Impacts of Agricultural Producer Support on Climate and Nutrition Outcomes with Special Emphasis on Latin America and the Caribbean

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Introduction

Despite significant reforms over the past 25 years, the agricultural sector remains highly subsidized. Agricultural producer support is projected to reach almost USD 1.8 trillion in 2030 (FAO/UNDP/UNEP 2021). About 73 percent of this (USD 1.3 trillion) is projected to be in the form of border measures, which affect trade and domestic market prices. The remaining 27 percent (USD 475 billion) is projected to be in the form of fiscal subsidies to agricultural producers. About two thirds of the total producer support (USD 1.2 trillion) is estimated to support crop production while one third (USD 595 billion) is expected to go to livestock producers.

It has been long recognized that agricultural producer support measures, especially price incentives and coupled subsidies, can greatly distort producer planting decisions, the type and use of production inputs, and trade and marketing decisions. What is less well understood is how those decisions can have adverse impacts on the environment, climate, nutrition and food security and health.

This chapter examines the impact of agricultural producer support on climate and nutrition with particular focus on Latin America and the Caribbean (LAC). It draws on recent analytical work prepared for the FAO/UNDP/UNEP report "A Multi-Billion Dollar Opportunity--Repurposing Agricultural Support to Transform Food Systems" (FAO/UNDP/UNEP 2021)[102]. LAC countries are particularly of interest because while they account for almost 11 percent of total agricultural production and 10 percent of total

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102. The analytical results are based on the global computable general equilibrium modelling framework described in Laborde et al. (2020) of which further details are presented in Annex 2 of the FAO/UNDP/UNEP (2021) report.

trade (FAO 2021), they currently account for just 4 percent of total agricultural support (FAO/UNDP/UNEP 2021). Because of this, the impacts of removing agricultural support outside of LAC countries can have significant impacts on the region through its impact on foreign production, trade and prices.

Impact of removing agricultural support on the agricultural sector

Our analysis considers three alternative scenarios. The first scenario considers the removal of all border measures, including tariffs and other restrictions that provide price support to domestic producers by making foreign imports more costly[103]. The second scenario examines the removal of all fiscal subsidies, which support producers through transfer payments, sometimes tied to production or input use, or through more decoupled forms of fiscal support where payments are tied to factors of production, such as land. The third scenario examines the impact of removing both border measures and all fiscal subsidies. The results are highly dependent on their underlying assumptions and are best interpreted as indicative of the likely effects, in a relative rather than absolute sense. In the presentation that follows, the emphasis is on the direction and relative magnitude of a given effect rather than the actual magnitude.

Border measures have markedly different impacts on the farm sector compared to fiscal subsidies. Border measures such as import tariffs and duties insulate domestic producers from world prices and competing foreign suppliers. Measures such as tariffs raise the prices for consumers either directly, through consumer-ready food like fruits and vegetables, or indirectly, through higher input prices for feedstuffs and foodstuffs like cereals or oilseeds, which raise the production costs of more processed foods such as meat or bread[104]. Because border measures have negative effects on trade, world prices tend to be lower, as global suppliers have fewer export markets in which to sell their goods (OECD, 2016).

The impact of fiscal subsidies is more indirect. They typically increase producer returns without having direct impacts on market prices. If such measures are tied to production, they will tend to encourage more production of that commodity, or if tied to inputs such as fertilizers or seeds, such measures can result in higher yields and production. Producers gain through higher returns (with lower market prices offset by subsidies) while consumers gain through lower market prices, with the costs largely borne by the government. Where support is decoupled, this can have marginal impacts

103. Border measures also include export taxes and duties, though they are far smaller in magnitude than import tariffs.
104. Likewise, export taxes and duties tend to decrease domestic prices by making prices more expensive for foreign buyers. Export taxes and duties are relatively small in magnitude compared to import tariffs but their impact on a given commodity (for example, wheat) may be quite large, particularly when global supplies are tight.

on agricultural production, but may ultimately distort factor prices (for example, land values and rents for capital) as transfer payments from taxpayers to farmers are capitalized into asset values.

