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Document nº 8

Fiscal policies in agriculture and producer support estimates

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1. Introduction

Fiscal policies have multiple effects on the economy and, therefore, on the agricultural sector and rural economies within it. This paper analyzes agricultural taxes and agricultural expenditures; it also looks into different forms of public policy support for agricultural producers and follows the Producer Support Estimates (PSE) methodology already applied to the Latin America and the Caribbean (LAC) region. This methodology combines fiscal support and other forms of support, such as those deriving from trade policies. Finally, this paper presents a summary of evaluation studies about different types of public expenditure for agriculture and draws some conclusions.

2. Fiscal issues and agriculture: taxes and revenue mobilization

Data on agricultural taxes are scarce. It is very difficult to determine the level of explicit direct and indirect taxes[1] paid by farmers in developing countries, among other things, because national tax data are not classified by source or sector and the figures do not include taxes collected by state and local governments (Khan 2001). This data gap needs to be filled in order to provide a complete view of fiscal issues in agriculture.

2.1 Types of taxes

This section discusses agricultural taxation issues using a simplified classification from Sarris (1994), who divides taxes into land taxes, income taxes, taxes on output, and taxes on inputs, such as fertilizers, water and so on.[2]

Land taxes have several advantages. In terms of efficiency, they do not distort relative output prices within agriculture and do not reduce production incentives. In terms of equity, the wealthier pay more. Nevertheless, land taxes may increase producers' risk profiles, when compared to income taxes and if the land tax applies irrespective of production amounts.

[1] Some studies argue that implicit or indirect measures that could act as taxes (such as overvalued exchange rates, trade protection to other sectors, and procurement programmes through monopoly marketing, all of which affect output prices) have been more important in defining the level of taxation for agriculture (Krueger, Schiff and Valdés 1988) (Díaz-Bonilla, 2015, 2019).

[2] Where not otherwise attributed, the source of the next paragraphs is Sarris 1994.

Yet, if this kind of tax is paid regardless of the production level, it may become an incentive to increase production and productivity (see below). Land taxes may also be relatively simple to administer, depending on the availability of necessary information such as property area, land ownership, location, and characteristics (water availability, fertility and proximity to a market).

In the past, land taxes were important as a percentage of revenue, but their importance has declined in recent decades in many developing countries (Sarris, 1994;[3] Khan, 2001). The main reasons for such decline seem to be political resistance by landowners, as well as government decisions to implement less obvious and more indirect taxes, such as taxes on output. However, it seems important to renew the attention on land taxation. For instance, a World Bank report (2007) argues that in the case of Paraguay, where land concentration is a source of social conflict in rural areas, unequal land ownership –with a significant presence of large farms and low land use– partially reflects that a very small land tax is charged on rural properties.

An appropriately designed land tax in that country applied over realistic fiscal valuations (current valuations are minimal compared to market values) is expected to have a beneficial impact on the distribution of land ownership, agricultural productivity, poverty alleviation, and municipal finances, considering that revenue potential for local governments has been estimated at somewhat more than 1 percent of GDP (World Bank, 2007).

Income taxes on agriculture do not seem to be important contributors to fiscal revenues (Khan, 2001). The bulk of agricultural tax revenue in many developing countries comes from taxes and duties on marketed agricultural products in domestic and foreign markets. Although Value Added Taxes have become an important revenue generator for LAC countries, tax rates applied on food products are usually reduced, and in many cases these products are tax exempted.

Taxes on exported and imported products have traditionally been a major source of government revenue in developing countries. This is an administratively simple way of collecting taxes, considering that foreign trade is concentrated in a few ports that can be more easily controlled.[4] Overall, the general equilibrium effects of export taxes, particularly the impact on total welfare in the country that applies them, is more complex than the common policy recommendations to eliminate them would seem to recognize (Cicowiez, C. Díaz-Bonilla and E. Díaz-Bonilla, 2010; and Díaz-Bonilla, 2015).

Another possible form of explicit taxation of agriculture is taxation of purchased inputs. In general, however, most public interventions related to inputs such as seeds, fertilizers, machinery and equipment, including irrigation, are in the form of subsidies rather than taxes on those inputs (Sarris,1994). These subsidies are discussed below, in the producer support section.

[3] Sarris cites studies showing that in 1940, agricultural land taxation was 23 percent of central government revenues in Egypt, 19 percent in India, and 5 percent in Chile, while in the late 1980s in those same countries, land taxes did not account for more than 1 percent of central government revenues.

[4] Using differential import or export taxes in a value chain is also a point of debate in trade theory and practice. For example, a country may have zero import tax on wheat, a tax on flour, and an even higher tax on pasta or bread. This "tariff escalation" practice acts as an incentive to import only the primary product and develop the industrial component in the importing country, while for exporters, relative prices incentivize primary exports and discourage industrialization. Therefore, producer countries of primary products may tax more the primary product (i.e. soybean) and tax less subsequent levels of processing (i.e. meals and oils) to try to counter the tariff escalation and maintain industrial activities at home (Díaz-Bonilla, 2015).

2.2 Levels of agricultural taxation

Considering those taxes altogether, what would the explicit tax burden on farmers be? The answer to that question is not clear because of insufficient data.[5] In general, the overall tax/GDP ratio for the economy as a whole, is inversely related to the share of agricultural production in the economy. This inverse correlation may be due to (1) the fact that in many developing countries, agricultural producers are poor and operate in the informal sector; (2) the difficulty and cost of collecting explicit taxes on a dispersed population; and/or (3) the sector's political ability to avoid taxation.

Nevertheless, the agriculture sector should not be left aside as a "hard-to-tax" sector (Keen, 2012), and tax collection efforts could focus on land and large producers, while most small farmers will fall into income categories that, by the usual criteria, would be exempted from wealth and income taxes.

