impacts on food security, nutrition and climate outcomes are investigated. The policy scenarios illustrate the elimination of distortions at national and global levels, progressively addressing issues of global inequality and policy dynamics in the Global South.

The results indicate that a cross-border support redistribution yields improvements for low- and middle-income countries, contributing to a more sustainable global food system. This underscores the need for a radical rebalancing of policies worldwide. Additionally, the modelling work also reveals that solely removing existing distortions will not comprehensively

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address the challenges facing global food systems. It emphasizes the importance of investing in productivity gains and addressing productivity gaps.

1 Tables of Content

2 Introduction

The multifaceted challenge confronting agricultural and food systems requires a nuanced approach to ensure food security, promote nutrition, safeguard environmental sustainability, and support livelihoods. Governments play a pivotal role in steering this transformation through diverse policy tools, encompassing regulatory measures, market-driven mechanisms, price adjustments reflecting production costs, and the reevaluation of agricultural subsidies. Comprehensively addressing the challenges facing food systems across food security, nutrition, and sustainable development dimensions necessitates indispensable policy reforms.

Historical Context

The Uruguay Round Agreement on Agriculture (AoA) achieved a significant milestone by integrating agriculture into a system of multilateral rules and disciplines, particularly governing domestic support. This agreement capped domestic support based on historical levels (with the Amber Box) and encouraged Members to reform support towards minimally production- and trade-distorting measures (with the Green Box) as outlined in Annex 2 (Glauber, 2022b). The immediate effect prompted reforms among Members, leading to a decline in average producer support estimates among OECD countries from 36.4 percent of the gross farm receipts in 1986 to 19 percent in 2010 (OECD, 2022b).

Specifically, subsidies considered as having a more than minimally production- and trade-distorting effect, subsidies under the Amber Box, are converted into the Aggregated Measurement of Support (AMS) with the methodology outlined in Annex 4. Product-specific and non-product specific subsidies undergoes a "de minimis" test: if the level of support is below a specific share of the current production value, the support is considered as "de minimis" and is excluded from the total AMS calculation ("de minimis" threshold of 5% for developed countries, 10% for developing countries).

Under the AoA, countries reporting support levels exceeding the "de minimis" levels at the beginning of the post-Uruguay Round Reform period (1986-1988, also referred as "base period") are bound by a domestic support reduction commitment: they committed to bind their total AMS at their level during the base period reduced by a defined percentage (for developed countries, by 20 percent over 6 years; for developing countries, by 13 percent over

10 years – cf. Part IV of Schedule and Article 6.3). Subsidies in countries without domestic support reduction commitments are constrained by "de minimis" levels. Additionally, there are some exemptions to reduction commitments under the Development Box and the Blue Box. As specified in article 6.2, the Development Box exempts developing countries from reduction commitments for direct and indirect support measures promoting agricultural and rural development (it can include input subsidies). The Blue Box exempts "production limiting programs" from reduction commitments, defined in article 6.5, as programs where the payments are based on fixed areas and yields, or a fixed number of livestock.

Challenges and Stagnation

Since 2008, reforms among OECD countries have largely stalled, and support levels have increased due to trade wars and the impact of COVID-19. Large emerging economies like China and India have also witnessed a surge in support levels (Mamun et al., 2021). Worse, current provisions under the AoA give ample leeway for the provision of trade-distorting support. Costa Rica estimated that "*potential expenditures on-trade distorting domestic support*" exceed USD 910 billion annually (cf. JOB/AG/243, (WTO, 2023g)), with 10 members concentrating about 80% of these expenditures.

Criticisms of the AoA include exemptions to reduction commitments (cf. Blue Box, Green Box and Development Box), and the persistent lack of level-playing field across countries and commodities. Notably, countries bound by domestic support reduction commitments (cf. Article 6.3) are afforded the latitude to provide support exceeding the "de minimis" threshold imposed on other members. This disparity not only enables them to provide elevated levels of support overall but also facilitates the allocation of significantly higher support levels to specific commodities (97% of support provided under article 6.3 was product-specific according to JOB/AG/245 (WTO, 2023a)). Product-specific support for key commodities (rice, cotton, wheat, corn/maize, and bovine) is concentrated among a few WTO Members, with two or three of these members accounting for between 80 and 90% of product-specific support, depending on the commodity. Worse, the Members providing substantial product-specific support for these commodities are often significant global producers and/or exporters of the respective commodity (JOB/AG/245).

Criticism of support under the "de minimis" thresholds is mounting as it is related to the global value of production, resulting in a notable increase as the global value of production rises (cf.

JOB/AG/243). Global de minimis entitlements have indeed surged from around USD 182.4 billion in 2001 to USD 631.8 billion in 2019 (JOB/AG/245).

Finally, green support is increasingly under scrutiny particularly as it constituted more than 75% of total domestic support in 2019, with its distribution heavily concentrated among a select few countries (as evidenced by 5 members providing over 90% of total green support according to JOB/AG/253 (WTO, 2023b) and JOB/AG/253/Rev.1 (WTO, 2023c)). Notably, green support has experienced significant growth compared to other support categories. Specifically, green box support has surged by 117% in contrast to a 50% increase for "de minimis" support, a 63% rise for blue box support, a 40% growth for the current total aggregate measure of support, and a marginal 3% increase for Development Box support.

Current landscape and proposals

The surge in agriculture support in recent years prompted renewed calls for concerted efforts to reduce and harmonize domestic support measures under the AoA. WTO members have submitted proposals aiming at sharply reducing and eliminating AMS entitlements (JOB/AG/216/Rev.1 (WTO, 2023e) and JOB/AG/242/Rev.1 (WTO, 2023d)). Most proposals advocate for the harmonization of current support by introducing stricter disciplines on the blue box (cf. JOB/AG/242/Rev.1 that would limit support levels at 2.5% of the value of production for a given product), the development box (cf. JOB/AG/195 (WTO, 2021)), and the green box (cf. JOB/AG/243/Rev.1 (WTO, 2023h) and JOB/AG/243/Rev.2 (WTO, 2024) that advocate for a review and an update of the criteria set out in Annex 2, and JOB/AG/242/Rev.1 that propose that the total support within certain categories under the Green Boxx should not exceed 5% of the value of production).

Some members also advocate for introducing product-specific caps to prevent concentrating domestic support in a handful of commodities. For instance, JOB/AG/243/Rev.1 and JOB/AG/243/Rev.2 proposed a limit that would represent a share of the product's total value of production and would be more stringent the more the member actively engages in the exports of the given product.

Recently, Costa Rica put forth a new comprehensive approach to domestic support, which involves reducing all trade-distorting support. The "*potential expenditure on trade-distorting domestic support*" (cf. JOB/AG/243) would be used to determine the cap for each country. The

cap would therefore extend beyond the AMS to encompass all forms of trade-distorting domestic support, including support under the Blue Box, Development Box, and de minimis entitlements. The individual caps would then be reduced, ensuring that the total cap (the sum of all individual caps) undergoes a minimum 50% reduction by 2035. The reduction will be proportional to the size of the individual cap within the total cap. This approach has gained traction and is supported by the Cairns Group and Ukraine (cf. JOB/AG/243/Rev.1 and JOB/AG/243/Rev.2). This approach is in line with repurposing as it aims to greatly reduce trade-distorting support, thereby encouraging members to implement green box support.

Looking Forward

When looking to the future of agricultural policy and international trade, it is imperative to consider evolving challenges and emerging opportunities. The ongoing debates within the WTO and among member countries underscore the need for a dynamic and adaptable approach. Key considerations should include the integration of climate-smart agricultural practices (Glauber, 2022a), promotion of digital technologies for sustainable farming, and the equitable distribution of benefits across diverse economies. Additionally, addressing the unique needs of smallholder farmers, enhancing food system resilience, and fostering international cooperation will be pivotal in shaping a sustainable and inclusive global agricultural landscape. Moving forward, collaborative efforts and innovative policy frameworks will play a central role in navigating the complexities of global agriculture while fostering resilience, equity, and sustainability.

3 Review of previous modelling on the effects of repurposing agricultural subsidies

Removing agricultural subsidies

Several studies have investigated the impact of removing agricultural subsidies, all highlighting potential adverse outcomes. (Laborde et al., 2021a) analyzed a worldwide removal of coupled producer payments using the static version of CGE model MIRAGRODEP. A decrease in agricultural GHG emissions (-0.6%) was found, which was smaller than the reduction in global farm output (-0.9%). This was due to the lower decline in the production of emission-intensive products (such as beef and dairy, which respectively declined by 0.7% and 0.6%) and the relocation of production to regions with higher emission intensities.

(FAO et al., 2021) expanded this analysis to encompass poverty and food security outcomes. Using the dynamic version of CGE model MIRAGRODEP, they simulated a global removal of all fiscal subsidies, including output, input and factor of production subsidies. In accordance with (Laborde et al., 2021a), eliminating agricultural subsidies would result in a decrease in agricultural production (crop production would decline by -1.6% in 2030 and livestock production by -0.46%). This would lead to a reduction in agricultural land by 0.17% and an increase in forestland by 0.02%. Emissions are projected to slightly decrease by 11.3 million tons of $CO2_{eq}$ by 2030, due to a decline in both agricultural emissions (-0.3%) and in land use change emissions (-0.18%). However, eliminating agricultural subsidies would have adverse outcomes in terms of poverty, food security and nutrition. Farm income would reduce significantly (-5.7% in 2030), leading to a step up in the prevalence of extreme poverty, particularly in developing countries (+0.2pp globally) and in the prevalence of undernourishment (+0.16pp).

(Gautam et al., 2022) also investigated the impacts of removing all support across all countries simultaneously (without considering trade barriers) using MIRAGRODEP. Similarly, they found a reduction in crop production (-1.3% by 2040) and in livestock production (-0.5%), mixed economic outcomes with an augmentation in real work income (+0.05%), and a significant decline in farm income (-4.5%). However, it would have adverse consequences on poverty and nutrition, with an increase in the prevalence of extreme poverty (+0.01%), and in healthy food

prices (+1.7%). Removing agricultural subsidies would however have a limited, but favorable outcome on climate with a reduction in emissions of 103 million tons of $CO2_{eq}$ by 2040 (-1.48% decrease in AFOLU emissions). They also found agricultural land would decline by 27 million ha by 2040, preventing approximately 49% of the projected land conversion to agriculture that is projected between 2020 and 2040.

In a report analyzing whether agricultural policy reforms could contribute to mitigating the adverse effects of climate change on agriculture, (Guerrero et al., 2022) simulated an elimination of coupled support policies with the partial equilibrium (PE) model GLOBIOM. They found a reduction in crop and livestock production (by respectively -0.5% and -0.4% in 2050) and a decrease in cumulative AFOLU GHG emissions (by -124 Mt $CO2_{eq}$ over 2010-2050). However, this policy scenario would also increase the prevalence of undernourishment.

(Springmann & Freund, 2022) examined policy scenarios to align agricultural subsidies with health, climate change and economic objectives. They used the CGE model MAGNET and combined it with a global risk-disease model. Their analysis underscored the potential economic and environmental benefits of removing producer payments, with a 0.3% reduction in total food-related emissions. However, this policy option would have adverse health consequences due to a decrease in agricultural production (-0.62%), particularly for fruits, vegetables and grains. Consequently, a decline in total energy intake and consumption of fruits and vegetables was forecasted, leading to an increase in diet-related mortality.

(Cao et al., 2023) investigated the relationship between global agricultural and food support reforms, agricultural emissions and food security, with the overarching goal of constraining the potential expansion of agricultural land. They used the CGE model GTEM and found that removing agricultural subsidies worldwide would have some economic benefits with an increase in global economic growth. However, the greatest benefits would be observed in high-income countries. This policy scenario would have adverse impacts on food security as it would lead to a decline in crop and livestock productions, resulting in a rise in food consumer prices and a decrease in food consumption. Removing agricultural subsidies would nonetheless have a positive environmental outcome with a reduction in agricultural emissions (-1.6% in 2050), mostly driven by a decline in emissions from livestock production.

Finally, (Valin et al., 2023) examined various global policy reform scenarios that could reduce GHG emissions from agriculture by redirecting government budgetary transfers to the

agricultural sector. Consistent with the literature, they found a decline in agricultural emissions (-2.1%) and in agricultural land (-0.4%), but negative impacts on food security and livelihoods, including a decrease in food supply (-0.7%) and in farm receipts (-2.4%).

Removing all agricultural support entails therefore important adverse trade-offs. While it tends to have positive environmental outcomes, particularly in terms of reducing emissions, the extent of this mitigation remains limited in addressing the challenge of combating climate change. Worse, the elimination of agricultural subsidies would adversely impact food security and nutrition. In a context of limited government budgetary resources, the repurposing of agricultural subsidies has gained increasing interest both academically and in the public sphere. This is evidenced by recent submissions by Brazil at WTO (JOB/AG/254, (WTO, 2023f)) and commitments from Agricultural ministers at the OECD in November 2022 (OECD, 2022a).

Repurposing agricultural subsidies

Results from the literature suggest that repurposing agricultural subsidies could comprehensively address the multifaceted challenges facing global food systems. (Springmann & Freund, 2022) investigated redirecting all producer payments towards environmentally friendly and healthy food products. This repurposing scenario would have a positive environmental impact, resulting in a reduction of 0.34% of GHG emissions. Additionally, it would improve population health by increasing the production of fruits and vegetables by 3.9%, leading to a significant decrease in diet-related mortality. However, this policy scenario was found to have negative economic impacts, particularly in OECD countries.

(Gautam et al., 2022) modelled a repurposing of current budgetary support, directing a portion of it towards higher public spending on R&D and incentives for the development, as well as and adoption of green innovations. The remaining would be returned to taxpayers. The authors found that this policy scenario would have significant positive outcomes for the environment, poverty reduction, nutrition and the overall economy. Specifically, this policy scenario would improve economic welfare, resulting in a 1.6% increase in global real income by 2040. Crop and livestock production would rise (by +16% and +11% respectively), as would rural incomes, contributing to improved food security. Additionally, the cost of healthy diets would substantially decrease (-18%) and the prevalence of extreme poverty would also decline (-1%). Furthermore, GHG emissions would be significantly reduced (-40.5% for AFOLU emission, with -24% in production emissions and -16% in land use change emissions). About

80% of the incremental emissions expected over 2020-2040 would be avoided. This policy scenario would also yield favorable outcomes on nature as the decreasing agricultural land use (-2.2%) would result in the restoration of 105 million ha of natural habitats.

(Valin et al., 2023) examined several repurposing scenarios that would redirect parts of the budgetary support either towards innovation and productivity growth, or towards investments targeting emission abatement technologies. They found that targeted investments would effectively decrease GHG emissions (-1.3%) and agricultural land (-0.4%) without negatively impacting food provision (+1%) and farm production (+0.6%). Investments in abatement technologies would result in the greatest reduction in emissions (-5.1%). However, this policy scenario would only lead to a slight improvement in food security (+0.1% in caloric availability) and, more concerning, an increase in agricultural land (+0.2%), which would cause higher land-use change emissions.

Finally, literature has considered the challenges of concerted international action. For example, (Gautam et al., 2022) implemented repurposing scenarios that would occur only among developed countries or only among developing countries. Similar results were found in the repurposing across all regions scenarios, but to a more limited extent. The magnitude of change was more significant under the repurposing scenario for developing countries compared to the repurposing scenario for developed countries.

(Springmann & Freund, 2022) emphasized the necessity and advantages of coordinated international action through a repurposing scenario that reallocates producer payments between countries. They discovered similar health benefits to the repurposing-only approach, along with a rise in horticultural product production and consumption, and a decline in diet-related mortality. The benefits were distributed more equally across regions. This scenario of repurposing would result in similar or greater reductions in GHG emissions. Additionally, it would lead to global economic benefits and an increase in economic welfare (while global welfare would decrease under repurposing-only scenario).