Table 1 shows the impact of the removal of agricultural support on crop and livestock production. Globally, the removal of all border measures is estimated to increase global crop production by 0.22 percent and livestock production by 0.21 percent relative to the 2030 baseline levels. Of interest is the regional shifts in production. Livestock production declines in developing countries while increasing in developed country while crop production declines in developed countries and increases in developing countries. Crop production increases in most of the LAC region (Figure 1). For example, crop production in Argentina is estimated to increase by almost 10 percent as import demand increases abroad due to tariff reductions and export taxes are eliminated domestically. The impact of removing border measures is more mixed for livestock production, declining in the Andean countries[105] and Central America[106], and increasing in Brazil and Other Mercosur countries[107].

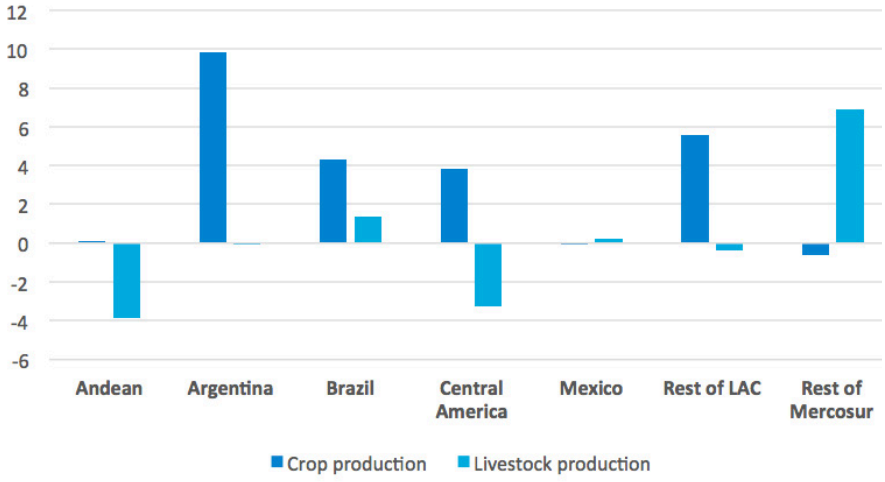
Table 1--Percent change in crop and livestock production relative to 2030 baseline levels due to removal of agricultural support

ITEM/REGION	PERCENT CHANGE DUE TO A REMOVAL OF:		
	BORDER MEASURES	AGRICULTURAL SUBSIDIES	BORDER MEASURES PLUS AG SUBSIDIES
CROP PRODUCTION			
WORLD	0.22	-1.60	-1.30
DEVELOPED ECONOMIES	-0.15	-2.35	-2.28
DEVELOPING ECONOMIES	0.32	-1.41	-1.05
LIVESTOCK PRODUCTION			
WORLD	0.21	-0.46	-0.19
DEVELOPED ECONOMIES	0.74	-1.22	-0.37
DEVELOPING ECONOMIES	-0.18	0.09	-0.05

Source: Author's calculations based on Miragrodep

105. Andean countries include Bolivia, Chile, Colombia, Ecuador, Peru and Venezuela
106. Central America countries include Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama
107. Paraguay and Uruguay

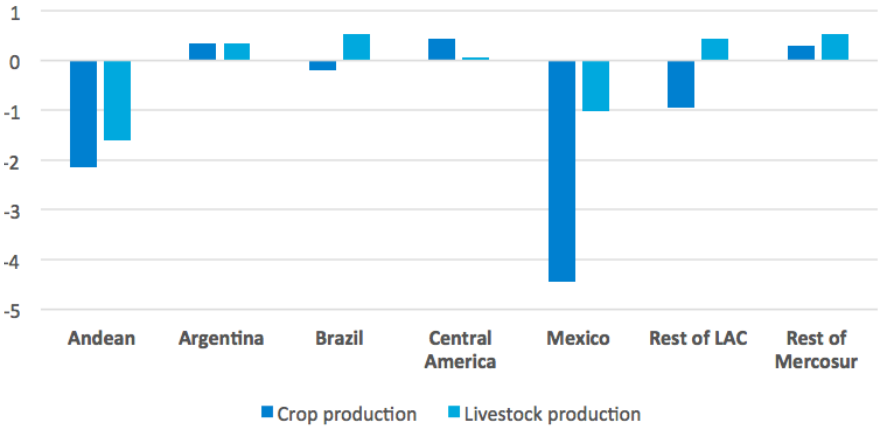
Figure 1--Percent change in crop and livestock production in LAC countries in 2030 compared to baseline levels due to removal of border measures