As noted before, trade taxes on imports and exports have been the most obvious fiscal instrument related to agricultural products. As a result of trade liberalization processes, taxes on international trade (all products) have significantly declined in LAC countries since the 1990s when they represented about 14 percent of revenue while, by 2015, they dropped to 4.3 percent of the total, which is about 0.9 percent of GDP (ECLAC, 2018). However, import taxes and other trade measures affording trade protection for several agricultural products are still important in several LAC countries and represent the largest percentage of support for agricultural producers. On the other hand, agricultural export taxes have been progressively eliminated since the mid-1980s in most LAC countries, because of the decline in world agricultural prices during that period and because of the structural adjustment programmes negotiated with the IMF and the multilateral banks. However, a form of that tribute has been maintained as a source of parafiscal revenues for producer associations such as the case of Colombia with coffee and other agricultural products. Also, Argentina reestablished export taxes to a variety of agricultural products and other commodities in the early 2000s, most of which were reduced or eliminated in 2016 by the new government, only to be restored in 2018 to stabilize fiscal accounts after the economic turbulences of that year.[6]

[5] Studies for several countries in Africa have calculated the tax burden for agriculture. These could be used as a template to do similar calculations in LAC (FIAS, 2006).

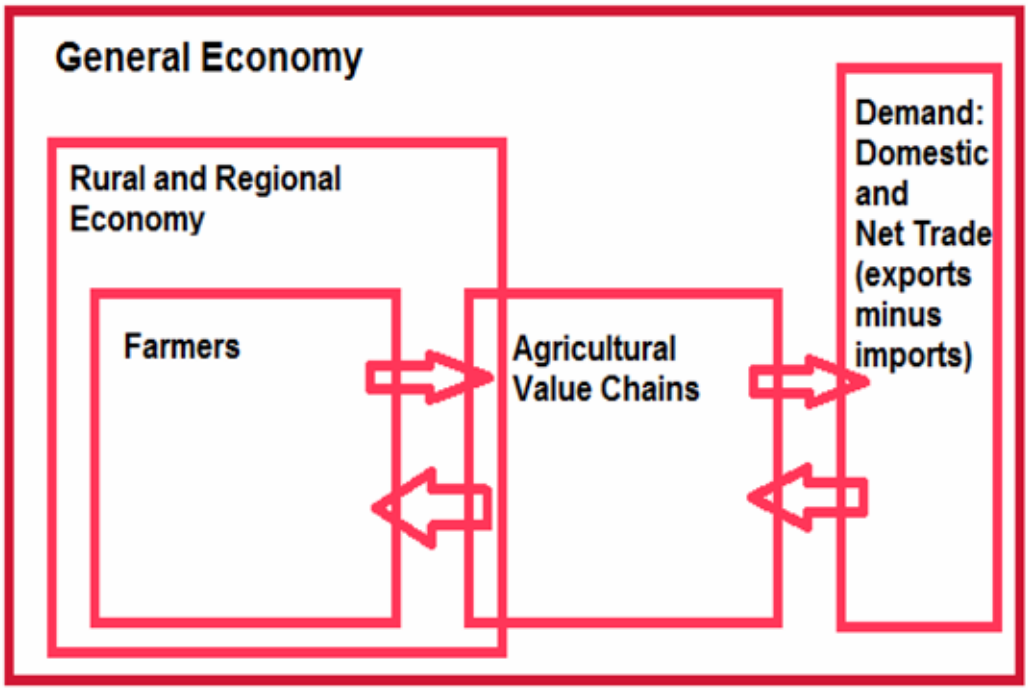
[6] The agricultural price spike of 2008 led some countries to briefly impose export taxes and export restrictions on food products to cushion the domestic impact of higher world prices.

3. Fiscal issues and agriculture: expenditure

3.1 Data and definitions

Before carrying out an analysis on "expenditure for agriculture" it is necessary to define the meaning of both, "agriculture", and "expenditure". In relation to "agriculture", one should consider the fact, highlighted in Figure 1, that interventions on agriculture are not limited to farmers, but encompass three other interrelated domains: rural areas plus the regional geographical space, food and agricultural value chains, and the whole economy.

Figure 1. Different Levels of Policies and Interventions



Source: Díaz-Bonilla, 2015

Such complexity has led to suggestions about the need to distinguish between public investments and expenditure in agriculture –specifically aimed at enhancing primary production in the crop, livestock, aquaculture and forest sectors as well as in upstream and downstream activities– and expenditure for agriculture –focusing on other sectors i.e. infrastructure, rural health, education, and others (FAO, 2012)– which can also have a positive impact on agricultural production, productivity and farm incomes. Figure 1 goes further and highlights the fact that there are other public policies and interventions that regardless of their direct or indirect application *in* and/or *for* food and agricultural production, remain nonetheless crucial for those activities.

In relation to the second aspect about expenditure, diverse concepts are used in very different ways, both in formal classifications and in economic analysis (Mogues *et al.*, 2012). Usually, data as collected by the IMF from national budgets (and then reflected in databases such as FAOSTAT and IFPRI's SPEED) mainly consider expenditure *in* agriculture, and often, only the one that correspond to the sectoral Ministry[7] (IMF, 2001).

Another important distinction is to be made between expenditure that delivers "public goods" and expenditure oriented to "private goods". In principle, governments should focus their expenditure on public goods and other sources of market failures, such as externalities. There is agreement that public expenditure and investments in areas such as research and development (R&D), education, and general infrastructure count as "public goods", in a broader sense,[8] and have positive effects for the agricultural sector, while the effects of expenditure oriented to "private goods" (direct subsidies to products or producers, that are appropriated privately) are not as clear. Finally, there are also reasons for public interventions that are completely separated from market failures: they are related to distributive measures under some societal notion of equity.

There are well-known classifications of public expenditure such as OECD's calculation of Producer Support Estimates (PSE) and General Services Support Estimates (GSSE) which have been developed to monitor and evaluate the level and composition of support provided to agriculture in member countries of the organization.