Factors accounting for the different results

Although the trade-offs highlighted in the various analyses are consistent, the magnitude of the challenges differs. This is partly due to differences in the modelling approaches. (Guerrero et al., 2022) use the partial equilibrium model GLOBIOM, while the other studies use a CGE

model. Some assessments are done with the static version of the model (Laborde et al., 2021a; Valin et al., 2023), and different time horizons are considered among dynamic analyses.

Furthermore, different support databases are used. While some studies rely on the GTAP database that embeds information on subsidy rates, other modeling work has adjusted those rates to align with alternative data sources. For instance, (Valin et al., 2023) use the OECD PSE database to precisely model subsidies. This results in differences in the total number of subsidies removed. With the GTAP the total amount of positive transfers to production factors and output in the agricultural sector is only USD 156 billion in 2017, while it amounts to USD 232 billion with the OECD PSE database.

Additionally, it is important to note that different studies may have varying scopes of subsidies being removed. For example, in the study conducted by (Guerrero et al., 2022), only coupled support policies that are commodity-specific transfers (other than market price support) are considered for the suppression. Input payments are therefore not included in the suppression, resulting in a total removal amount of USD 28 billion instead of the USD 150 billion of total coupled support. (Cao et al., 2023) removed only domestic support for the agricultural sector and did not include subsidies provided to food manufacturing.

Finally, the removal of agricultural supports scenario is considered alongside assumption that will have a major impact on the results observed. For instance, (Cao et al., 2023) make the assumption that land use is fixed between the baseline and the reform scenario in each region (no variations in deforestation due to the repurposing scenario).

4 Method

Introduction

The MIRAGRODEP model is a multi-region, multisector computable general equilibrium model (CGE model). It builds on MIRAGE, a multisector CGE model of the global economy (Decreux & Valin, 2007). By capturing international economic linkages through international trade in goods and services, as well as capital flows, this model provides a comprehensive and consistent representation of economic and trade relations between countries. Additionally, the MIRAGRODEP model can account for environmental considerations and can be linked to individual surveys to assess the impact of various shocks and reforms on households. Specifically, the model can estimate the effects of such events on income, purchasing power, poverty, food security, and nutrition.

The MIRAGRODEP model is based on an input–output framework and its theoretical structure is derived from optimizing behavior of economic agents, particularly households and firms. The model assumes perfect competition in all sectors, enabling detailed geographic and sector decompositions. A complete documentation can be found in (Bouët et al., 2022).

The recursive dynamic version of the model was used for this analysis. The model incorporates a capital accumulation framework, where the capital for year t+1 is based on the capital of year t, increased by the previous year's investment and adjusted for depreciation. The model is then solved sequentially, moving the equilibrium from one year to another.

The primary data source for MIRAGRODEP is GTAP11 database (fully documented in (Aguiar et al., 2019), a database comprising world macroeconomic accounts and trade flows for the reference year 2017. Specifically, it describes the values of production, intermediate and final consumption of commodities and services for 141 countries or regions and 65 sectors. The database also provides information on global bilateral trade patterns, international transport margins, and protection matrices allowing for an accurate representation of linkages between individual countries and regions.

Regarding the supply side, the production function is modeled for each sector as a Leontief function of intermediate inputs and value-added. The intermediate input function is a constant elasticity of substitution (CES) function of all goods, to account for the substitutability between

two intermediate goods, depending on their relative prices. The level of substitutability is assumed to be constant for any pair of intermediate goods. Similarly, value added is a CES function of unskilled labor, land, natural resources, and a bundle of skilled labor and capital. This nesting structure enables the model to capture the lower substitutability between capital and skilled labor compared to other factors.

In each region the demand side is modeled with a representative agent who is assumed to own all factors of production, have a constant propensity to save and seek to maximize his utility by purchasing goods. The agent's utility function is a linear expenditure system-constant elasticity of substitution (LES-CES) function to capture his preferences between goods and determine the allocation of expenditure across those goods. The LES-CES function also allows for different income elasticities of demand for goods and can therefore account for the evolution of demand structure across regions as income levels change. This is particularly relevant for modeling agricultural and non-agriculture sectors since income elasticities for food tend to be lower than those for manufactured goods and services. Additionally, the elasticity of substitution among sectoral consumptions is constant only above a minimum level, which can vary by region, such as developing versus developed countries.

MIRAGRODEP is a bilateral trade model that is consistent with the Armington assumption, which posits that commodities are heterogeneous based on their origin and thus, imperfect substitutes for each other (Armington, 1969). The model uses nested CES functions to reflect preferences for varieties originating from different countries. This approach allows for countries to import and export the same product simultaneously, reflecting consumers' preferences for specific varieties.

Lastly, MIRAGRODEP explicitly models the government as separate from private agents. The government's income comprises taxes on production, factors of production, exports, imports, consumption, and households' income. The model assumes that the government aims to maximize a Cobb-Douglas utility function, where its expenditure on each commodity is a fixed share, in value, of the total public expenditure on goods and services.

Four main assumptions

The model rests on four major assumptions: the factor market closure, the private account closure, the external account closure and the government account closure.

With respect to the factor market closure, total employment is assumed to remain constant as a proportion of the active population, which is defined as individuals aged between 15 and 60 years old. Labor markets are differentiated by gender, accounting for an imperfect substitution between male and female labor within each skill category. Skilled labor is perfectly mobile, while unskilled labor has imperfect mobility between agricultural and non-agricultural sectors, as determined by a constant elasticity of transformation (CET) function. Natural resources are the only factor with a fixed supply over time. Land supply, on the contrary, is endogenous and depends on the real remuneration of land. Additionally, it is assumed that land has imperfect mobility between agricultural sectors. Finally, installed capital and natural resources are modeled as sector specific.

Regarding the private account closure, the model makes the neo-classical assumption that the marginal propensity to save remains constant. Consequently, variations in income result in variations in savings, which, in turn, bring variations in investment. Investments are therefore savings-driven.

For the external account closure, it is assumed that the current account balance remains stable as a proportion of global GDP. Hence, the real exchange rate adjusts through different changes in domestic prices across various regions, referred to as competitive disinflation.

Finally, with respect to the public account closure, it is assumed that the government budget remains a fixed share of the national GDP, and that the real public expenses per capita are held constant to ensure a constant provision of public goods. There are therefore no changes in the size of the public sector and no crowding-out effect on private investment. To keep the government budget and the real public expenses per capita at a constant level, a consumption tax is adjusted. The magnitude of this tax thus measures the cost of maintaining a steady supply of public goods.

Poverty and environmental aspects

The poverty analyses were carried out using the POVANA household model, as documented in (Laborde Debucquet et al., 2020). The POVANA model is based on the POVANA dataset which provides the full income distribution for approximately 300,000 households. The model captures the endogenous evolution of households' real income in response to changes in multiple factors, such as employment, prices of goods and services, wages, and productivity.

Additionally, the comprehensive information on household consumption patterns within the POVANA dataset enables the estimation of the effects of economic shocks on household costs, including the costs of food.

Regarding land use, the models builds on the AEZ approach of (Hertel et al., 2008) and evaluates land use change across agroecological zones defined for each region in the model. Within each agroecological zone, the model reallocates land between forest areas and various types of agricultural land in response to changes in returns. Specifically, a constant elasticity of transformation (CET) specification is used to represent the competition for land between forestry and agricultural uses. Land is then redistributed between agricultural activities based on changes in relative prices.

Finally, the model includes a post-solution module to compute the impact on greenhouses gas (GHG) emissions. This module is based on a GHG database that maps GHG emissions to crop and livestock production, by region. The database was developed by (Laborde et al., 2021b), and subsequently updated with research by (Tubiello et al., 2021). Additionally, the database is used to calculate GHG emissions resulting from land use change, such as the conversion of forestland to grazing or cropland.

Farm policies

The model accounts for farm policies through a comprehensive set of instruments, including ad-valorem output subsidies, ad-valorem input subsidies, and payments to production factors, such as subsidies to capital, labor, and land. The model draws on detailed data on agricultural support from the 2021 release of the Ag-Incentives database, which covers nearly 90 percent of global agricultural production for most years since 2005. A technical summary of the dataset is available in Annex 1 of the (FAO et al., 2021). Non-product-specific expenditures are allocated among relevant products based on the agricultural value of production. Additionally, the model incorporates other relevant food system policies, such as general services payments and consumer subsidies.

Baseline

The baseline was constructed using the projections from the latest United Nations (UN) demographic projections (UNDESA, 2022) and the 2023 International Monetary Fund (IMF) economic growth estimates (IMF, 2023), to bring the base year values (2017) of GTAP to those

of the actual years of policy scenario (2024–2028) and estimate the outcomes of these policy scenario up to 2035.

Policy scenarios implemented

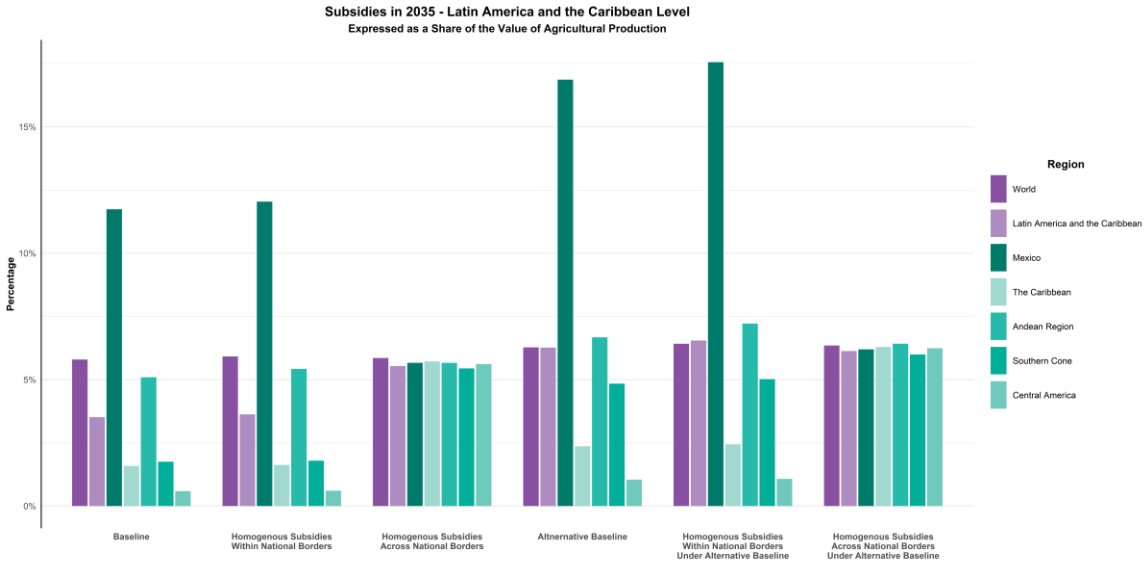
This paper explores the implications of harmonizing agricultural support while taking into account the policy dynamics in the Global South. Specifically, two policy scenarios are modelled:

1) Harmonization of agricultural support within national borders, to create a level playing field across products. Current agricultural support is indeed highly biased towards some commodities.
2) Harmonization of agricultural support across national borders, to address the issues of global inequality since current agricultural support is unevenly distributed around the world. This "bold" scenario in terms of political economy would create a level playing field both across products and across countries. To enhance its political viability, it is considered that only countries with historically higher levels of agricultural support relative to the global average would contribute to global financial transfers to countries with a level of support lower than the average. For the countries not contributing but with a level of support higher than the global average, a financial transfer to consumers is considered.

To increase the political feasibility of this scenario, countries that previously had a level of support lower than the global average are never contributing to the global financial transfers towards countries with a lower level of agricultural support, meaning only countries with historically higher levels of agricultural support compared to the global average are contributing to the global financial transfer.

5 Results

5.1 Subsidies and net transfers

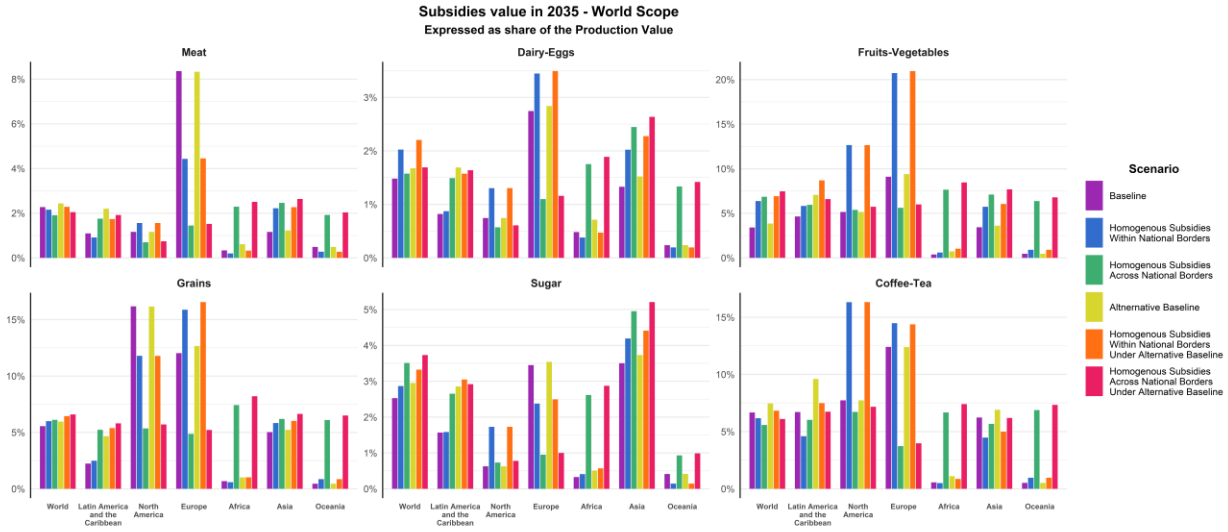


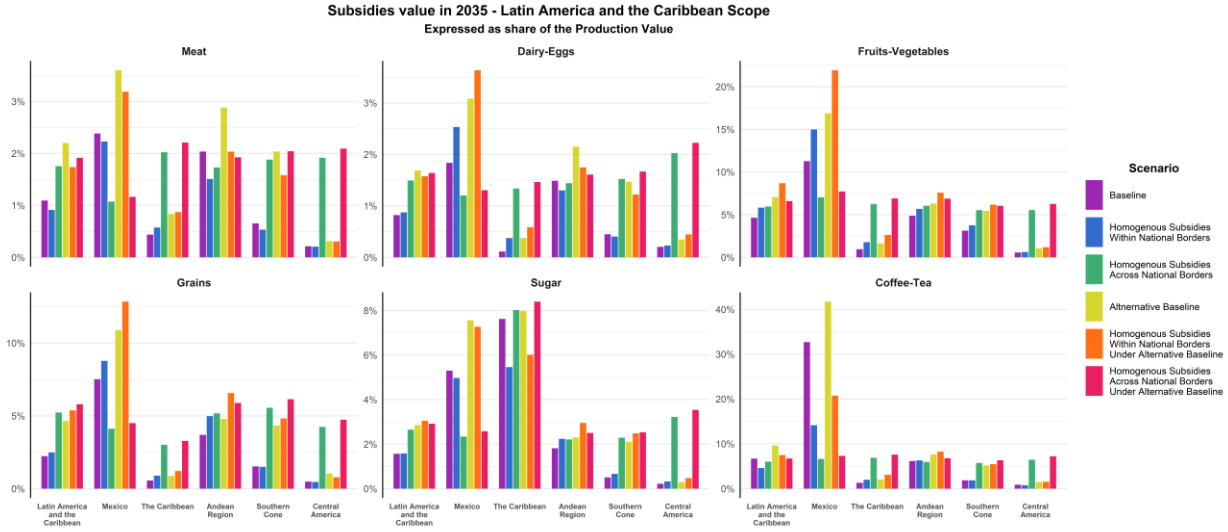
Subsidies in the agricultural sector will be highly biased across subregions within Latin America and the Caribbean without policy reforms: if the level of subsidies amount to 12% of the value of agricultural production for Mexico in 2035, it represents less than 0.6% of the value of agricultural production for Central America. Worse, when considering the policy dynamics of the Global South (Cf. captured by the alternative baseline), the gap would widen: the level of subsidies would amount to 17% of the value of agricultural production for Mexico in 2035 against 1% for Central America. It is also worth noting that this alternative baseline would induce a limited increase in the total level of agricultural subsidies: subsidies would represent 6.3% of the value of agricultural production against 5.8% beforehand.