Source: Author's calculations based on Miragrodep

By contrast, crop and livestock production is projected to fall 1.6 percent and 0.5 percent, respectively, from 2030 baseline levels when agricultural fiscal subsidies are removed. Declines are projected to occur in developed and developing economies with the size of the decrease roughly proportionate to the level of fiscal subsidies in the individual country. As seen in Figure 2, among the LAC region, the largest impact are felt in the Andean countries and Mexico (where crop production is projected to decline by over 4 percent from 2030 levels), though some small gains are projected in the Mercosur region where declines in agricultural subsidies are offset by higher market returns.

Figure 2--Percent change in crop and livestock production in LAC countries in 2030 compared to baseline levels due to removal of agricultural fiscal subsidies



Source: Author's calculations based on Miragrodep

Table 2 shows the impact of removal of agricultural support on real (that is, inflation-adjusted) farm income. Removal of agricultural border measures is projected to increase global farm income by 0.19 percent above 2030 baseline levels. Real farm income in developing countries is projected to increase by 0.21 percent while a slightly lower increase (0.11 percent) is projected for farm income in developed economies. Farm income gains are largely positive across the LAC region, except for Andean countries where farm income is projected to fall by about 2 percent and for Mexico where a small decline is projected (down 0.5 percent). By contrast, Mercosur countries post large gains, with farm income in Argentina, for example, projected to increase by over 10 percent over baseline levels.

Removal of agricultural fiscal subsidies is projected to cause global farm income to decline by 5.7 percent in 2030. Most of that decrease is expected to occur in the developed economies (down over 11 percent) where fiscal subsidies account for a larger share of agricultural support (43 percent of total support). Farm income in developing countries is projected to fall by 4 percent where fiscal subsidies account for 21 percent of total agricultural support in those countries. Fiscal subsidies account for a relatively large share of total agricultural support in the Andean countries (where they account for 36 percent of total agricultural support) and in Mexico where fiscal subsidies account for 88 percent of total agricultural support. Not surprisingly, farm income in

those countries is projected to decline the most relative to other LAC economies due to a removal of agricultural subsidies.

Table 2--Percent change in real farm income relative to 2030 baseline levels due to removal of agricultural support

REGION	PERCENT CHANGE DUE TO A REMOVAL OF:		
	BORDER MEASURES	AGRICULTURAL SUBSIDIES	BORDER MEASURES PLUS AG SUBSIDIES
WORLD	0.19	-5.70	-6.29
DEVELOPED ECONOMIES	0.11	-11.42	-14.09
DEVELOPING ECONOMIES	0.21	-4.00	-3.77
ANDEAN	-1.68	-4.20	-6.07
ARGENTINA	16.02	0.87	16.76
BRAZIL	5.14	0.35	5.41
OTHER MERCOSUR	7.39	1.26	8.47
CENTRAL AMERICA	5.40	0.72	6.03
MEXICO	-0.54	-8.19	-8.68
OTHER LAC	2.89	-0.28	2.40

Source: Author's calculations based on Miragrodep

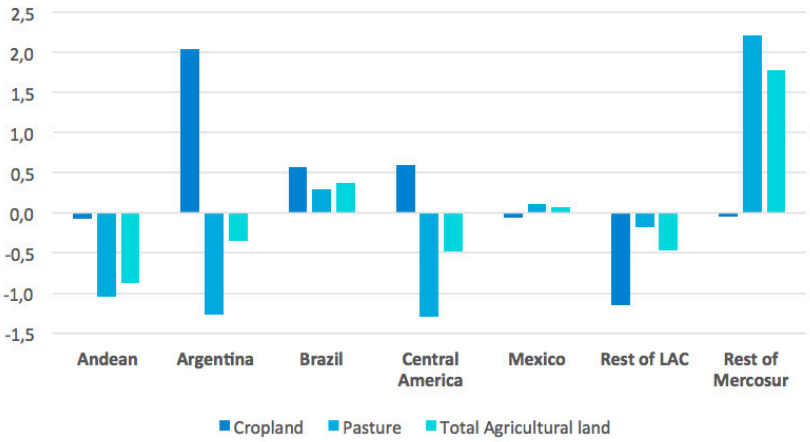
Impacts of Removing Agricultural Support on Greenhouse Gas Emissions