3.2 Public expenditure on agriculture in LAC

The Agrimonitor initiative of the Inter-American Development Bank (IDB) measures public spending for agriculture in LAC countries. Available data from the last three years by country show that public expenditure for the agricultural sector in Latin America and the Caribbean amounted to an annual average of about USD 19 billion (nominal).[9]

On average, public expenditure on agriculture represented roughly 8 percent of the region's agricultural value added. However, there were wide differences across countries, with Guatemala

[7] This interpretation is called the "functional" classification of expenditure indicating the purposes of expenditure (such as agricultural services, education, healthcare, schools, and so on). This approach is different from the "economic" classification of expenditure, which considers two main groups: the one that covers recurrent activities (such as compensation of employees, subsidies and other transfers, consumption of goods and services, interest, and similar expenditure) and the one covering investments (contributing to public capital formation or the acquisition of other assets). The notion of investment in this classification may not always coincide with the concept of investment used in economic analyses: for instance, salaries and other current expenditure utilized for research and development (R&D) in public accounts are not treated as capital formation *per se* (Mogues *et al*. 2012), even though they contribute to knowledge capital. There have also been debates about the meaning of public investments, as a subset of public expenditure. A proper differentiation and classification of all government expenditure and what should be considered investment, may require detailed public expenditure reviews (PERs) (FAO 2012).

[8] This notion is in quotation marks because it is considered less strict than the one used in welfare economics about goods or services that are non-rival (their use by one person does not preclude their use by another one) and non-excludable (the producer cannot exclude others from using them).

[9] The years covered vary by country, but basically correspond to the current decade. As a comparison, data from FAOSTAT for 2010-2017, with a smaller coverage of countries recorded somewhat more than USD 17 billion per year (nominal) for LAC. This number is different from the estimate on producer support discussed in another section, because the latter also includes support that does not come only from the public budget (i.e. a transfer from the taxpayer to the producer) but it is also generated by trade policies (a transfer from consumers to the producers).

and Haiti spending as little as 1.2 and 1.7 percent of their agricultural GDP for their sector's development, in contrast with Peru, Barbados and Trinidad and Tobago, which spent as much as 26.4, 44. 7 and 58.0 percent of Agricultural GDP, respectively. Figure 2 shows the average levels of public expenditure relative to agricultural value added, per country.

Figure 2: Public expenditure in agriculture, relative to agricultural value added across Latin American and Caribbean countries (three-year average)

Source: Agrimonitor database, IDB (2018)

Most Caribbean countries spent on agriculture more than the region's average. This characteristic can be explained by the relatively small size of agricultural sectors in Caribbean countries and the availability of resources coming from other economic sectors (tourism and/or natural resources).[10] At the same time, small public budgets, including those for the agricultural sector, as in the case of Guatemala and Haiti, on the one hand, and a large agricultural sector in Argentina, on the other hand, might explain the low levels of public spending relative to agricultural value added.

In order to compare LAC and other regions in the world, Table 1 shows the ratio of public expenditure on agriculture as a percentage of the agricultural GDP (from IFPRI's SPEED database)[11] for three years in different regional groups of countries.[12]

[10] Caribbean countries are included to provide a full picture of the region, even though their agricultural sector and the related expenditures are small. More importantly, they are members of FAO, IADB, and other regional institutions and must be considered in any regional analysis.

[11] The SPEED (Statistics of Public Expenditure for Economic Development) database covers expenditure in general. Following the IMF classification, it is divided into agriculture, education, health, infrastructure, social protection, and defense and includes an overall total. (see IFPRI http://www.ifpri.org/book-39/ourwork/programs/priorities-public-investment/speed-database). The Agricultural Science and Technology Indicators (ASTI) initiative includes R&D expenditure only (http://www.asti.cgiar.org/home).

[12] The numbers must be interpreted with caution. They represent simple averages of the countries included in the database, which may change between years. The LAC countries with data include Argentina, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Jamaica, Mexico, Panama, Paraguay, Peru and Uruguay.

Table 1: Agricultural expenditure as percentage of agricultural GDP

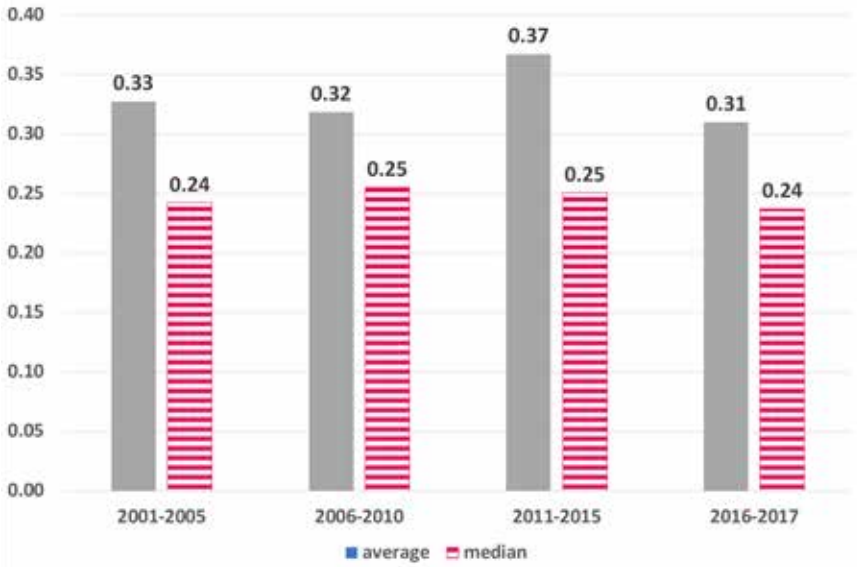
	1980	1995	2014
East Asia and the Pacific	7.6	5.9	8.0
South Asia	6.6	12.7	8.4
Europe And Central Asia	na	12.0	15.9
Middle East and North Africa	14.5	15.7	18.3
Latin America and the Caribbean	7.2	6.1	10.3
Sub-SaharanAfrica	11.6	8.3	11.2
High-Income European Countries	36.4	36.7	28.0
Other High-Income Countries	14.6	16.9	19.3

Source: IFPRI, SPEED

LAC countries appear in the middle, when compared to other developing regions. They are above the Asian developing regions, but below MENA, Europe and Central Asia. In turn, LAC and all developing regions are clearly below the ratios spent in high income countries.