A harmonization of subsidies within national borders would not create a level playing field between countries: the same level of subsidies is maintained for a given region. On the contrary, under a harmonization of subsidies across national borders, the level of subsidies is the same across regions (in the graph above the bars do not exactly have the same height due to differences in the value of production).

Under the harmonization of subsidies across national borders, the financial transfers would mostly occur from the European Union and the United States to Sub-Saharan Africa, the Rest of Asia and South-East Asia. Latin America and the Caribbean is a recipient of net transfer, but to a lesser extent under the alternative baseline due to a major increase in the agricultural subsidies for Southern Cone (especially Brazil).

It is worth highlighting that to increase the political viability of this scenario, only countries that historically received higher levels of subsidies compared to the global average are considered as "emitters" of financial transfers. As such, China, Russia and Mexico are part of no financial transfers for both policy scenarios.

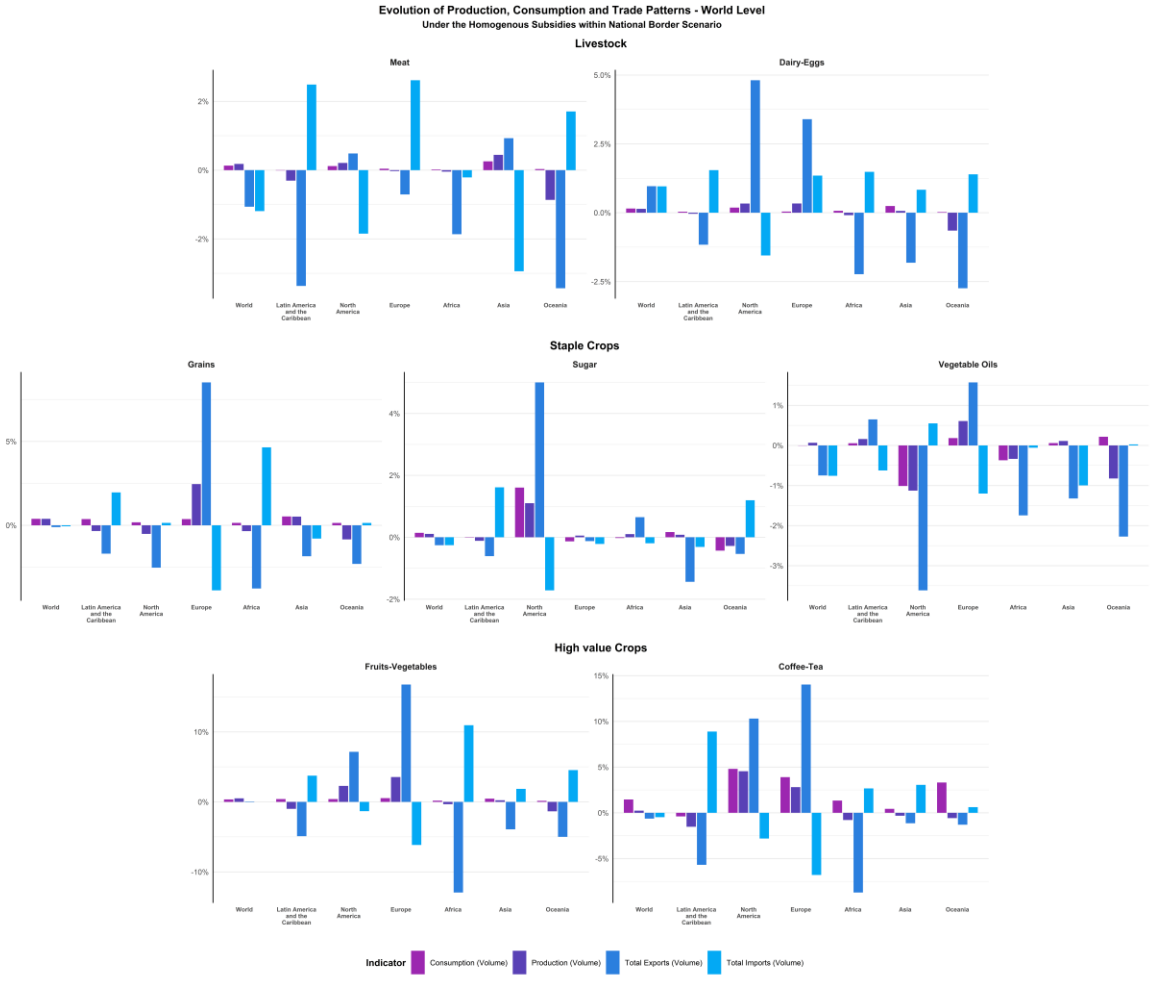




5.2 Production, consumption, imports, exports evolutions

5.2.1 World Level

5.2.1.1 Harmonization of subsidies within national borders



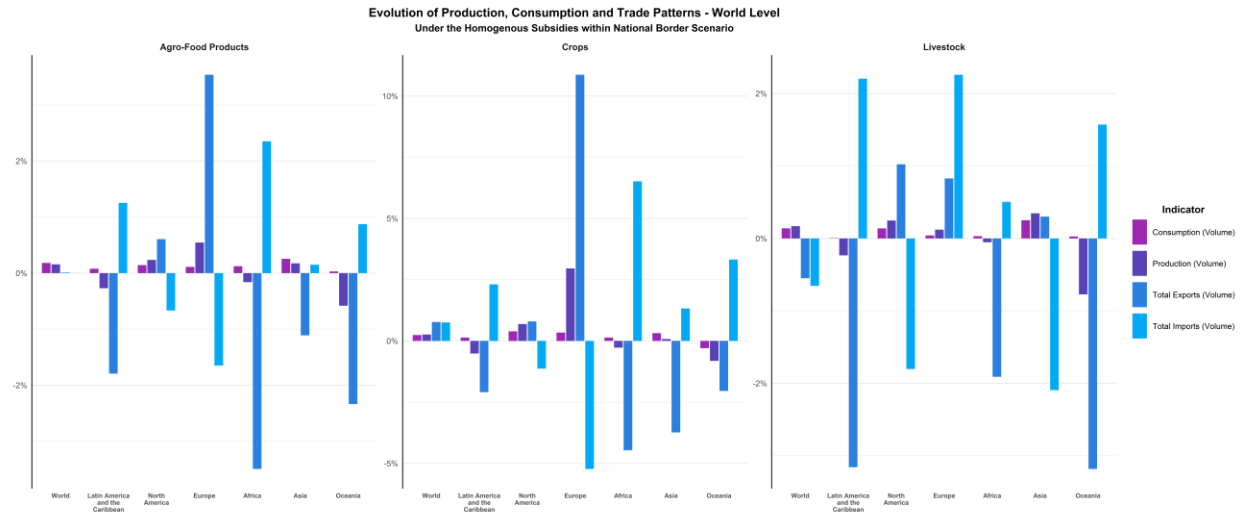
Under the harmonization of subsidies within national borders, meat trade is reduced at the global level. Asia, a major meat importer, would indeed decrease its imports (-2.9%) due to an increase in meat production (+0.4%). This growth in the meat sector is Asia is induced by the large increase in the subsidies in this sector with the harmonization of subsidies within countries: the subsidies values in terms of the value of production would double and reach the global average level. Latin America and the Caribbean and Oceania on the contrary would reduce quite significantly their exports (both by -3.4%) due to a reduction in meat production (by respectively -0.3% and -0.9%) caused by the reduction in the level of subsidies.

Dairy and egg trade would increase with the harmonization of subsidies within national borders, driven by an increase in exports from Europe (+3.4%) due to the high increase in exports in the European Union (+7.5%) whose production would increase (+1.0%) under this

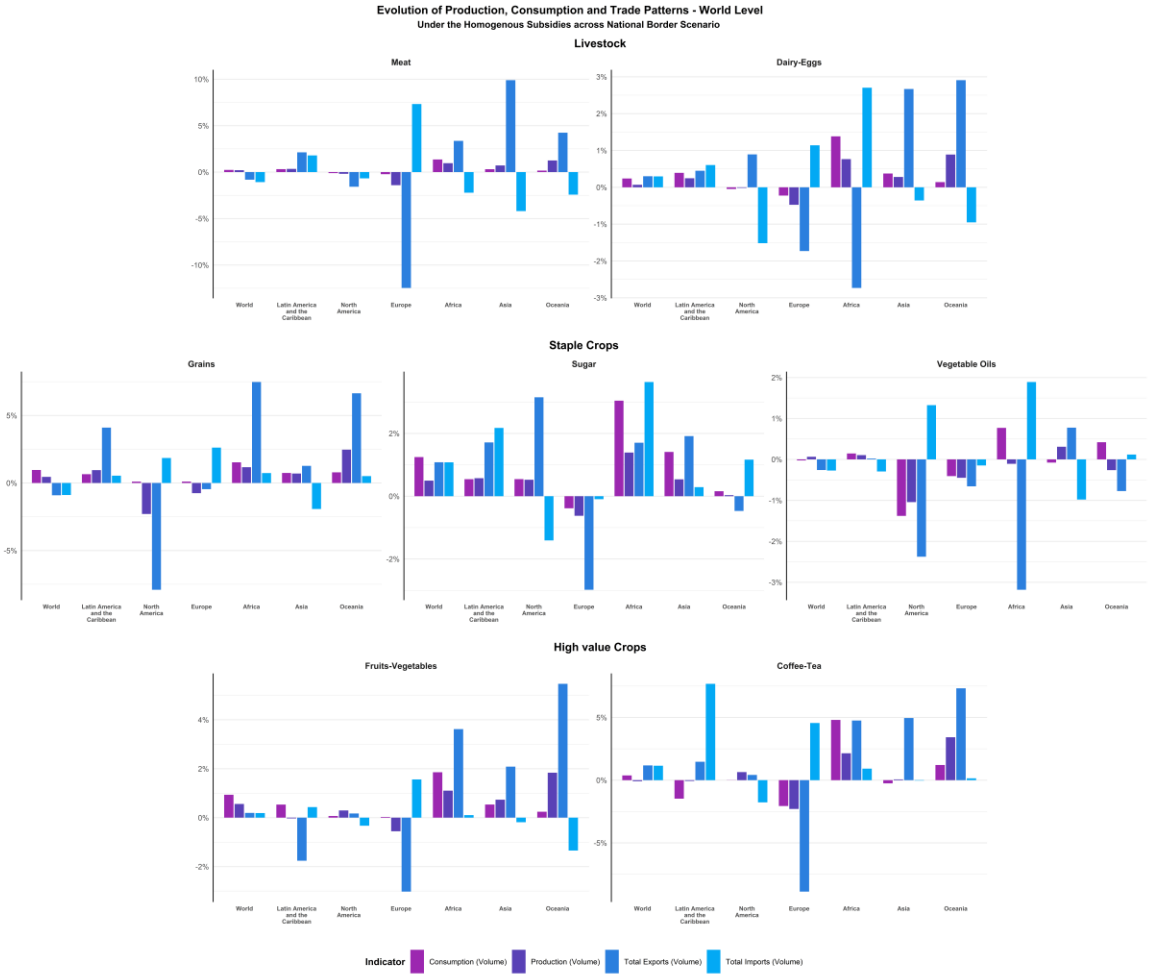
policy scenario with the increase in the value of subsidies. Imports would increase in Asia (+0.8%), Europe (+1.3% due to a significant increase in imports from Rest of Europe, by 7.0%, induced by a decline in the production and a stagnant consumption) and Africa (+1.5%).

The coffee and tea sector would experience a decrease in world trade. While Asia would increase its imports (+3.1%) due to a decrease in production (-0.3%) due to a decrease in subsidies, Europe would significantly reduce its imports (-6.8% due to an increase in production +2.8%) so would North America (-2.8%, similarly due to an increase in the production +4.5% accounted for the very high increase in the level of subsidies). Africa and Latin America and the Caribbean, which both experienced a decrease in the level of subsides, would both significantly reduce their exports (by respectively -8.7%and -5.7%) due to a notable decrease in production (by respectively -0.8% and -1.5%).

Finally, vegetable oils trade would also decrease, with a major reduction in exports from North America (-3.6%) accounted for by the decrease in production (-1.1%). Both Asia and Europe would reduce their imports (by respectively -1% and -1.2%) due to a rise in their production (by respectively +0.1% and +0.6%).



5.2.1.2 Harmonization of subsidies across national borders



The harmonization of subsidies across national borders would also induce a decrease in the global trade of meat. Like the previous policy scenario (under which subsidies were harmonized within national borders), Asia, a major meat importer, would even more decrease its imports (-4.2%). The increase in production (+0.7) due to the even higher level of subsidies under this scenario accounts for this even larger decline in meat imports from Asia. However, contrary to the previous policy scenario, global exports would be significantly reduced because of a significant decrease in exports from Europe (-12.5%). The meat sector would experience a significant decline in the level of support (more than divided by 4 compared to the baseline scenario), resulting in a drop in the meat production in Europe (-1.4%).

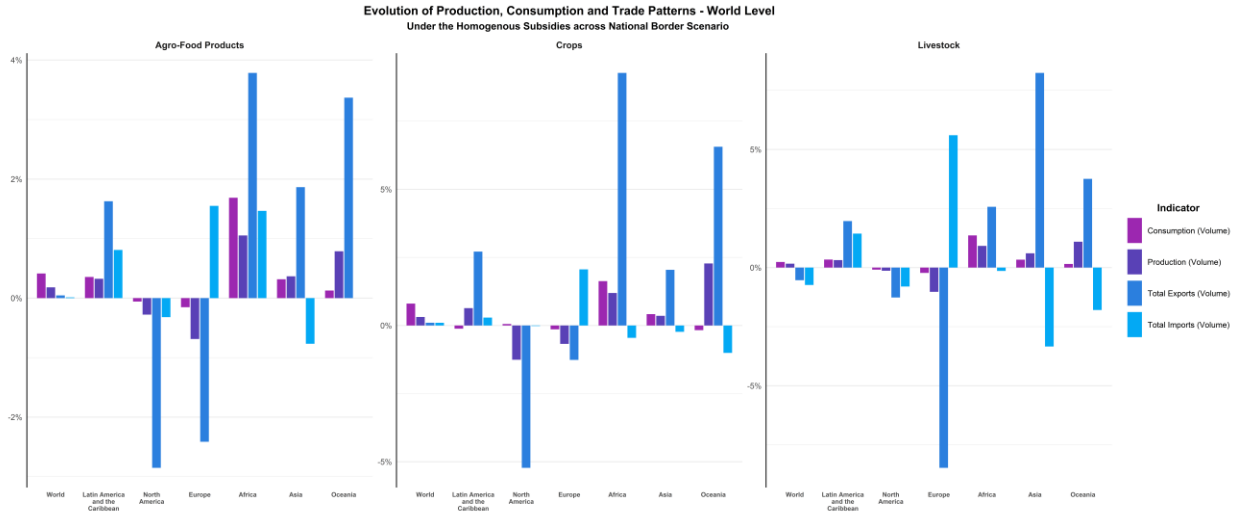
The harmonization of subsidies across national borders would lead to an increase in global consumption of fruits and vegetables (+0.9%), without an increase in the global trade of the

later, due to a rise in domestic consumption of fruits and vegetables in Africa and in Asia that would both experience an increase in the level of subsidies.