We now turn to how the removal of agricultural subsidies potentially affects climate outcomes globally and in the LAC countries. The impact of agricultural support on GHG emissions depends on a number of factors including the commodity in question, where it is produced and production methods. A recent study by Mamun, Martin and Tokgoz (2019) finds that production-related emission levels for the same commodities differ substantially between rich and poor countries and, also, within those groups. Moreover, removing support can have both negative and positive effects on GHG emissions, as production can shift between countries (Laborde et al. 2020). Removing border measures can decrease domestic production of a commodity but increase global production as consumption rises due to lower prices. This leads to a paradoxical outcome where GHG emissions may fall in the country where the border measures were removed, but rise worldwide because of increased global production. Searchinger et al. (2020) show that those impacts may be even more consequential if indirect land use change caused

by changes in policies results in deforestation or conversion of pastureland to cropland.

Our model captures both the change in direct GHG emissions due to regional shifts in crop and livestock production as well as the impact on GHG emissions due to land use change (for example, converting forestland to pasture or pastureland to cropland). Figure 3 shows the direct impacts in LAC countries on cropland and pastureland due to a removal of border measures. The impacts parallel the impacts in Figure 1 that looked at crop and livestock production. Cropland area increases in Argentina (up 2 percent), Brazil (up 0.6 percent) and the Central American countries (up 0.6 percent) while the other regions show relatively small declines. Shifts in livestock production to Brazil and other Mercosur countries (Paraguay and Uruguay) result in an increase in pastureland in those countries. Overall, total agricultural land use (cropland plus pastureland) declines in most regions except Brazil (up 0.4 percent) and other Mercosur countries (up 1.8 percent).

Figure 3 Percent change in agricultural land use relative to 2030 baseline due to removal of border measures



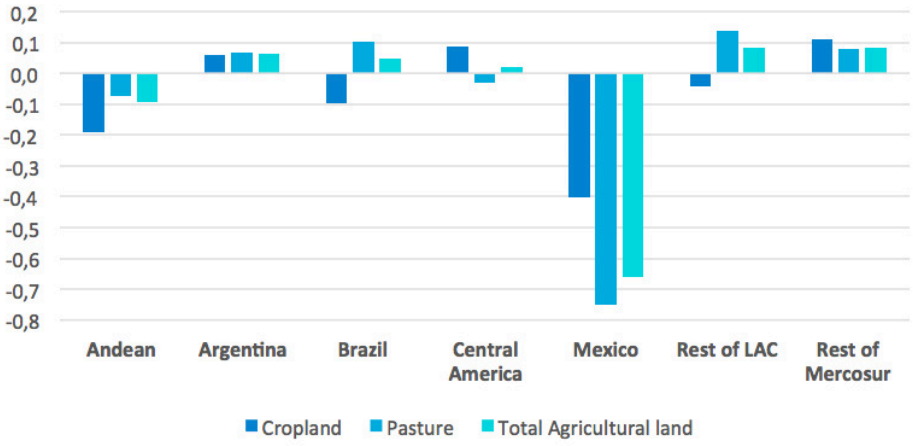
Source: Author's calculations based on Miragrodep

Figure 4 shows the impact of removing agricultural fiscal subsidies on land use. Overall, agricultural land use is projected to increase in the Mercosur region while the largest declines in percentage terms are projected for Mexico (total agricultural land use down 0.7 percent). Table 3 shows total impact on GHG emissions due to a

removal of agricultural support. Globally, GHG emissions are projected to decline by 78 million tonnes CO2e in 2030 due to the removal of border measures and agricultural subsidies. Most of that decline is expected to occur in developing economies outside of LAC. This reflects, in part, the shift of livestock and crop production to the LAC regions. Overall, GHG emissions in LAC countries are expected to increase by 11.1 million tonnes CO2e. Most of that increase is projected to be in Brazil (an increase of 28.7 million tonnes CO2e) and other Mercosur countries (an increase of 13.2 million tonnes CO2e) due, in part, to increased crop and livestock production and commensurate increases in pasture and cropland use (with a proportion decline in forest and other habitat).