Figure 3 shows a different indicator called agricultural orientation intensity (AOI), which is the percentage of agricultural expenditure over total expenditure, divided by the share of agricultural GDP in total GDP.[13] A number smaller/greater than 1 indicates that the share of government spending on agriculture is less/more than the share of agriculture in GDP, suggesting that there may be under or overspending in the sector in relation to its importance in the economy. The figure also presents the evolution of the average and the median by quinquennium since 2001.

Figure 3. Agriculture Orientation Index.



Source: FAOSTAT

[13] The LAC countries from the FAOSTAT database are Argentina, Bolivia, Brazil, Chile, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Jamaica, Mexico, Panama, and Paraguay.

Clearly, LAC countries spend on the agricultural sector smaller percentages than the sector´s share in the GDP: the AOI oscillates around 0.31-0.37 (average) and 0.24-0.25 (median). As a reference, during the period 2010-2105 the AOI for developed countries was around 1.25 (average) and 0.55 (median), and, in the case of developing countries, the values were 0.38 (average) and 0.27 (median) (Díaz-Bonilla, 2018). This indicates that LAC is assigning less resources to agricultural development than other developing and developed countries, regardless of the importance of the sector in the region.

The data mentioned above mainly covers expenditure *in* agriculture. There are very few studies taking a broader view of expenditure *for* agriculture or extending the scope of analysis beyond the farmer only, as well as on some aspects of value chains (see Figure 1). There are some analyses of public expenditure with a food and nutrition security (FNS) focus (ICEFI, 2014; Díaz-Bonilla and Centurión, 2018).

For instance, Díaz-Bonilla and Centurión (2018) consider public expenditure on FNS in Honduras divided into five blocks: 1) agricultural and agro-industrial development, including a variety of agricultural services such as agricultural research and development (R & D), extension and veterinary services to farmers, pest control services, land reform and land settlement, irrigation, drainage systems, and others; 2) rural and regional development such as road infrastructure, energy, communications and transportation, health and education and other aspects of non-agricultural development activities and quality of life in rural areas, as well as in intermediate and small cities; 3) social protection networks and income transfer programmes that are basically non-contributory safety nets, important for alleviating poverty and food insecurity; 4) health and nutrition programmes, including those that serve vulnerable populations, such as pregnant women, children and nursing mothers, the school-age population, and other vulnerable groups; and 5) mitigation and adaptation services to climate change, as well as the conservation of natural resources. In this spending group the emphasis is on the forestry sector and other activities related to climate change, and biodiversity conservation and management.

The authors found that expenditure in 2015 and 2016 amounted to 2.7 percent and 2.9 percent of Honduras' GDP, while public expenditure in agriculture alone (based on Agrimonitor database) amounted only to 0.6percent of total GDP during comparable periods. Those differences suggest the need to conduct broader studies on public expenditure that go beyond the agricultural primary sector, and consider different aspects of rural and regional development, value chains, and food and nutrition security. These studies would also help clarify the level of effort needed to achieve a variety of Sustainable Development Goals (Díaz-Bonilla, Saravia-Matus, 2019).

4. Producer and general support estimates according to the OECD methodology

This section explores the quantity and composition of public support to agriculture using the Producer Support Estimate methodology (PSE), developed originally by the Organization for Economic Cooperation and Development (OECD) as the main analytical tool, applied in Latin America and the Caribbean countries by the Agrimonitor initiative of the Inter-American Development Bank (IDB).

4.1 Measuring agricultural support: main indicators

The PSE methodology is a quantitative and standardized analytical tool to measure the levels and composition of policy support that governments provide to the agricultural sector[14]. The methodology comprises a set of indicators measuring economic transfers to farmers and consumers resulting from the implementation of agricultural policy and programmes. Transfers can originate from public expenditure or from price distorting policy regulations such as tariffs, import quotas, export incentives, or administrative prices, among others.

Transfers to individuals or groups of agricultural producers are measured by the Producer Support Estimate (PSE) indicator. The PSE indicator includes two components: i) Market Price Support (MPS) which measures the extent of support provided through price distortion, and ii) budget transfers (BT), financed through public expenditure.

In addition, transfers that benefit the agricultural sector as a whole (through the provision of public goods and services), are measured by the General Services Support Estimate (GSSE) indicator. Finally, transfers to agriprocessors and other consumers of agricultural production are captured by the Consumer Support Estimate (CSE) indicator. The sum of PSE, GSSE, and budget transfers included in CSE provides the Total Support Estimate (TSE), a measure of total policy transfers to the agricultural sector.

In terms of composition, the main agricultural policies implemented in Latin America and the Caribbean region can be classified in five broad categories (Egas, De Salvo, 2018):

- Market Price Support (MPS): Most countries in the region use market price protection measures (tariffs, duties, quotas, fixed prices) that increase domestic prices, usually for both consumers and producers.