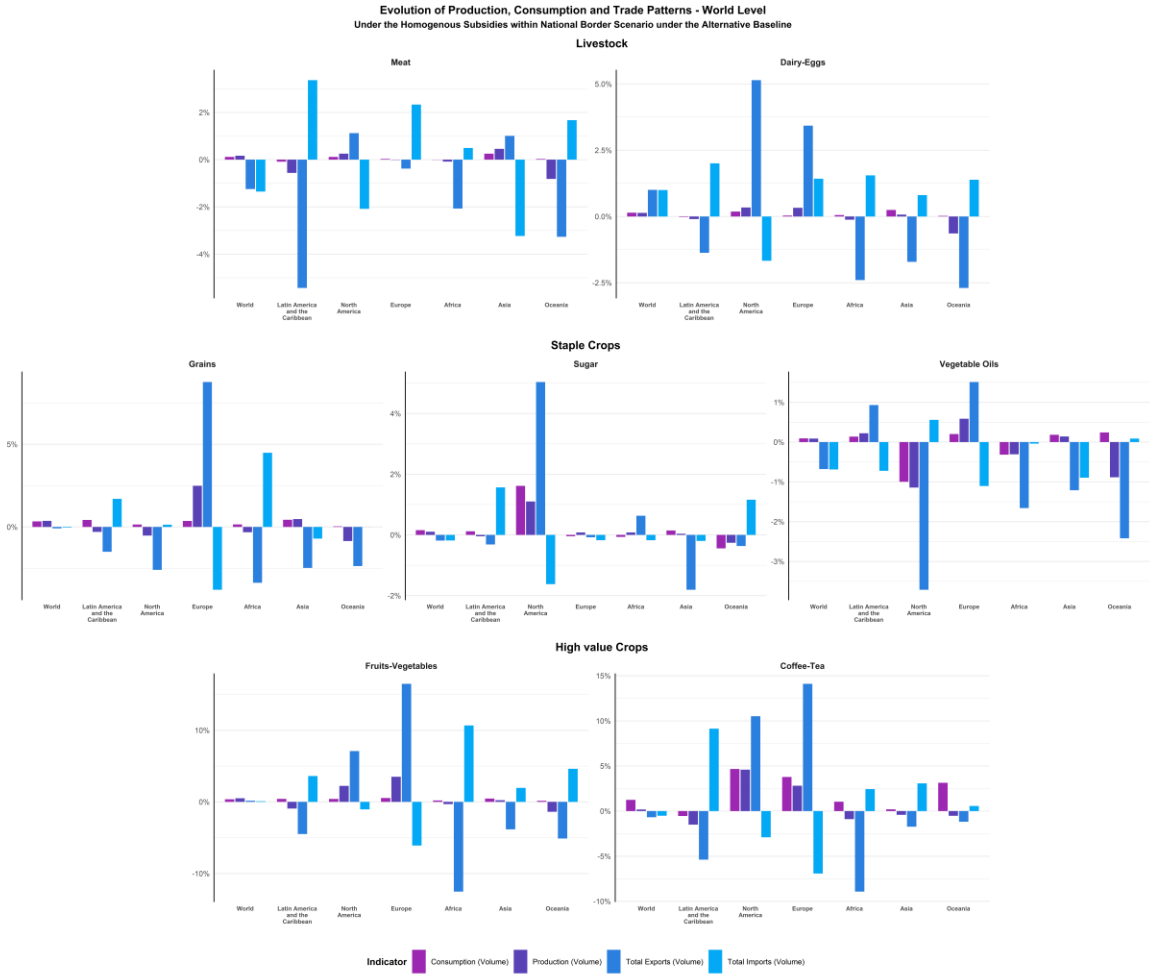
Additionally, under a harmonization across national borders, global trade of grains would decrease, with a notable reduction in imports from Asia, a major grain importer (-1.9%) due to an increase in production (+0.7%). While Latin America and the Caribbean would significantly increase their exports (+4.1%) due to a rise in the production (+1.0%) induced by the significant increase in the level of support (more than double), the exports from North America would significantly reduce (-7.9%) and overcompensate this increase in exports from Latin America and the Caribbean. This large decrease in exports from North America can be accounted for by the large decline in production (-2.3%) induced by the large decrease in the level of subsidies (to less than a third of their initial value).

Global sugar trade would increase under harmonization across national borders. African imports would significantly increase (+3.6%) due to a notably increase in the consumption (+3%), and despite the increase in the production (+1.4%) induced by the important increase in the level of subsidies. On the export side, the exports from Latin America and the Caribbean, and Asia would largely increase (by respectively +1.7%, +1.9%) due to a notable increase in the production (by respectively +0.6%, +0.5%) accounted for by the increase in the level of subsidies.

Lastly, contrary to the scenario of a harmonization solely within the national borders, the global trade of coffee and tea would increase under the harmonization across national borders. Specifically, imports from Europe would significantly increase (+4.6%) due to a large decrease in production (-2.3%) induced by the very important decrease in the level of subsidies (reduced to less than a third of the initial value of subsidies). Exports from Latin America and the Caribbean and from Asia would increase (by respectively +1.5% and +5.0%) due to a combination of stable production and a decline in consumption (by respectively -1.5% and -0.3%). African exports would in addition significantly increase (+4.8%) due to a large increase in the production (+2.1%), spurred by the very important increase in the level of subsidies.



5.2.1.3 Harmonization of subsidies within national borders under the alternative baseline

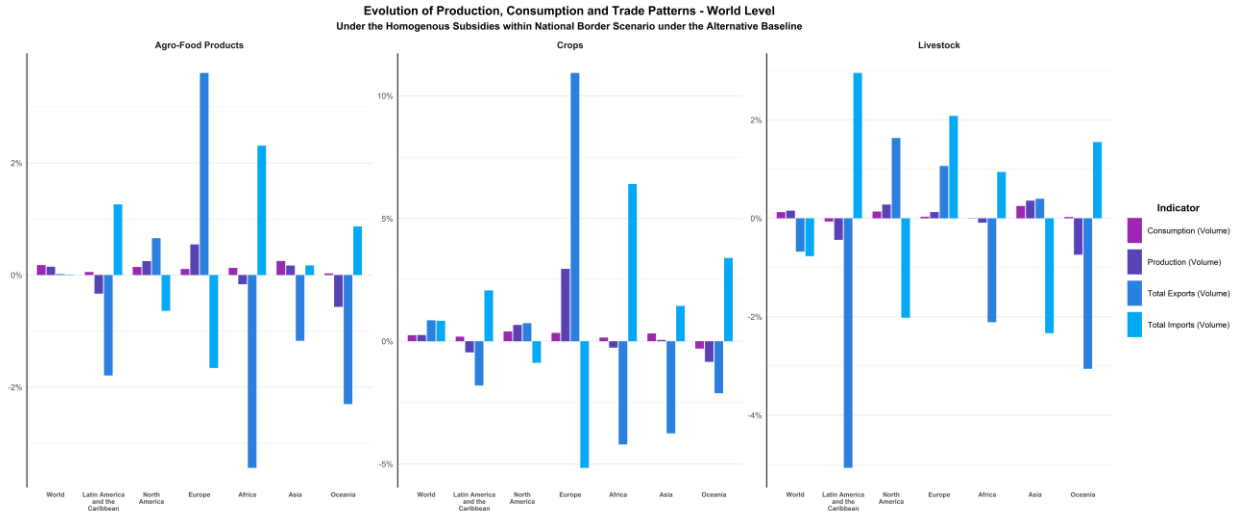


The harmonization of subsidies across national borders under the alternative baseline would yield a similar outcome for meat than the under the initial baseline: Asia would significantly reduce its imports (-3.2%) due to an increase in meant production (+0.5%), stemming from the increase in the level of subsidies. Latin America and the Caribbean would reduce its exports even more (-5.4%) due to a decrease in the meat production more important (-0.6%) induced by the larger decrease in the level of subsidies.

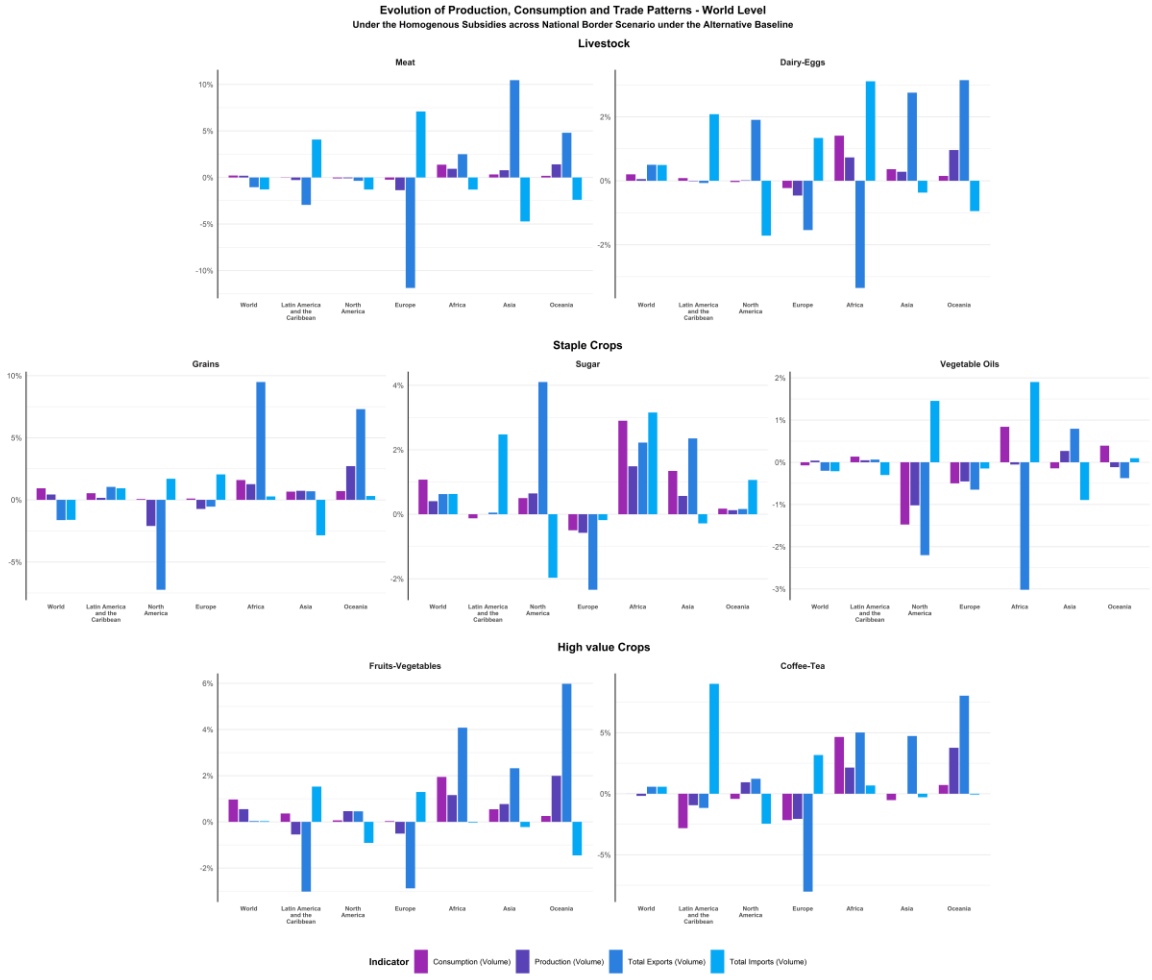
Like the corresponding policy scenario under the initial baseline, dairy and egg trade would increase, driven by an increase in exports from Europe (+3.4%) caused by the high increase in exports in the European Union (+7.5%). Imports would decrease in Asia (+0.8%), Latin America and the Caribbean (+2.0% - slightly larger than the increase in imports under the initial baseline, due to a small decrease in the level of subsidies under the alternative baseline against a slight increase under the initial baseline), Europe (+1.4% due to a significant increase in Rest of Europe by +6.9%) and Africa (+1.6%).

Consistently with the harmonization of agricultural policies under the initial baseline, global coffee and tea trade would decrease. While Asia would increase its imports (+3.1%), Europe and North America would significantly reduce its imports (by respectively -6.9% and -2.9). Africa and Latin America and the Caribbean would both significantly reduce their exports (by -8.9% and -5.4%) due to a notable decrease in production (by respectively -0.9% and -1.5%).

Finally, vegetable oils trade would also decrease, with a major reduction in exports from North America (-3.7%) and Asia (-1.2%). Both Asia and Europe would reduce their imports (by respectively -0.9% and -1.1%).



5.2.1.4 Harmonization of subsidies across national borders under the alternative baseline



The harmonization of subsidies across national borders under the alternative baseline is consistent with the harmonization under the initial baseline. Specifically, Asia would reduce its meat imports (-4.7%), to a larger extent than under the initial baseline due to a higher increase in the level of subsidies resulting in a higher increase in production (+0.8%). Global exports would also be reduced due to a significant decline in exports from Europe (-11.9%) and from Latin America and the Caribbean (-3%) that experiences a decline in the production (-0.3%) due to the reduction in the amount of subsidies received.

Under the alternative baseline this policy scenario would also lead to an increase in the trade of dairy and eggs. Specifically, Europe, Africa and Latin America and the Caribbean would increase their imports (by respectively +1.3%, +3.1% and +2.1%). This rise in imports for Europe would be due to a decrease in the production, for Africa it would stem from an increase in the consumption more important than the increase in production; while for Latin America and the Caribbean, it would be due to the high increase in imports from Mexico (+5.1%) resulting from a decrease in production. Exports from Asia and Oceania would rise (by respectively +2.8% and +3.1%), resulting from an increase in production.

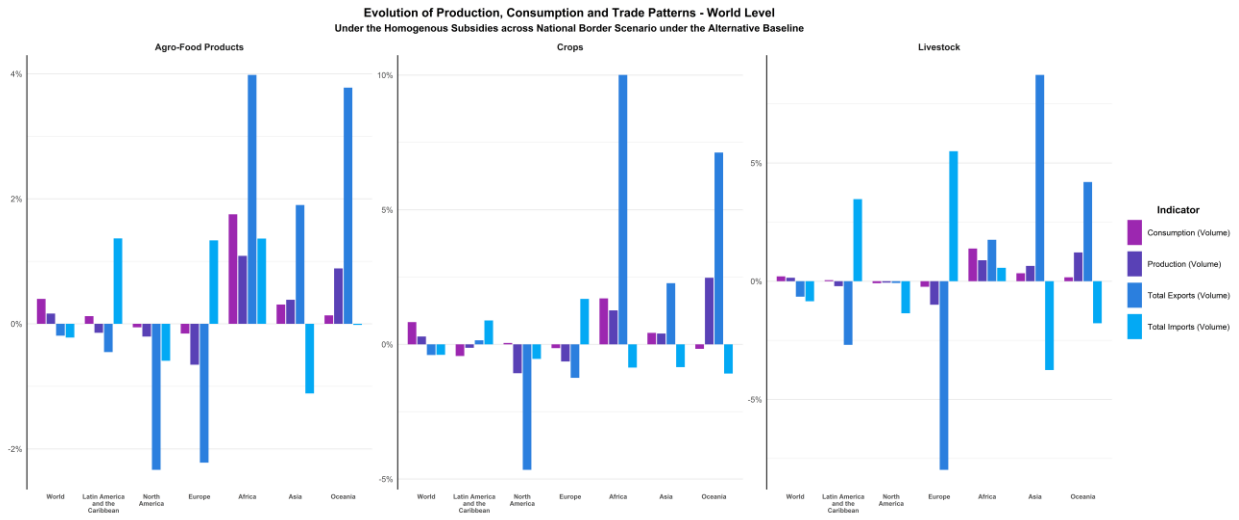
Similar to the harmonization of agricultural subsidies across national borders under the initial baseline, the harmonization under the alternative baseline would also lead to a rise in the global consumption of fruits and vegetables (+1.0%), due to an increase in domestic consumption of fruits and vegetables in Africa and in Asia that would both experience an increase in the level of subsidies.