It is important to note that our analysis does not consider the impact of climate smart agricultural practices which could increase production efficiency relative to GHG emissions, nor does it analyze carbon sequestration policies which could reduce overall carbon emissions through afforestation or other practices.

Figure 4 Percent change in agricultural land use relative to 2030 baseline due to removal of agricultural subsidies



Source: Author's calculations based on Miragrodep

Table 3--Change in GHG emissions relative to 2030 baseline due to removal of agricultural support (mil tonnes CO2e)

ITEM/REGION	PERCENT CHANGE DUE TO A REMOVAL OF:		
	BORDER MEASURES	AGRICULTURAL SUBSIDIES	BORDER MEASURES PLUS AGRICULTURAL SUBSIDIES
GLOBAL	-55.7	-11.3	-78.4
DEVELOPED COUNTRIES	31.4	-11.7	3.9
DEVELOPING COUNTRIES	-87.1	0.3	-82.3
ANDEAN	-26.4	-1.6	-27.8
ARGENTINA	-2.1	1.6	-0.5
BRAZIL	17.7	8.0	28.7
REST OF MERCOSUR	12.0	1.1	13.2
CENTRAL AMERICA	-2.5	0.1	-2.4
MEXICO	1.1	-3.4	-2.4
REST OF LAC	1.1	1.0	2.3
ALL LAC	1.1	6.7	11.1
OTHER DEVELOPING COUNTRIES	-88.2	-6.4	-93.4

Source: Author's calculations based on Miragrodep

Impacts on food prices and per capita food consumption

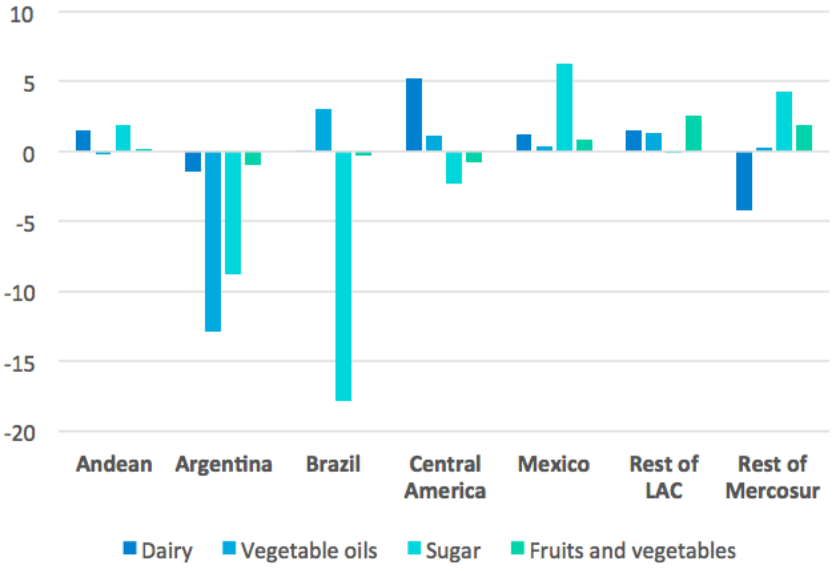
Agricultural support measures can impact nutrition through their impacts on income and on their impacts on relative prices. Border measures tend to increase domestic prices by insulating consumers from cheaper foreign supplies which tends to dampen demand. By contrast, agricultural producer subsidies can distort domestic production, hence leading to lower prices for those commodities. As we have seen, agricultural producer subsidies enhance farm income which increases the demand for food. Income effects are often proportionately larger in poorer households because poorer families tend to spend a larger share of their disposable income on food. Additional income in a poor household results in larger expenditures on food, increasing the quantity and often the types of foods consumed[108]. The relative responsiveness of food consumption to changes in prices depends on consumer tastes and preferences. Generally, food demand is characterized as relatively less responsive to price changes compared to the demand of other consumption items. However, consumers will switch to other food choices, particularly if they are close substitutes.