[14] Full details are available at https://www.oecd.org/tad/agricultural-policies/psemanual.htm

- Subsidies to variable or fixed inputs: these aim to increase access to inputs, such as energy, seeds, and fertilizers, to improve productivity. These subsidies have been implemented in several countries in the region, including Brazil, Chile, Mexico, and Nicaragua. Besides, credit schemes offering preferential interest rates to encourage agricultural investment are important policy tools in Brazil and Colombia.
- Decoupled payments: these involve payments to farmers that do not depend on current input use or production. They are usually area based, and therefore provide the same income to farmers, regardless of possible changes in market prices or weather-related events. These policy interventions have been implemented in Brazil, Chile, Guyana, Mexico, Paraguay, Peru, and Trinidad and Tobago.
- Supply of public goods: Chile, Peru, Argentina, Costa Rica, Brazil, and Uruguay have mostly focused on investments in the provision of public goods, such as irrigation and drainage, agricultural research, extension services, and plant and animal inspection services.
- Climate Smart Agriculture initiatives: climate change has been a cross-cutting issue that countries in the region have started to internalize in the design and application of their agricultural policies, with Brazil, Uruguay, and Peru leading policy efforts in this direction. Programmes focused on reducing greenhouse gas emissions to mitigate climate change are providing a global public good; although spending allocated to help farmers adapt to global warming effects are more in the nature of subsidies to private goods.[15]

Interventions such as land titling or land reform programmes are also in place in several countries, but the aims and mechanisms may be somewhat different, ranging from providing land titles of previously state-owned land to applicants (a type of subsidy), to strengthening and formalizing land rights for indigenous communities and historical users of land, in the framework of institutional modernization processes. In this sense, these programmes may be classified as subsidies (the former) or general services (the latter). Land titling interventions, though, are rarely included in the calculation of the PSE, as the nature of the service is in most cases not specifically targeted to the agricultural sector, but rather a general service provided to the entire population, independently of their geographic location or economic sector.

4.2 Total support vs. public spending: the weight of market price support in the region

On average, for the three most recent years with available data for each country, total support to agriculture in Latin America and the Caribbean amounted to USD 18.8 billion per year[16].

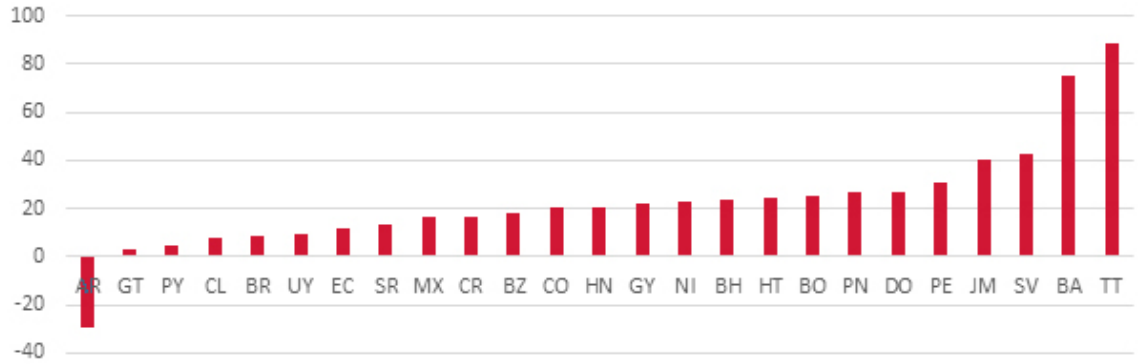
[15] A simplified way of looking at the estimates is that transfers to (or from) producers have two main components: the first, basically captured in the MPS, is more related to trade policies that lead to domestic market price received by producers and price payed by consumers for certain products (before other subsidies or taxes) differing from the equivalent price of world markets for comparable products (adjusted for quality, characteristics, marketing margins an so on); the other has to do with public spending aimed at supporting products and/or producers, or subsidizing consumers. The first component captures flows (positive or negative) between producers and consumers; and the second, between producers (or consumers) and taxpayers.

[16] Most recent years with available data per country: BR, CL, CO, CR, DO, MX (2015-2017); AR, PY (forthcoming), UY, EC (2014-2016); PN, TT (2013-2015); BA, BH, BZ, GY, JM, SR (2012-2014); PE (2011-2013); HT, SV (2010-2012); GT (2009-2011); NI (2009-2010); BO (2007-2009).

Excluding Argentina, the annual average total support to agriculture for the same period in-creases to USD 28.8 billion.[17]

Support to agriculture in relation to the size of agricultural sectors in Latin American and Carib-bean countries varied from negative values (such as Argentina, which taxes its agricultural sec-tor) to positive transfers of almost 90 percent of agricultural value added in the case of Trinidad and Tobago. Data available in the IDB's Agrimonitor platform shows that support in Southern Cone countries is typically lower than in most of Central America and the Caribbean countries, with total support accounting for between 5 and 9 percent of agricultural GDP, compared to an average 22 percent in Central America, and 38 percent in the Caribbean. Support in countries like El Salvador and Jamaica was as high as 40 percent of agricultural GDP, and in Barbados and Trinidad and Tobago, support increased to between 75 and 90 percent of agricultural value added. Figure 4 provides a snapshot of support relative to agricultural value added for 25 coun-tries in the region.

Figure 4: Total support[18] to agriculture relative to agricultural value added across Latin American and Caribbean countries (three-year average)



Source: Agrimonitor database, IDB (2018)

However, as mentioned before, not all this support is provided in the form of public expendi-ture. Countries rely on a mix of measures that protect market prices and assign public funds to support their farmers. Market price support accounted for an average 35.9 percent of total support to the agricultural sector (excluding Argentina). Price measures have hence become the second largest source of support, surpassed only by subsidies for private goods (or direct pay-ments, which will be analyzed below).

The share of market price support in total support varies widely between countries, depending on the country's trade openness, availability of fiscal resources, and the political economy rele-vance of different stakeholders in the economy. Bigger economies with a free-market tradition

[17] In particular cases, such as Argentina, policy interventions reduce the prices farmers receive, through ex-port taxes, fixed price mechanisms or other border measures, providing a "negative support". As noted be-fore, the value of public expenditure discussed in previous sections (USD 19 billion) does not include market price support.

[18] Including both public expenditure and support given via market price.

(such as Chile, Mexico, Brazil or Uruguay) rely less on market interventions than the rest of countries in the region, with their shares of market price interventions ranging between 2 and 24 percent of total support. On the contrary, most countries in the Andean region (with the exception of Peru), Central America and the Caribbean show great dependence on market price interventions to support their farmers, accounting for shares of the total support to agriculture ranging from 34 to 93 percent (see Figure 5).