Additionally, under a harmonization across national borders, global trade of grains would decrease under the alternative baseline, consistently with the corresponding policy scenario under the initial baseline. Imports from Asia would reduce significantly (-2.9%), so would exports from North America (-7.2%). The exports from North America would reduce slightly less than under the initial baseline, due to a less important reduction in the production (-2.1%), stemming from a more limited decrease in the level of subsidies.

Global sugar trade would increase under a harmonization across national borders under the alternative baseline, in accordance with the results obtained with the initial baseline. African imports would similarly significantly increase (+3.2%) due to a notably increase in the consumption (+2.9%). On the export side, the exports from Asia and North America would

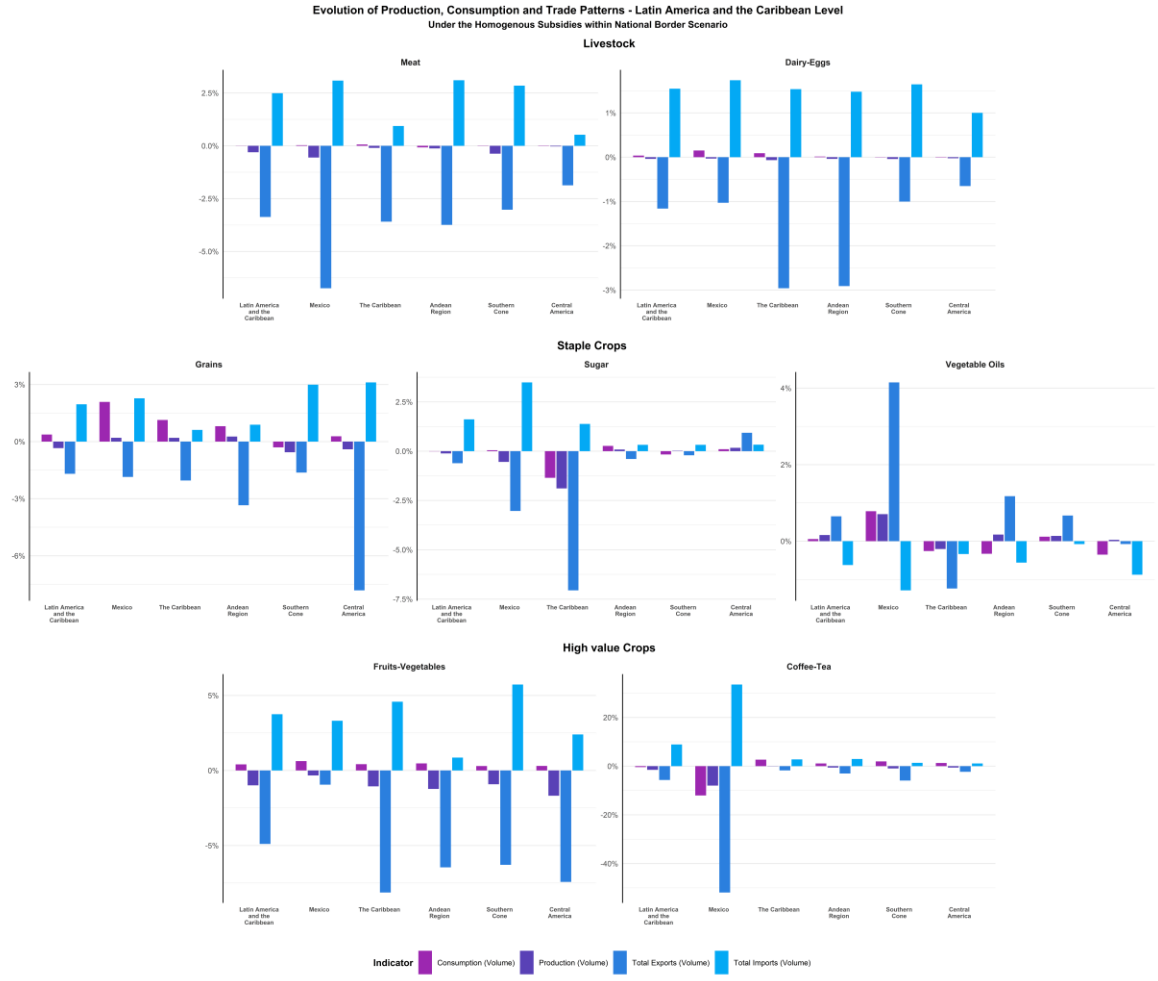
increase (by respectively +2.4% and +4.1%) due to an increase in production and a more limited increase in consumption.

Lastly, the global trade of coffee and tea would increase under the harmonization across national borders under the alternative baseline, as under the initial baseline. Specifically, imports from Europe would significantly increase (+3.2%). Exports from Africa, Oceania and from Asia would increase (by respectively +5%, +8% and +4.7%) due to a combination of stable production and a decline in consumption (by respectively -1.5% and -0.3%). For Africa and Oceania, this export rise stems from the increase in production, while for Asia, it is due to the decrease in consumption with a stable production.



5.2.2 Latin America and the Caribbean Level

5.2.2.1 Harmonization of subsidies within national borders

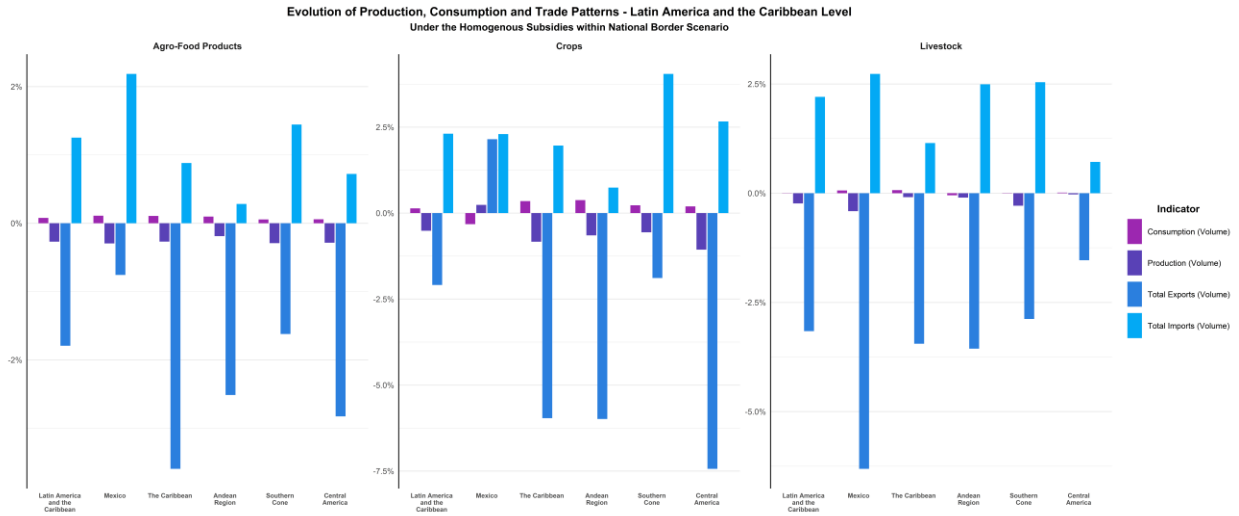


Under the harmonization of agricultural subsidies within national borders, meat exports from Latin America and the Caribbean would reduce significantly (-3.4%). This reduction would stem from the decrease in exports from Southern Cone (-3.0%), which faces lower levels of production (-0.4%) due to a reduction in the levels of subsidies. Imports from Southern Cone therefore increase (+2.8%), so do imports from Mexico (+3.1%, driven by the decrease in the production of -0.6%), resulting in the increase in imports at the level of Latin America and the Caribbean (+2.5%).

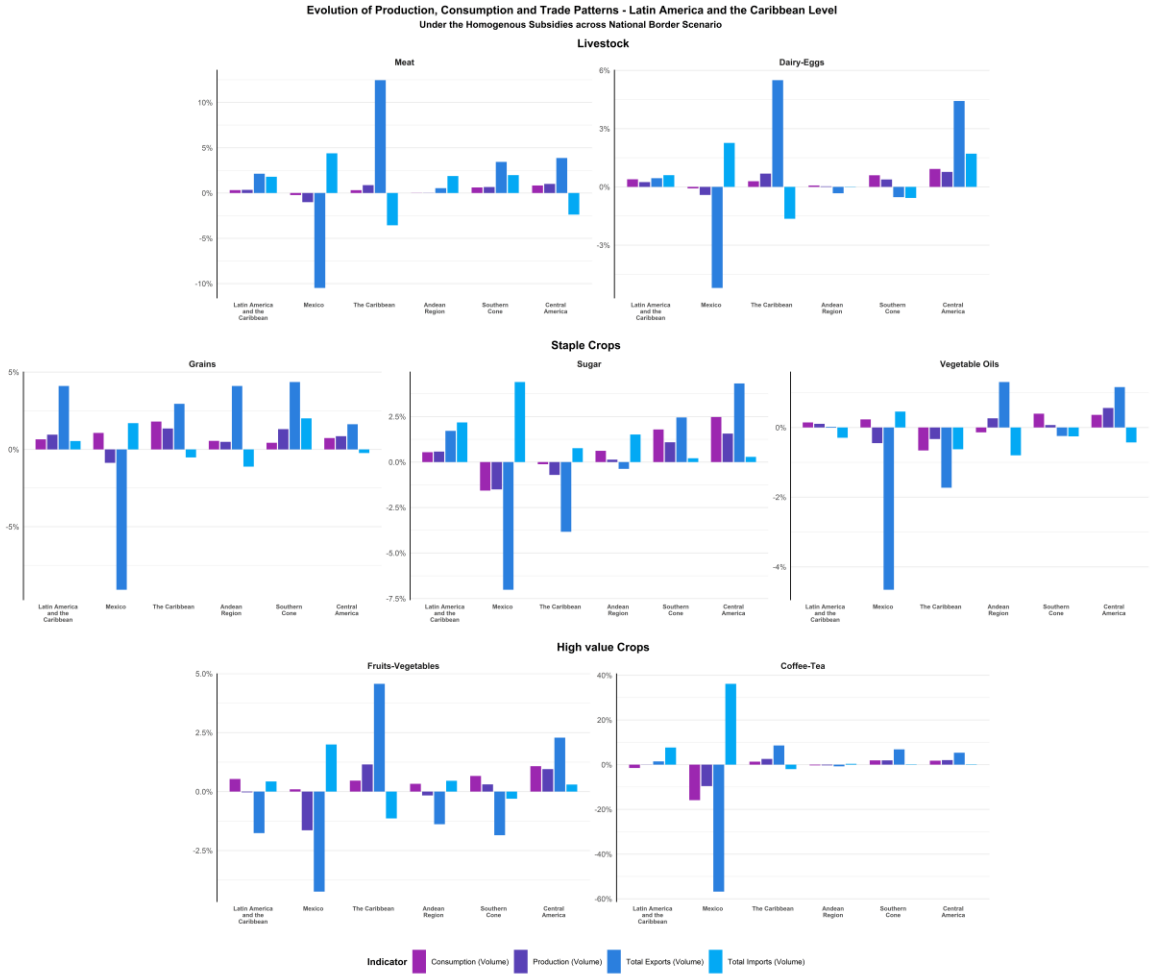
Exports of fruits and vegetables would also significantly decrease for Latin America and the Caribbean under this policy scenario (-4.9%), due to an increase in the consumption of these commodities (+0.4%), in conjunction with a decrease in the production (-1%). This trade evolution would stem from the significant decrease in exports from both Southern Cone and

Andean Region (by respectively -6.3% and -6.5%) due to the combined decrease in production and increase in consumption. Indeed, while the level of subsidies increases for fruits and vegetables in those sub-regions under the harmonization of agricultural subsidies within national borders, the level of subsidies is less important than the one for other trade competitors: there is no level playing field across countries.

Finally, exports from coffee and tea would also significantly reduce under this policy scenario (-5.7%). Exports from Southern Cone and Andean Region would indeed decrease significantly (by respectively -5.9% and -3%) due to the joined increase in consumption and decrease in production. The imports of coffee and tea of Latin America and the Caribbean would in parallel significantly increase (by 8.9%), due to a large increase in the imports from Mexico (by more than 30%). The coffee and tea sector in Mexico benefits under the baseline scenario of high levels of subsidies in 2035. The level of those subsidies therefore is significantly reduced under the harmonization scenario, resulting in a notable decline in the production of coffee and tea in Mexico (-8%).



5.2.2.2 Harmonization of subsidies across national borders



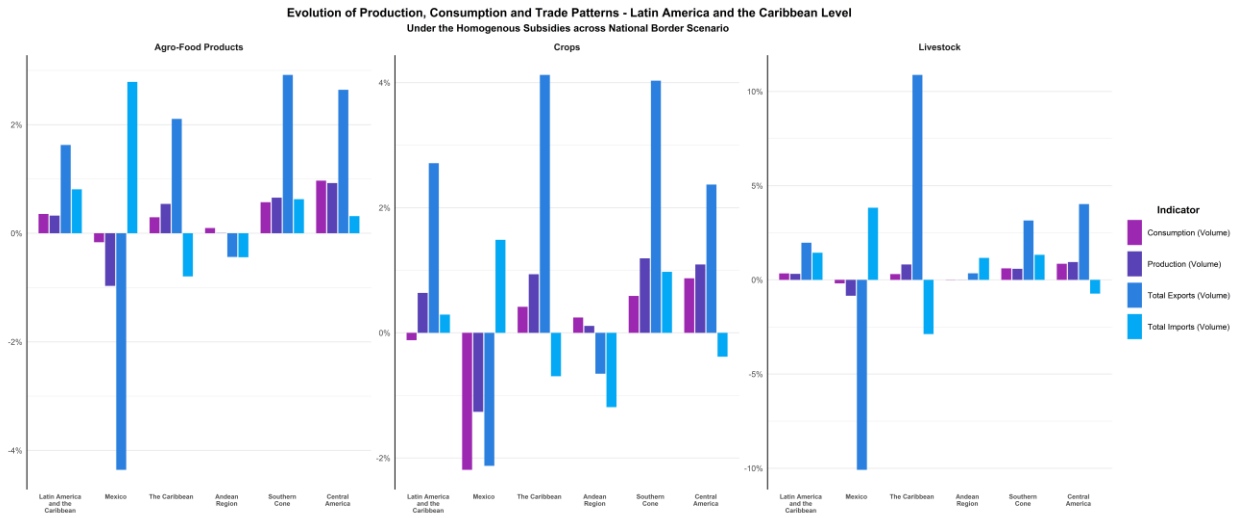
Under a harmonization of subsidies across national borders, meat exports from Latin America and the Caribbean would increase (+2.1%), mostly driven by the increase in exports from Southern Cone (+3.4%). Production in the subregion would indeed rise (+0.6%) due to a significant increase in the level of subsidies (more than triple).

Grain exports from Latin America and the Caribbean would also grow (+4.1%), due to the increase in exports from Southern Cone (+4.4%). Under this policy scenario, the level of subsidies in Southern Cone rises significantly (more than triple), resulting in an increase in production and this increase in exports.