Figure 5 shows the impact of removing agricultural border measures on per capita consumption of various food items within the LAC region. Generally, per capita consumption

108. As Du et al. (2004) point out, changing diets due to increased income do not necessarily correlate with better nutritional outcomes.

of food increases throughout much of LAC with the exception of some of the Mercosur countries where per capita consumption falls because of higher prices due to increased exports. For example, the large decline in sugar consumption in Brazil and to a lesser degree Argentina reflects increased global market access as countries remove border measures on what has been a highly protected commodity. Similarly, dairy consumption in Other Mercosur countries (Uruguay and Paraguay) is also estimated to fall. The decline in per capita vegetable oil consumption in Argentina reflects the removal of export taxes which increases soybean exports, thus raising prices throughout the soybean complex.

Figure 5 Percent change in per capita consumption of various food groups relative to 2030 baseline levels due to removal of agricultural border measures

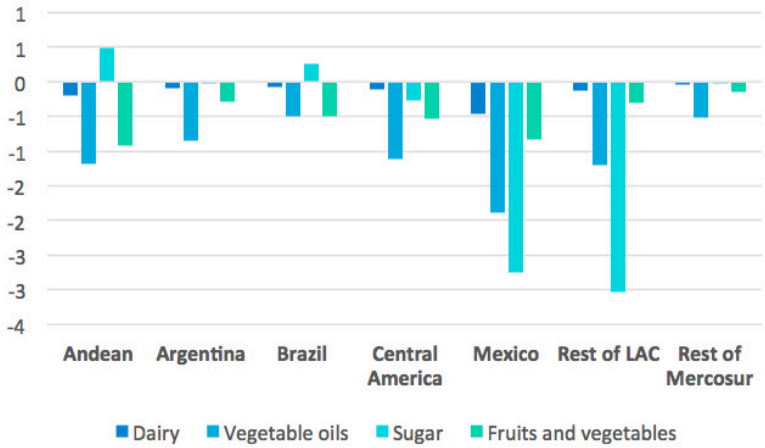


Source: Author's calculations based on Miragrodep

Removal of fiscal subsidies largely has a negative income effect on farmers which contributes to lower per capita food consumption for the products considered here. Per capita consumption levels of vegetable oils and sugar are projected to fall the most. In Mexico, for example, per capita sugar consumption is projected to fall by 3 percent and per capita

vegetable oil by almost 2 percent from baseline 2030 levels (Figure 6). This reflects the relatively large drop in farm income (down over 8 percent) seen in table 2.

Figure 6 Percent change in per capita consumption of various food groups relative to 2030 baseline levels due to removal of agricultural fiscal subsidies



Source: Author's calculations based on Miragrodep

Conclusion

The LAC region accounts for a small share of global agricultural producer support. Yet, scenarios that consider removing global support would likely have a large impact on the region, improving global prices, increasing agricultural production and trade and generally raising farm income throughout the region.

If no mitigation efforts were considered, such liberalization scenarios could lead to an increase in GHG emissions as agricultural production and agricultural land use expand, particularly in net exporting countries like Argentina, Brazil, Paraguay and Uruguay. GHG emissions could be partially offset by cropping intensification (e.g., double cropping) to lessen impacts on deforestation, adopting more climate smart agricultural policies and through carbon sequestration.

Likewise, the impact of increased agricultural prices (due to higher LAC exports) and loss of agricultural subsidies could lead to an adverse impact on per capita consumption.

Here the impacts are more mixed across the region, with countries providing producers with agricultural subsidies (for example, Mexico) facing a larger drop in farm income which could adversely per capita food consumption. The adverse income effects could be offset by repurposing the more harmful subsidies tied to production or input use by decoupled subsidies (FAO/UNDP/UNEP 2021).

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