This composition also varies over time. For instance, a study conducted by Egas and De Salvo (2018) tracked the Nominal Protection Coefficient (NPC)[19] from 1986 to 2016 for Brazil, Chile, Mexico, Colombia, and Costa Rica and showed that Chile, Mexico, and Brazil have reduced the use of border protection policies to support their agricultural sectors across time, showing more trade openness and more market transparency. In contrast, Costa Rica and Co-lombia continue to use border measures to protect their farmers.

Figure 5: Composition of support to agriculture in terms of market price support and public expenditure across Latin American and Caribbean Countries (three-year average)

Source: Agrimonitor database, IDB (2018)

Market price support interventions are usually distortive for the economy. Border measures that raise domestic prices give farmers inadequate market signals, preventing them from becoming more productive or switching to more profitable crops, livestock or non-agricultural activities. Moreover, this type of support usually raises prices for consumers as well, placing a special burden on poor consumers in a region where more than 42 million people are undernourished, according to FAO (2017). Efforts in the region should focus on reducing market price support and replacing it with less distortive policies.

[19] According to OECD (2016), the producer Nominal Protection Coefficient (NPC) is "the ratio between the average price received by producers at the farm gate (including payments per ton of current output and excluding price levies per ton of current output), and the border price, measured at the farm gate."

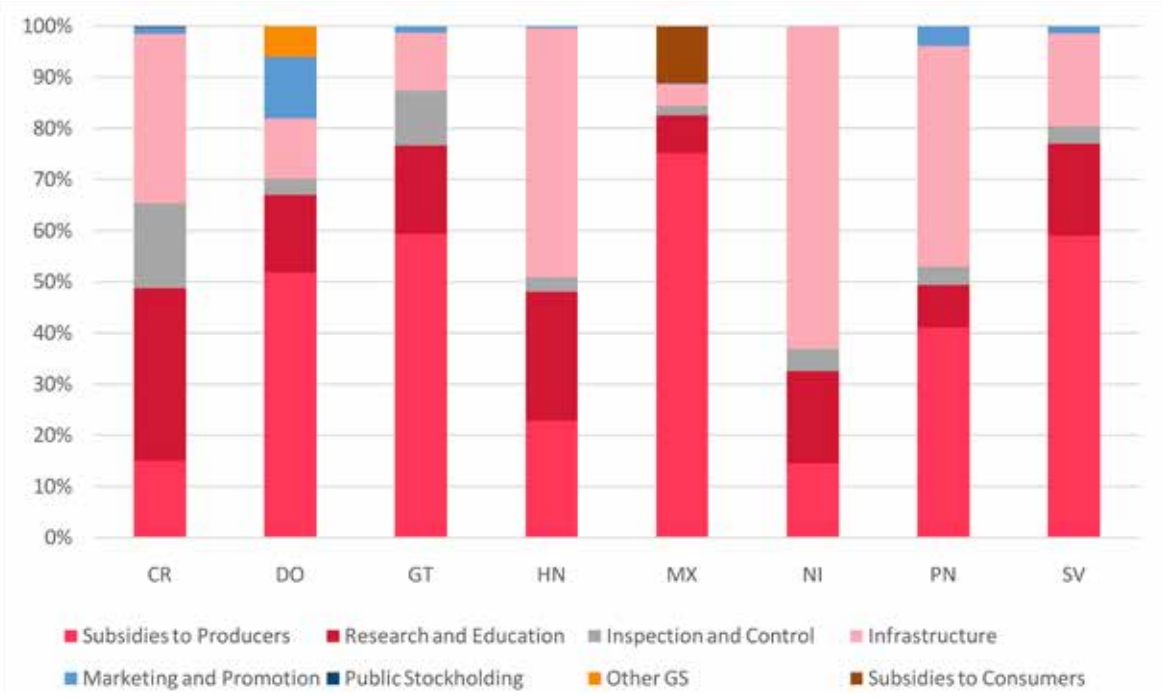
Direct support through "decoupled payments" to individual farmers are a more cost-effective way to support farmer incomes, since they do not encourage farmers to produce products that are worth less than they cost to produce, as do price supports and input subsidies. They also tend to have "multiplier effects"; that is, each dollar spent by the government results in an increase of farmer incomes greater than one dollar. These have been used in Paraguay and Mexico, which pioneered this approach with its Procampo programme. In addition, incentives for technology adoption have also had a positive impact in Bolivia.

4.3 Composition of public spending on agriculture: trends and differences within and between subregions

Countries belonging to the same subregion in Latin America and the Caribbean show some commonalities in the composition of public spending on agriculture. Four subregions will be presented below. Geographic closeness, similar structures of agricultural production and com-mon trade relations of the countries belonging to these subregions allow for comparisons and common analytical grounds.

Central America, Dominican Republic, and Mexico

Figure 6: Composition of public expenditure in agriculture across Central America, Dominican Republic and Mexico (three-year average)



Source: Agrimonitor database, IDB (2018)

Figure 6 shows the composition of agricultural public spending for Central America, the Dominican Republic, and Mexico. Net of MPS, the share of private subsidies in the mix of agricultural public expenditure was relatively high, accounting for more than 70 percent of public spending. However, most of this spending was contributed by Mexico, which stands out with 75 percent of public spending dedicated to subsidies to producers. Excluding Mexico, the rest of the countries spent, on average, a much more modest 39 percent of total spending on private subsidies.