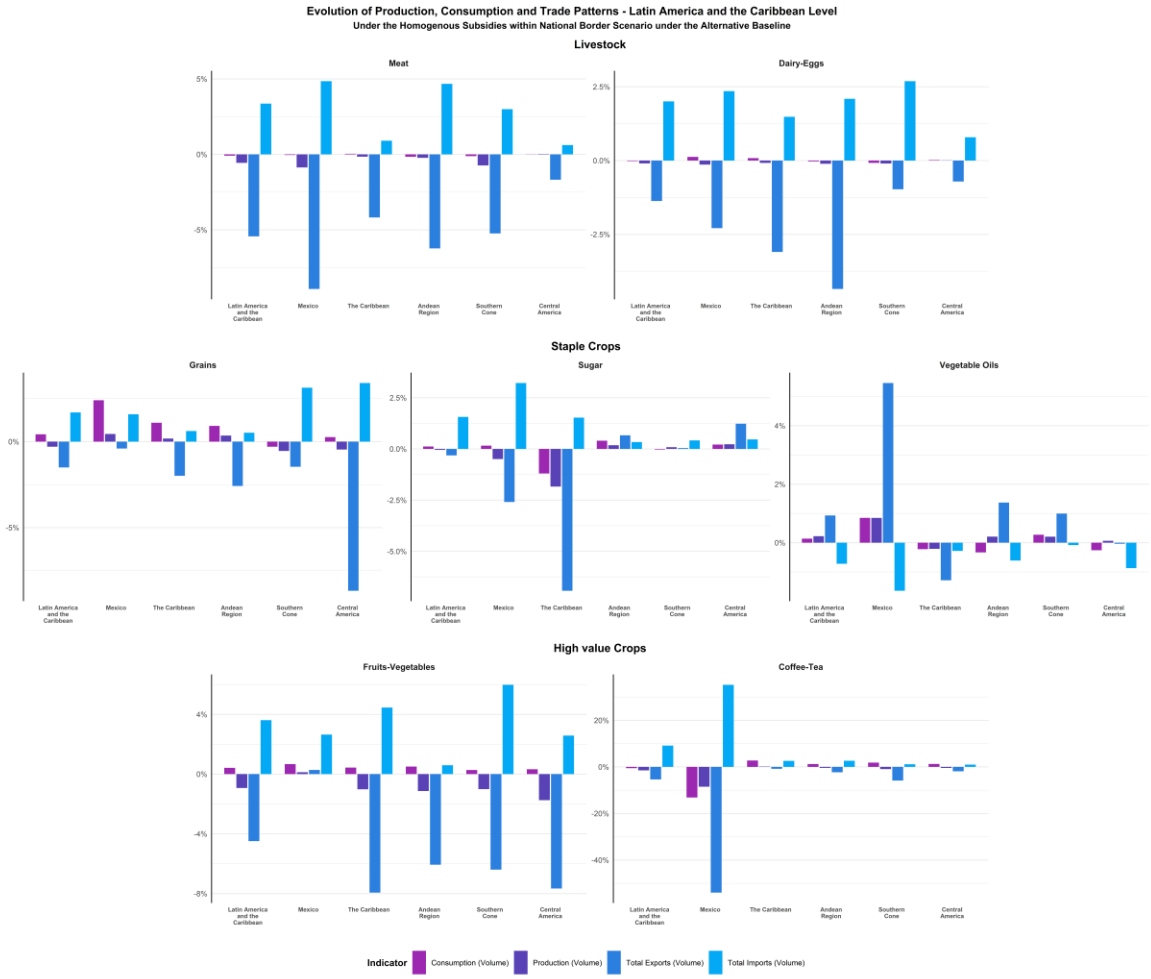
Contrary to the scenario of an harmonization of subsidies within national borders, the sugar exports from Latin America and the Caribbean would increase by 1.1% under the policy scenario of an harmonization of subsidies across national borders. This increase in exports

would stem from an rise in exports from the Southern Cone and the Central America region (by respectively +2.5% and +4.3%), caused by an augmentation in the production of those subregions following the significant increase in the level of subsidies for sugar (more than quadruple).

Finally, coffee and tea consumption would significantly decrease (-1.5%) under a harmonization of subsidies across national borders, due to a decline in the consumption from Mexico (-16%). Exports would however increase (+1.5%), driven by the increase in exports from Southern Cone and the Central American region (by respectively +6.9% and +5.3%), both resulting from a significant level of subsidies and the subsequent increase in production.



5.2.2.3 Harmonization of subsidies within national borders under the alternative baseline

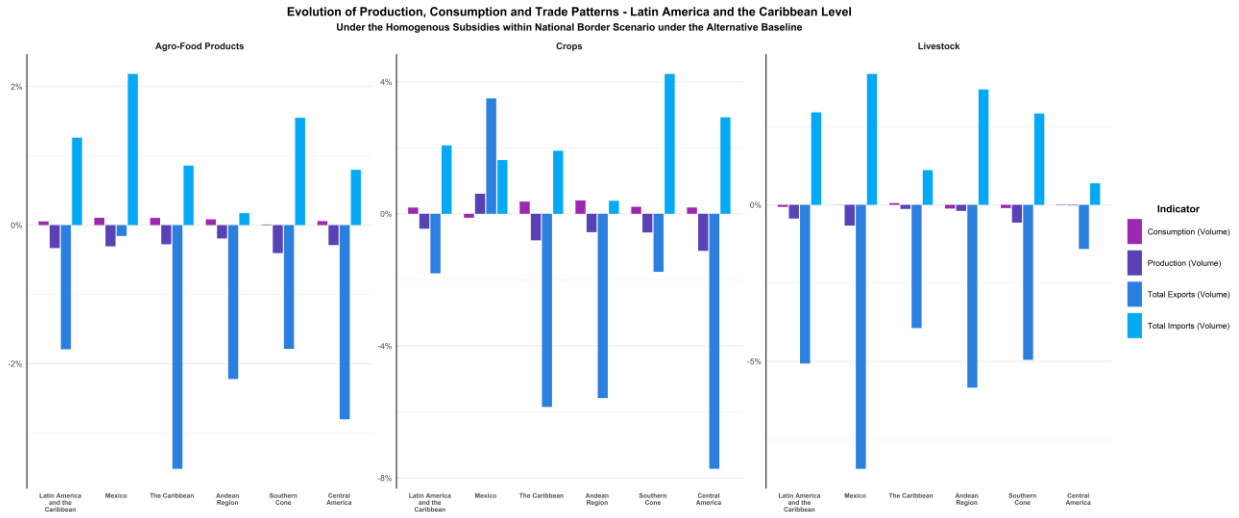


Under the harmonization of agricultural subsidies within national borders with the alternative baseline, meat exports from Latin America and the Caribbean would reduce significantly (-5.4%). This reduction, more important under the alternative baseline than under the initial baseline, stems from the higher decrease in exports from Southern Cone (-5.2%), which faces a more important reduction in the levels of subsidies. This higher reduction in the levels of subsidies with this policy scenario results from the commodity-biased increase in support under the alternative baseline for Southern Cone.

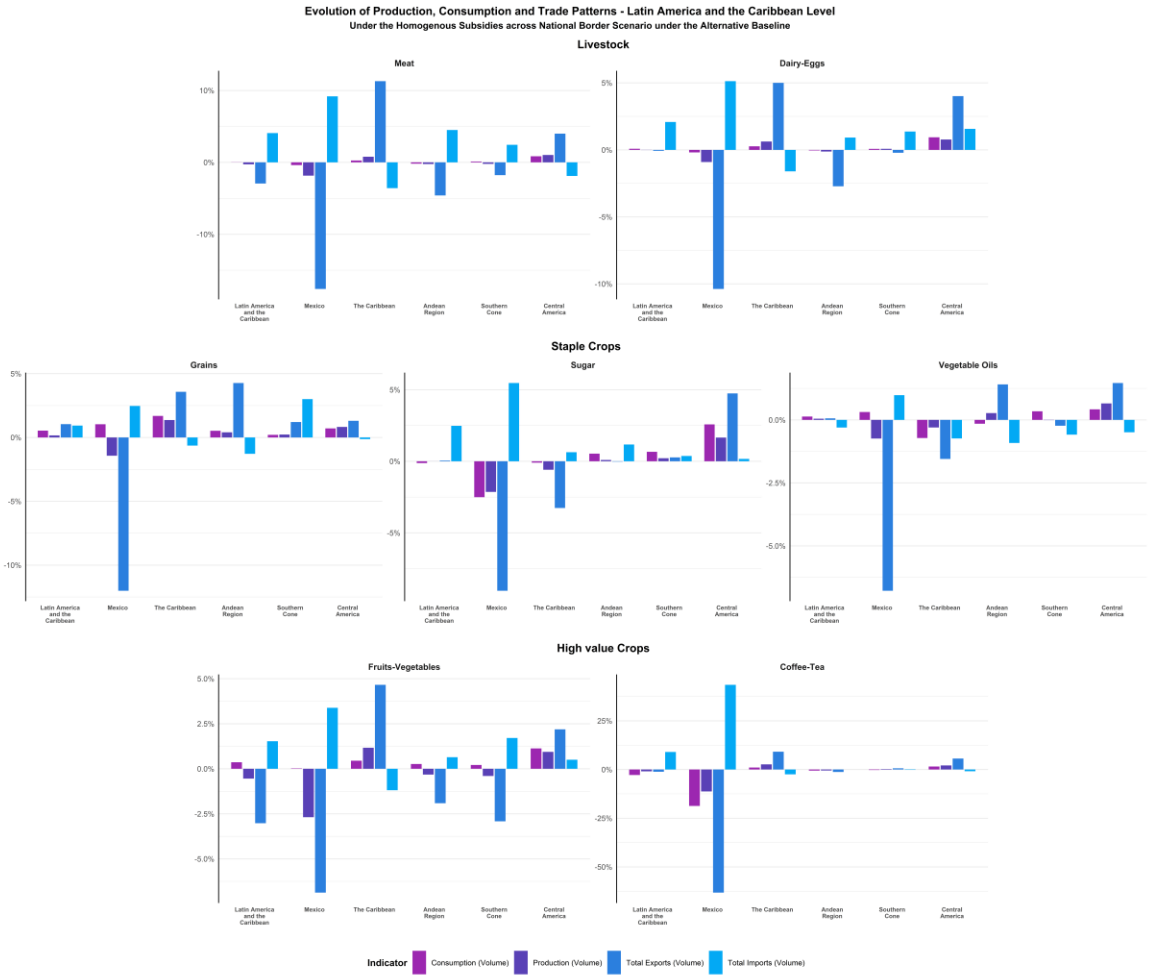
Exports of fruits and vegetables would also significantly decrease for Latin America and the Caribbean under this policy scenario (-4.5%), due to an increase in the consumption of these

commodities (+0.5%), in conjunction with a decrease in the production (-0.9%). This trade evolution would stem from the significant decrease in exports from both Southern Cone and Andean Region (by respectively -6.4% and -6.1%) due to the combined decrease in production and increase in consumption. The decrease in exports is less important than under the initial baseline since the Andean Region has a higher level of support with the alternative baseline and therefore face a slightly more limited decrease in production, resulting in a less important reduction in its exports.

Finally, exports from coffee and tea would also significantly reduce under this policy scenario (-5.4%). Exports from Southern Cone would indeed decrease significantly (-5.9%) due to the joined increase in consumption and decrease in production. As for the export evolution of fruits and vegetables, the decrease in exports is less important than under the initial baseline since the Andean Region has a higher level of support with the alternative baseline, leading to a smaller reduction in the production and a more limited decrease in exports (-2.3% against -3%).



5.2.2.4 Harmonization of subsidies across national borders under the alternative baseline

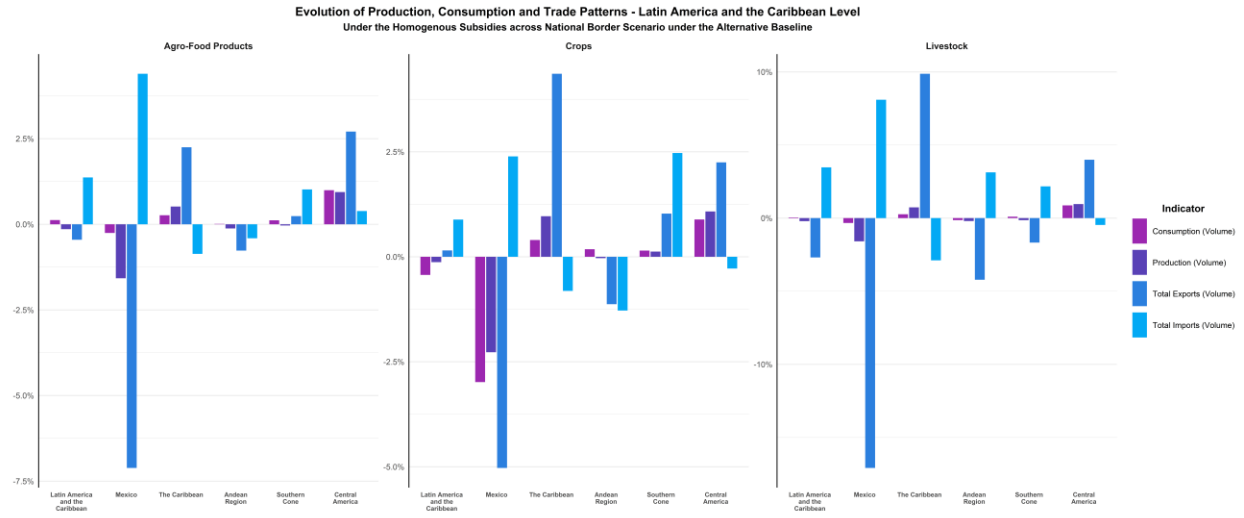


Under a harmonization of subsidies across national borders under the alternative baseline, meat imports from Latin America and the Caribbean would increase (+4.1%), mostly driven by the increase in imports from Mexico (+9.2). Production in Mexico would indeed decrease substantially (-0.4%) due to a significant decrease in the level of subsidies (more than divided by 3).

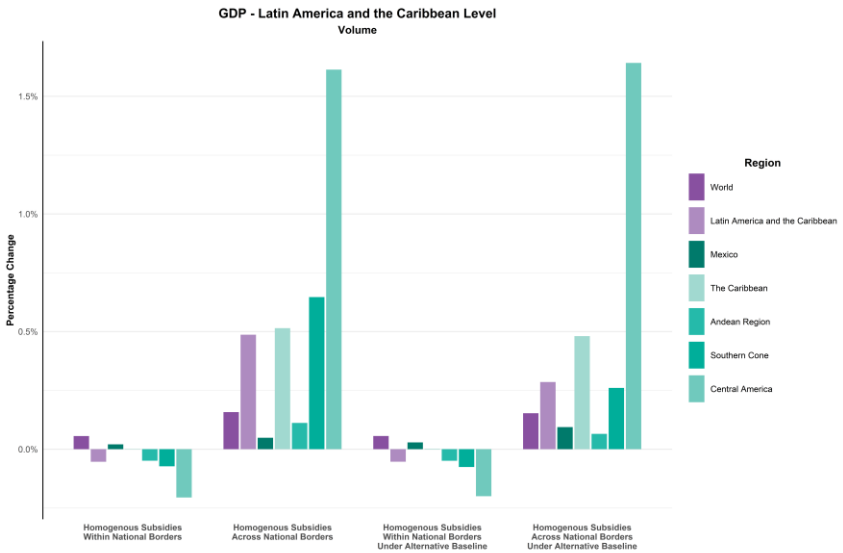
Exports of fruits and vegetables would also decrease for Latin America and the Caribbean under this policy scenario (-3.0%), more than under the initial baseline. Notably the exports from Mexico would reduce more (-6.9% against -4.2%) due to a more important decrease in production (-2.7% against -1.6%) stemming from a sharper decline in the level of subsidies

(divided by 3 under the alternative baseline, while were "only" divided by 2 under the initial baseline).

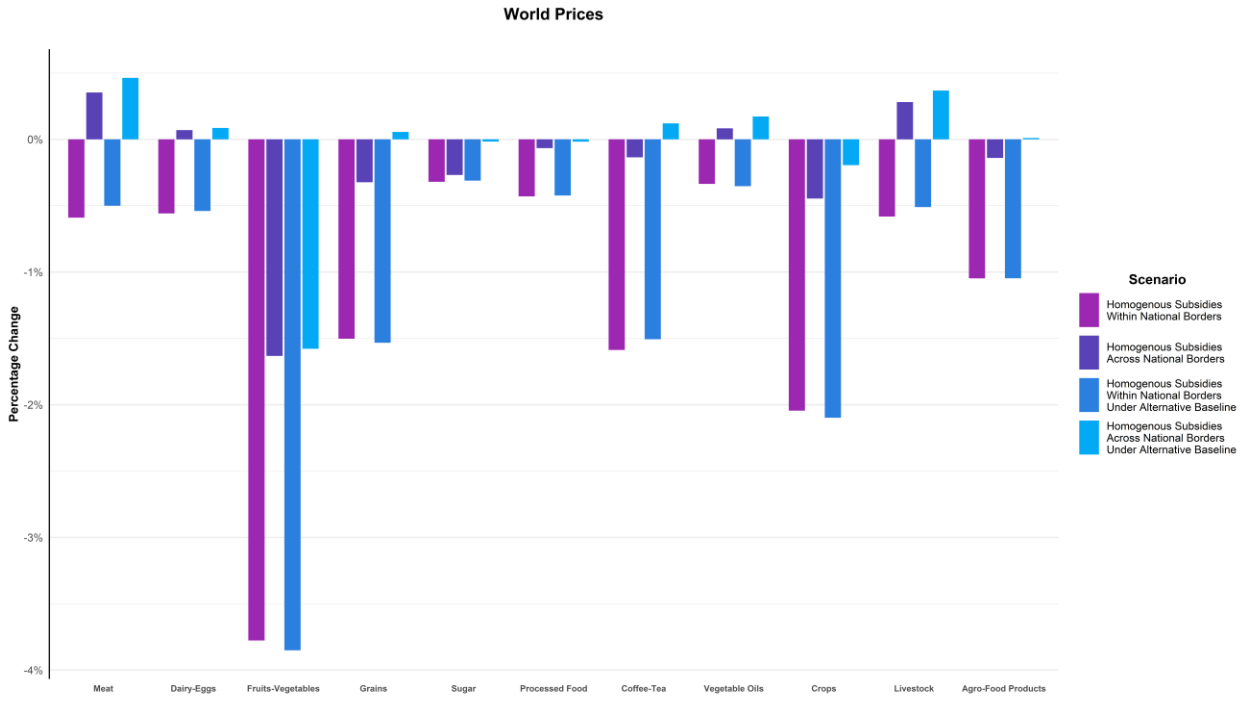
Finally, grain exports from Latin America and the Caribbean would also grow (+1.0%), due to the increase in exports from Southern Cone. (+1.2%) Under this alternative baseline, the increase in exports would be more modest than under the alternative baseline due to a more limited increase in the level of subsidies in Southern Cone, resulting in a more reduced rise in the level of production (+0.2% against +1.3% under the initial baseline).



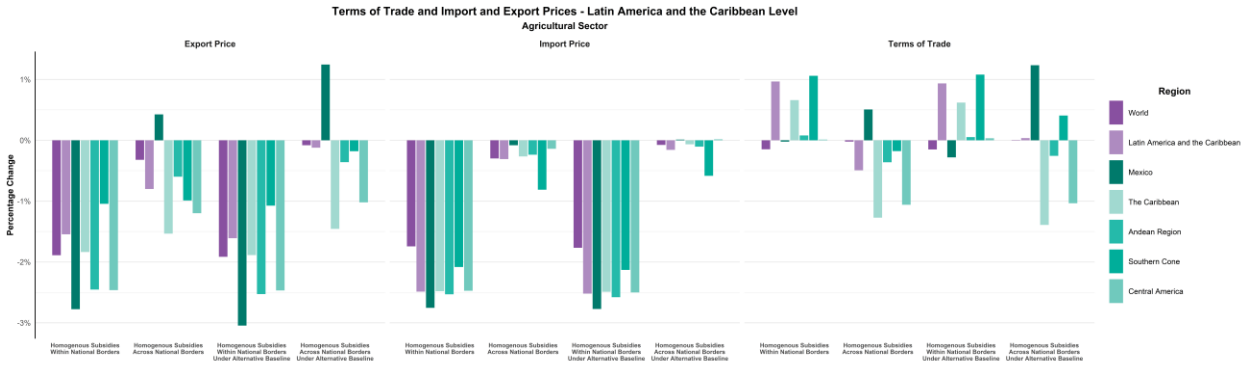
5.3 Macro-economic outcomes



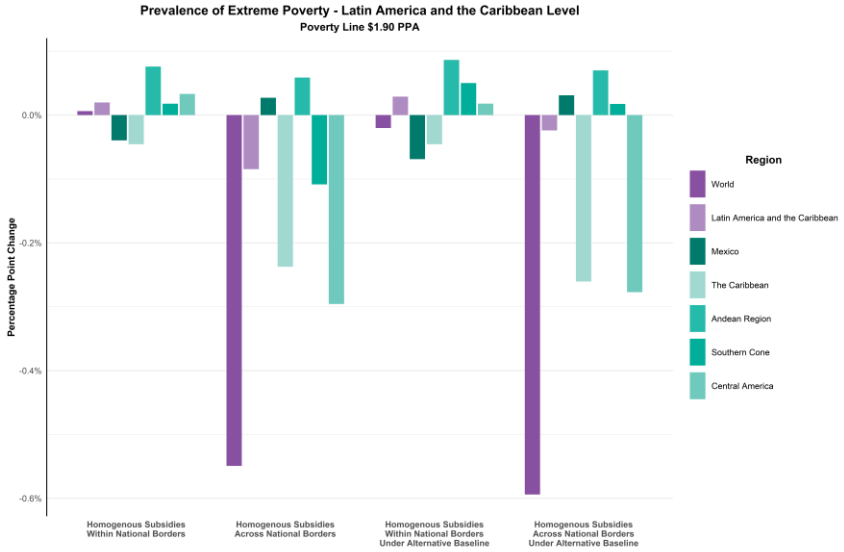
World GDP would increase more under a total homogenization of agricultural subsidies across national borders due to the efficiency gains. Within Latin America and the Caribbean, the increase in the GDP is the highest for the subregions receiving financial transfers, namely Caribbean, Southern Cone and Central America. The rise in GDP in Southern Cone is more limited under the alternative baseline due to more limited financial transfers (since initially the subregion had higher levels of subsidies).

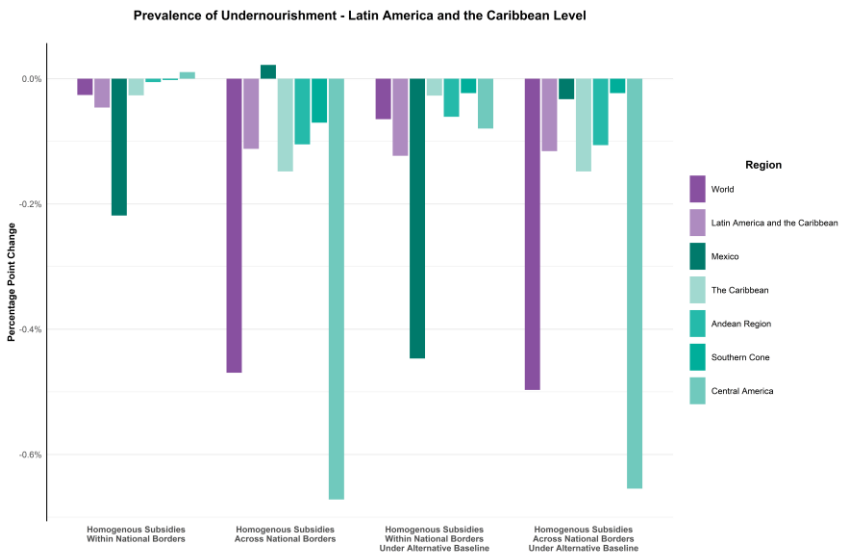


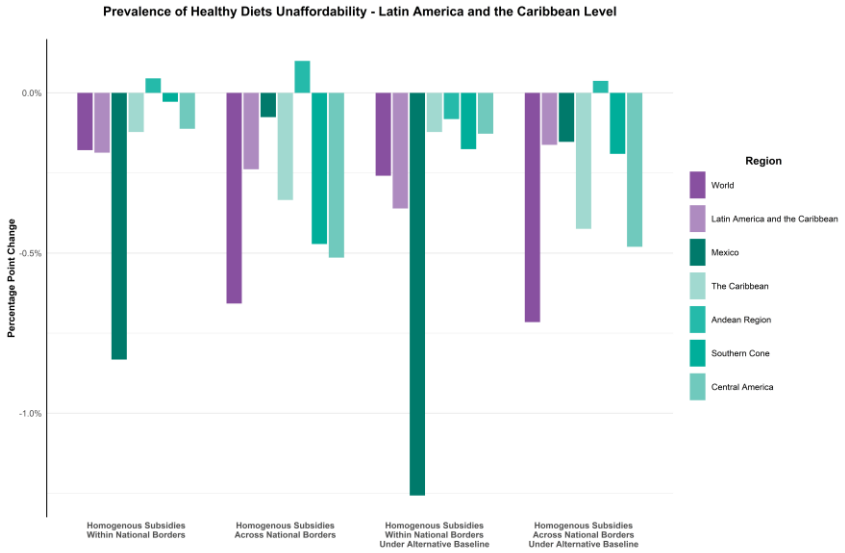
Under the harmonization of subsidies within national borders, the world prices decrease due to increased efficiency, especially for fruits and vegetables (by about -3.7%), grains (-1.5%) and coffee and tea (-1.5%). Under a harmonization of subsidies across national borders, the evolution of the world prices is more mitigated and is sometimes associated to a small increase for some commodities, for instance for meat. Under those policy scenarios, the subsidies and therefore the production are reoriented towards regions that export less since they have a strong domestic demand, as with Africa.



5.4 Social Outcomes







At a global level, the reduction in the prevalence of extreme poverty, undernourishment and unaffordability of healthy diets is particularly important for the policy scenarios of a homogenization of subsidies across national borders (the one under the initial baseline and the one under the alternative baseline). Under those policy scenarios, African countries receive financial transfers, resulting in a notable decrease in both the prevalence of extreme poverty and of undernourishment, with a reduction of about -2 percentage point change for the prevalence of extreme poverty and undernourishment in Africa, and a decrease of -1.5 percentage point change for the prevalence of healthy diets unaffordability.

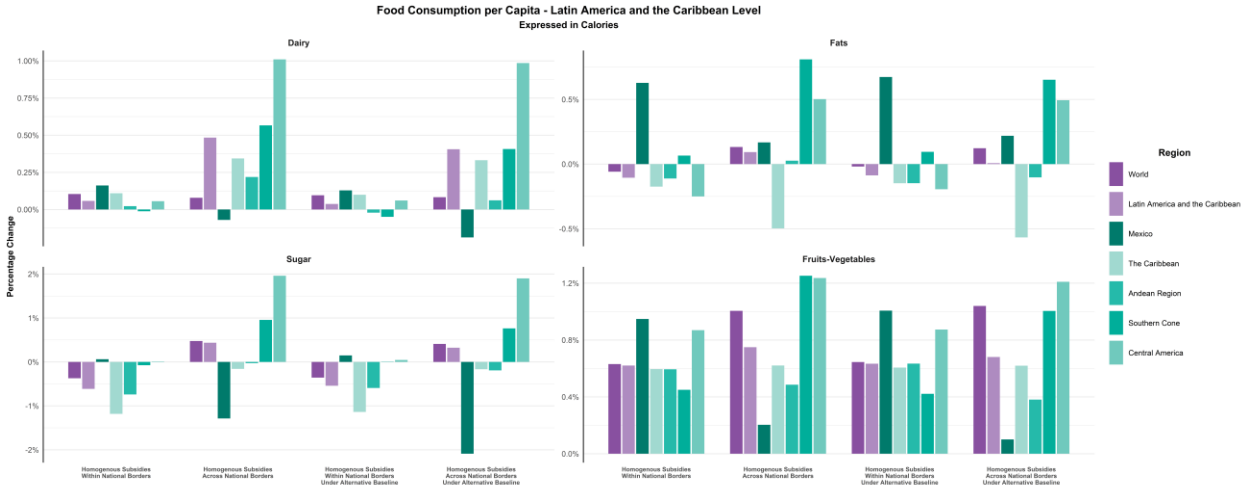
For the Latin America and the Caribbean region, there is a notable decrease in those social indicators in the subregions receiving monetary transfers: the Caribbean, the Southern Cone and Central America under the initial baseline; but only the Caribbean and Central America under the alternative baseline.

As for the Andean Region, there are very reduced evolutions in the prevalence of extreme poverty undernourishment and unaffordability of healthy diets since the region is receiving little financial transfer, that's why the evolution in those social indicators is due to the recomposition of agricultural production among agricultural sectors with varying levels of labor-intensity.

Finally, in Mexico under the harmonization of subsidies within national borders the prevalence of undernourishment and the prevalence of healthy diets unaffordability both reduce quite notably, due to a decrease in the import prices of the agricultural commodities resulting in a higher increase in the volume compared to the increase in the value of imports ; and even resulting in a decrease in the value of imports of fruits and vegetables and grains, while there is an increase in the volume of imports of those commodities. Under the harmonization across national borders, the agricultural production in Mexico significantly decreases due to the very notable decline in the amount of agricultural subsidies. In parallel, world prices of agricultural commodities do not decrease to a similar extent, resulting in an increase in the value of imports of all commodities. The social impact is however mitigated by the fact that Mexico does not contribute to the international monetary transfers: the reduction of subsidies is compensated by a non-targeted income transfers to consumers.

The evolution of farm employment within national borders differs among subregions and depends on the reorientation of the agricultural production to sectors with varying levels of labor-intensity.

At the world level, there is an increase of employment under the homogenization of subsidies across national borders due to a shift in the world agricultural production to countries more labor-intensive. For Latin America and the Caribbean, sub-regions receiving financial transfers have a higher farm production, resulting in an increase in farm employment. On the contrary, due to the sharp reduction in subsidies in Mexico, farm production decreases sharply, resulting in a decrease of employment under the policy scenarios of a harmonization across national borders.



These repurposing scenarios have a minimal effect on the diet pattern since they do not constitute targeted repurposing of the fiscal space. Consistent with (Glauber & Laborde, 2023), diet evolutions are more important under the targeted repurposing scenario.

5.5 Environmental outcomes

Agricultural emissions are found to increase at the global level under those policy scenarios. However, the increase is limited and there are contracting effects between countries. Furthermore, these policy scenarios do not consider changes in technologies: the repurposing of agricultural support is not conditional, neither redistributed to extension services or R&D. This limited increase in agricultural emissions calls for further assessment of conditional repurposing of agricultural support.

5.6 Global Implications and Learnings

Analyzing the impacts of reallocating agricultural support on various indicators reveals potential for improving food security, nutrition, and climate outcomes. Four scenarios were implemented, addressing both the structure and geography of support, emphasizing the need to level the playing field across products and countries.