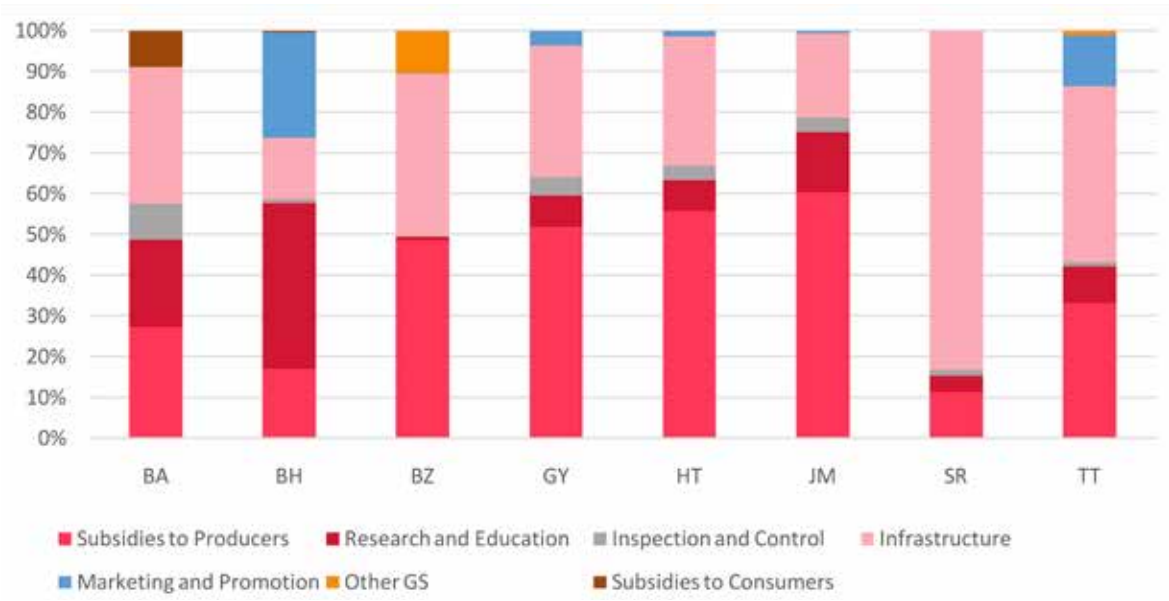
General services, which comprise most of public goods and services provided by governments to the agricultural sector, accounted for 20 percent of public expenditure in the subregion. Excluding Mexico, this figure increases to approximately 61 percent, a relatively high share compared to other countries in the region. However, this figure should be interpreted with caution, as total spending in these countries falls below the regional average relative to the agricultural value added, and it does not provide any information on the quality of services provided.

Within general services, most investments in Central American countries focused on construction and maintenance of infrastructure, which represent roughly 31 percent of all agricultural public spending. Research, development and transfer of knowledge has also been an area with significant investments, with 19 percent of total spending in Central America and the Dominican Republic directed towards this category. Mexico, in contrast, has allocated only 4.2 and 7.3 percent of its public agricultural expenditure on infrastructure and research and development, respectively.

Caribbean

Besides market price support interventions, subsidies to producers were significant in the region and represented roughly 42 percent of public spending in the last 3 years with available data. Belize, Guyana, Haiti, and Jamaica, which together contribute to more than 80 percent of agricultural value added in the Caribbean, spent more than 55 percent of their total public spending on private subsidies (see Figure 7).

Figure 7: Composition of public spending in agriculture in the Caribbean (three-year average)



Source: Agrimonitor database, IDB (2018)

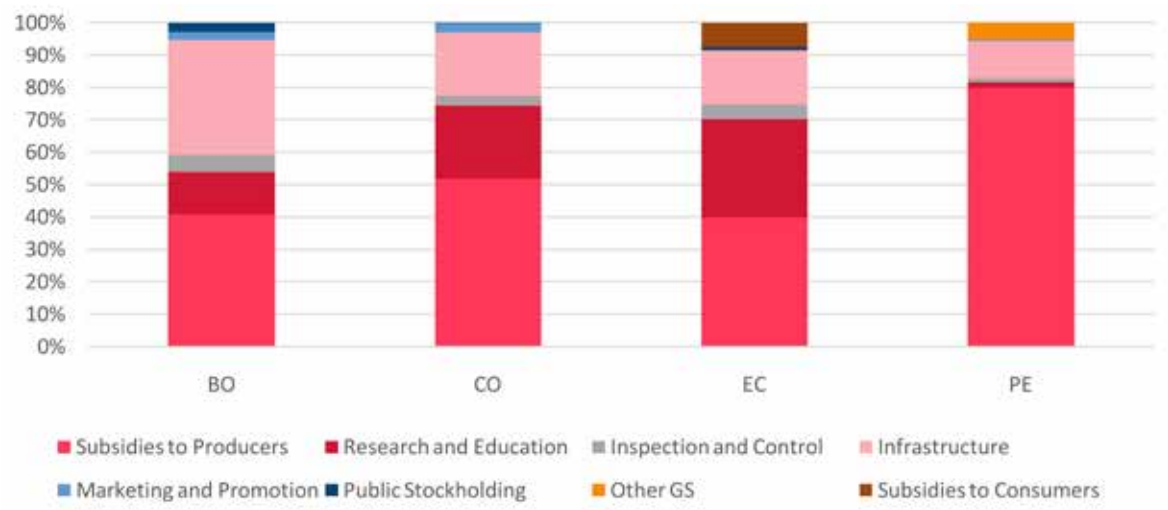
However, it is important to highlight that several countries, including Bahamas, Barbados, Suriname and Trinidad and Tobago, spent more than half of their public agricultural budgets on general services. The share of general services on public spending in these countries was a remarkable 73 percent. Again, the development and maintenance of infrastructure was the most significant investment in the Caribbean countries (37 percent of public spending), matching the trend shown

by Central American countries. Similarly, research, development and education initiatives were the second area of investment for Caribbean countries (11 percent of public agricultural spending).

Andean countries

Except for Peru, the Andean region is characterized by high levels of market price support that represent more than 70 percent of total support in the period of study. On one hand, private subsidies accounted for 49 percent of public spending in Colombia, Ecuador and Bolivia, and for almost 80 percent of total spending in Peru (see Figure 8 below).