These scenarios illustrate the elimination of distortions at national and global levels, progressively addressing issues of global inequality and policy dynamics in the Global South. The redistribution across borders shows better results for the world as a whole, particularly for low-income countries, emphasizing the need for a radical rebalancing of policies worldwide.

The global implications of climate change necessitate new strategies, recognizing that policy reform is a country-level process with environmental impacts extending beyond national boundaries. Current support should be better targeted to reduce the cost of nutritious food, increase sustainability, and make trade freer while balancing farmers' incomes. The modeling exercise reveals that removing existing distortions alone will not solve the problems, emphasizing the importance of investing in productivity gains and addressing productivity gaps.

Analyzing the impacts of scenarios on production, extreme poverty, undernourishment, and the affordability of healthy diets provides valuable insights. Scenarios with cross-border

support redistribution show substantial improvements for low- and middle-income countries, indicating the potential benefits of a more equitable global distribution of agricultural support

Repurposing domestic support has a discernible impact on reducing the cost of current and healthier diets. Phasing out resources from staple foods may modestly impact undernourishment, highlighting the need for careful consideration in selecting the "right" products. Technology transfer, innovation, and financial resources will prove indispensable in facilitating adoption, particularly in the Global South. The removal of existing policies presents a complex landscape of consequences, making repurposing policies imperative, with a particular emphasis on sustainable intensification and prioritizing the production of healthy and environmentally friendly products. Governments must navigate the challenges and opportunities presented by repurposing policies, ensuring a balanced and sustainable global agricultural landscape.

6 Conclusion

In conclusion, achieving a sustainable and equitable global food system requires a concerted effort by the international community. The role of multilateralism, represented by the World Trade Organization (WTO), is pivotal in steering the course towards a sustainable future. The ongoing debates and proposals within the WTO underscore the need for collaborative and innovative solutions to address the multifaceted challenges facing agricultural and food systems globally.

Reducing and removing trade-distorting domestic support emerges as a crucial step in this process. The analysis of scenarios, encompassing support redistribution and addressing environmental impacts, highlights the potential for positive outcomes, particularly for low- and middle-income countries. However, the complexity of global agriculture demands careful consideration of unintended consequences and a holistic approach that prioritizes sustainability, resilience, and inclusivity.

As nations navigate the intricate landscape of policy reforms, it is imperative to balance the interests of diverse economies, considering the unique needs of smallholder farmers and fostering international cooperation. The reallocation of financial resources, coupled with

targeted investments in sustainable practices, emerges as a key strategy for achieving a fairer and more resilient global food system.

Multilateralism provides the framework for coordinating these efforts, ensuring that policy reforms transcend national boundaries and address global challenges collaboratively. The WTO, as a platform for international dialogue and negotiation, plays a central role in facilitating these discussions and fostering consensus on critical issues such as the reduction of trade-distorting domestic support.

In essence, the path forward involves not only repurposing domestic support but also embracing a holistic and forward-looking approach that integrates environmental sustainability, technology transfer, and social inclusivity. By prioritizing these principles and leveraging the mechanisms of multilateralism, nations can collectively strive towards a sustainable and equitable global food system that meets the needs of the present without compromising the ability of future generations to meet their own.

7 References

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8 Appendix

8.1 Aggregations considered

Regional aggregation

MIRAGRODEP	GTAP
Argentina	ARG
Bolivia	BOL
Brazil	BRA
Caribbean	PRI - TTO - XCB
Chile	CHL
China	CHN
Colombia	COL
Costa Rica	CRI
Dominican Republic	DOM
European Union	AUT - BEL - BGR - CYP - CZE - DEU - DNK - ESP - EST - FIN - FRA - GRC - HRV - HUN - IRL - ITA - LTU - LUX - LVA - NLD - POL - PRT - ROU - SVK - SVN
Ecuador	ECU
El Salvador	SLV
Guatemala	GTM
Honduras	HND
India	IND
Jamaica	JAM
Mexico	MEX
North Africa	EGY - MAR - TUN - XNF
Nicaragua	NIC
Oceania	AUS - NZL - XOC
Panama	PAN

Paraguay	PRY
Peru	PER
Rest of North America	CAN - XNA
Rest of South America	VEN - XSM - XCA
Rest of Asia	ARE - BGD - BHR - IRN - IRQ - ISR - JOR - KWT - LBN - LKA - NPL - OMN - PAK - PSE - QAT - SAU - SYR - TUR - XSA - XWS
Rest of Europe	ALB - ARM - AZE - BLR - CHE - GBR - GEO - KAZ - KGZ - MLT - NOR - SRB - SWE - TJK - UKR - XEF - XEE - XER - XSU
Russia	RUS
Rest of Southeast Asia	IDN - KHM - LAO - MNG - MYS - PHL - THA - VNM - XEA - XSE
Southeast Asia – High Income Countries	BRN - HKG - JPN - KOR - SGP - TWN
Sub-Saharan Africa	BEN - BFA - BWA - CIV - CMR - COG - COM - ETH - GAB - GHA - GIN - KEN - MDG - MOZ - MUS - MWI - NAM - NGA - RWA - SDN - SEN - TCD - TGO - TZA - UGA - ZAF - ZMB - ZWE - XWF - XCF - XAC - XEC - XSC - XTW
United States of America	USA
Uruguay	URY

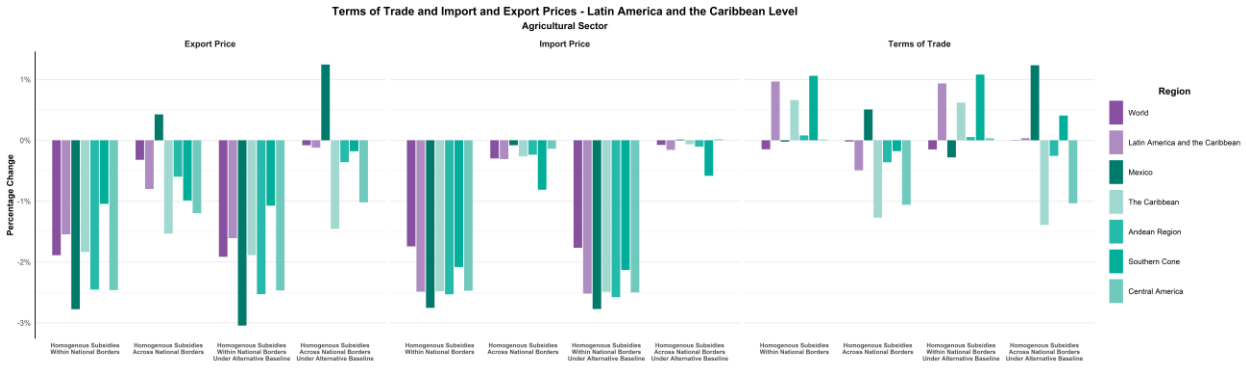
Sectoral aggregation

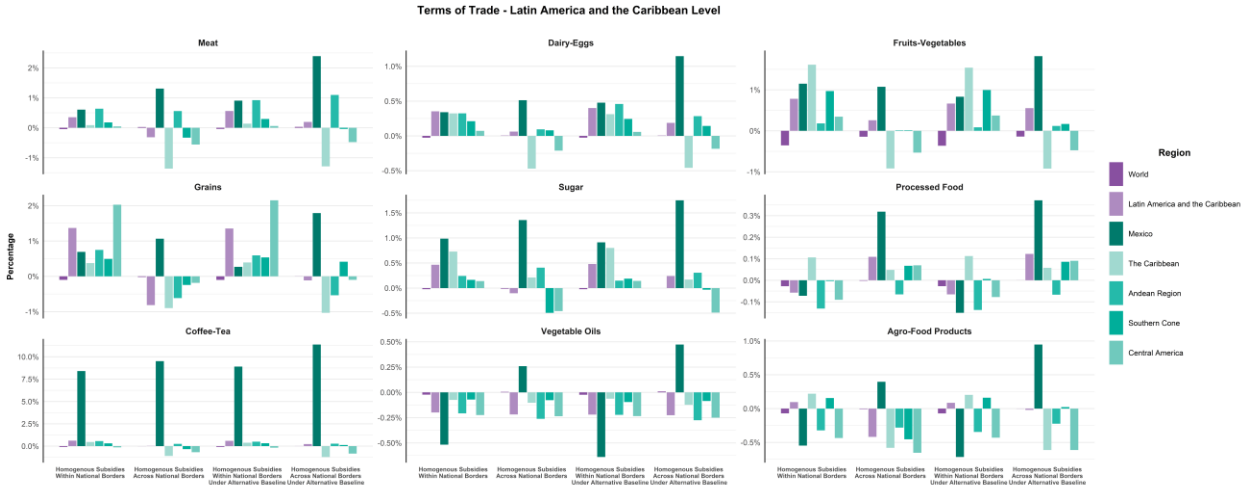
MIRAGRODEP	**GTAP**
Beverages and tobacco products	b_t

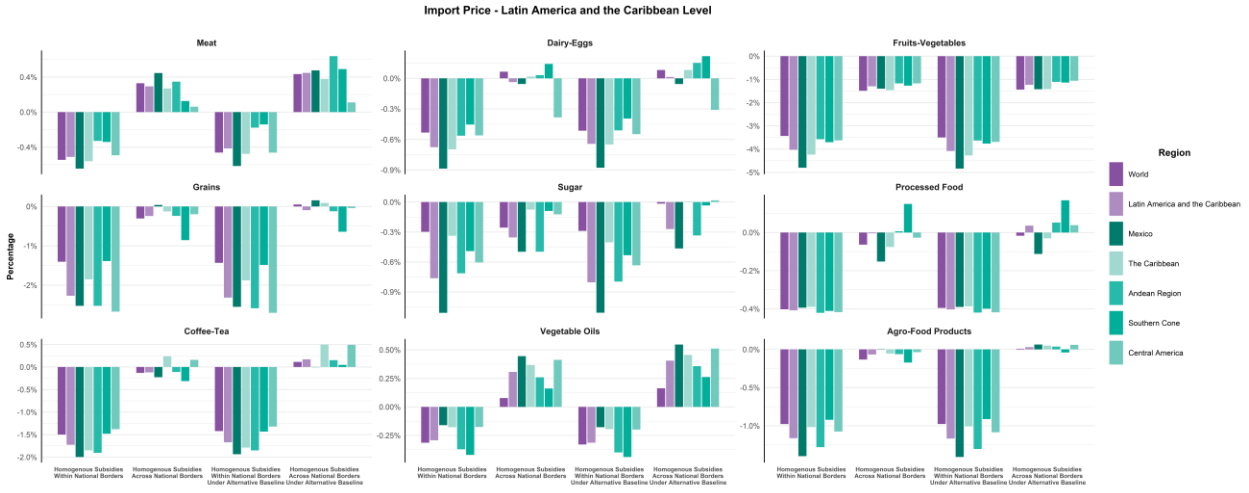
Cattle	ctl - wol
Dairy	mil
Energy	coa - oil - gas - p_c - ely - gdt
Fibers	pfb
Fisheries	fsh
Food	ofd
Forestry	frs
Maize	gro
Manufactured Products	tex - lum - ppp - bph - rpp - nmm - i_s - nfm - fmp - mvh - otn - ele - eeq - ome - omf
Cattle Meat	cmt
Pork and Poultry Meat	omt
Oilseeds	osd
Other Animal Products	oap
Other Crops	ocr
Paddy	pdr
Primary	oxt
Processed Rice	pcr
Other Services	wtr - cns - cmn - ofi - ins - rsa - obs - ros - osg - edu - hht - dwe
Sugar	sgr
Sugar Cane and Sugar Beet	c_b
Transportation	otp - wtp - atp
Vegetable and Fruits	v_f
Vegetable Oil	vol
Wheat	wht

Food and service activities	afs
Chemicals	chm
Raw Milk	rmk
Wholesale and retail trade	trd - whs
Leather and wearing apparel	wap - lea

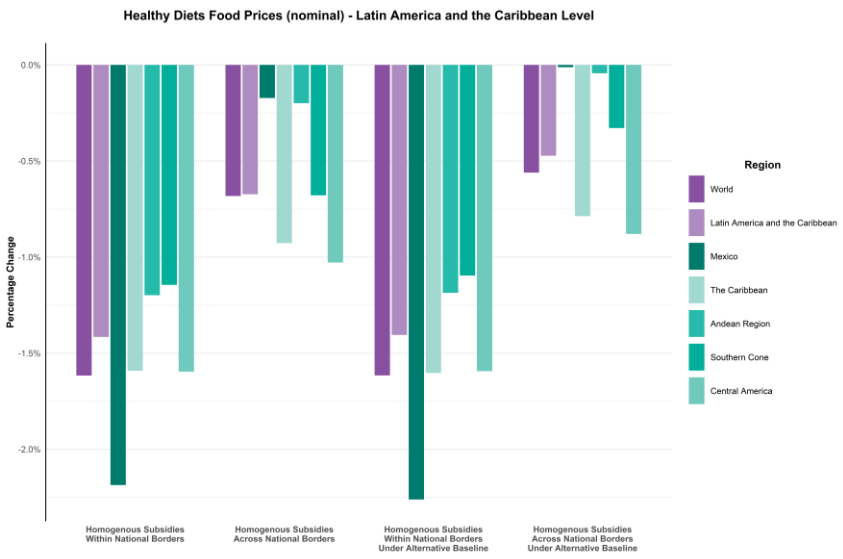
8.2 Terms of Trade

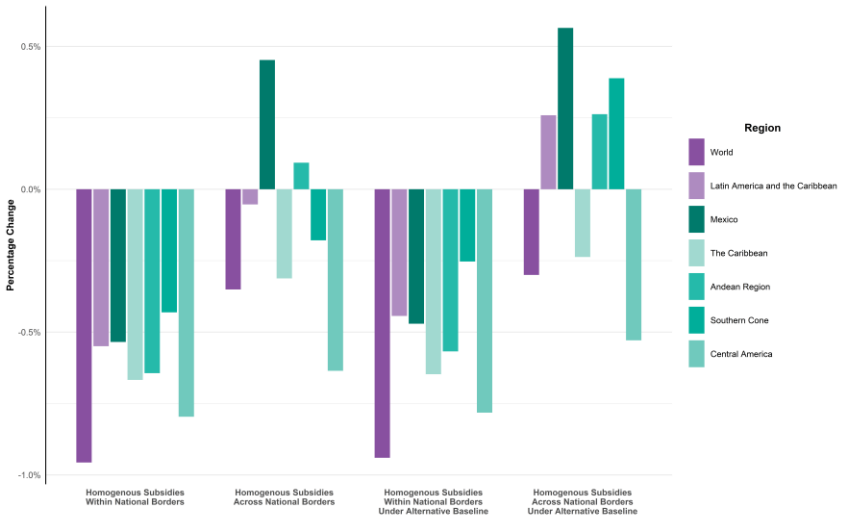






8.3 Diet Prices


Healthy Diets Food Prices (nominal) - Latin America and the Caribbean Level
Percentage Change
0.0%
-0.5%
-1.0%
-1.5%
-2.0%
Homogenous Subsidies Within National Borders
Homogenous Subsidies Across National Borders
Homogenous Subsidies Within National Borders Under Alternative Baseline
Homogenous Subsidies Across National Borders Under Alternative Baseline
Region
World
Latin America and the Caribbean
Mexico
The Caribbean
Andean Region
Southern Cone
Central America


Actual Diet Food Prices (nominal) - Latin America and the Caribbean Level
Percentage Change
0.5%
0.0%
-0.5%
-1.0%
Homogenous Subsidies Within National Borders
Homogenous Subsidies Across National Borders
Homogenous Subsidies Within National Borders Under Alternative Baseline
Homogenous Subsidies Across National Borders Under Alternative Baseline
Region
World
Latin America and the Caribbean
Mexico
The Caribbean
Andean Region
Southern Cone
Central America