Figure 8: Composition of public expenditure in agriculture in the Andean Region (three-year average)



Source: Agrimonitor database, IDB (2018)

On the other hand, general services represented roughly half of all public expenditure in Colombia, Ecuador, and Bolivia, and 20 percent in Peru. Again, investments in infrastructure were significant in all countries, although the weight of these expenditure was lower compared to Central America and the Caribbean. On average, 14 percent of all public spending was invested in the construction and maintenance of infrastructure, with Bolivia assigning 35 percent of its budget to this category of expenditure.

Remarkably, expenses on research, development and education account for 23 percent of all spending in Bolivia, Colombia, and Ecuador, whereas in Peru they only represent 2 percent of the total. In terms of intensity for research funding, only Colombia met the minimum recommended by the UN[20], with investment representing 1.3 percent of agricultural GDP; while Bolivia and Ecuador reached a level close to 1 percent. No information is currently available on Venezuela.

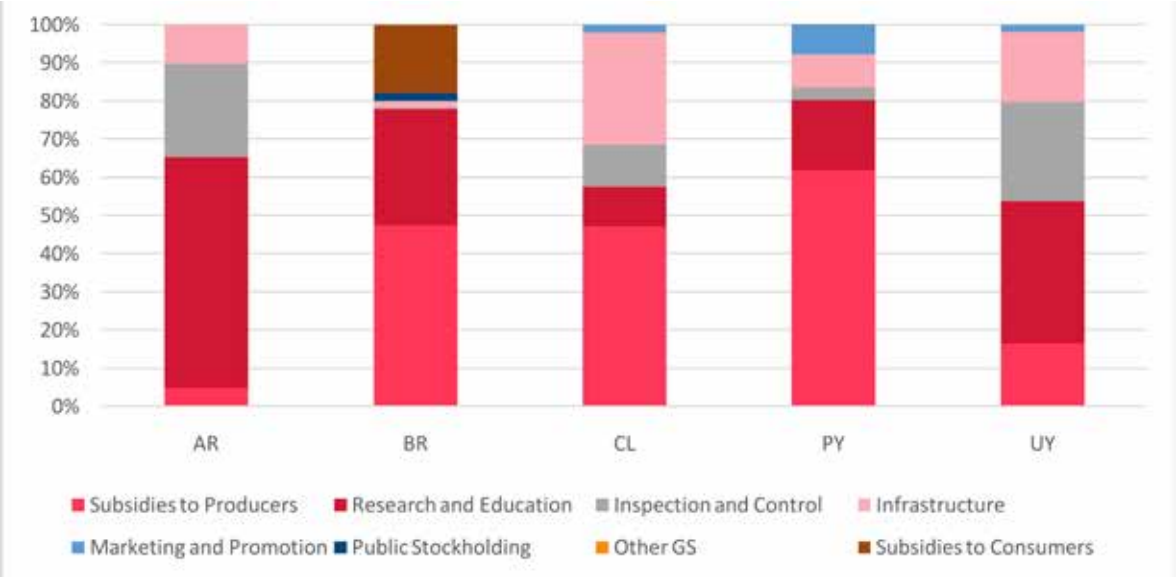
Southern Cone

Countries in the Southern Cone subregion share a common history of trade openness in agricultural products, which is reflected by the low levels of market price interventions (with the

[20] The UN recommends an intensity for research funding equivalent to minimum 1 percent of agricultural GDP.

exception of the negative levels of support in the case of Argentina). Therefore, countries have allocated more public budget funds. While Brazil, Chile and Paraguay relied significantly on private subsidies in the period of study (with shares reaching levels ranging between 47 and 57 percent of total expenditure), the importance of private subsidies to producers was much lower in the mix of agricultural policies in Argentina and Uruguay. Figure 9 illustrates the composition of public expenditure in the Southern Cone.

Figure 9: Composition of public expenditure in agriculture in the Southern Cone (three-year average)



Source: Agrimonitor database, IDB (2018)

Consequently, investments in public goods and other general services have been significant throughout these countries. Infrastructure was an important part of the interventions funded by Chile and Uruguay (with shares reaching 29 and 18 percent of total investment, respectively), but less dominant in Argentina, Brazil, and Paraguay. At the same time, a significant share of public spending was directed towards research, development, and education measures, accounting for almost 31 percent of all public expenditure in the Southern Cone. Argentina, Brazil and Uruguay exceed the minimum level of funding for agricultural research recommended by the UN, while Chile and Paraguay invest almost 0.8 percent of their agricultural GDP.

5. Impacts of agricultural expenditure

One key question is what type of expenditure and investments have stronger positive impacts on the performance of the agricultural sector and on other objectives, such as poverty reduction, nutrition enhancement, and environmental sustainability.

This section briefly summarizes three methodological approaches: a) econometric analysis using aggregate categories such as public and private goods; b) more disaggregated econometric analysis following the approach used in several IFPRI studies (see a compilation in Fan 2008 and related studies); and c) impact evaluation of specific programmes.

5.1 Aggregate econometric studies

Allcott, Lederman, and López (2006) divided public agricultural expenditure in LAC into "non-social subsidies," or "private goods" (export subsidies, forestry subsidies, targeted rural production subsidies, and so on) and "public goods" (such as investment in R&D, plant and animal disease control, and environmental protection).[21] They documented a decline in the share of expenditure devoted to non-social subsidies throughout the period, moving from 40-45 percent in the late 1980s to 30 percent in 2001, while at the same time, average rural public expenditure per capita increased throughout the period. More relevant, they estimated a positive impact of public goods (such as investment in R&D, plant and animal disease control, and environmental protection) and a negative impact of non-social subsidies or private goods (export subsidies, forestry subsidies, targeted rural production subsidies, and so on). Specifically, a reduction of a standard deviation in the latter was estimated to lead to a 5 percent increase in agricultural GDP per capita in the countries considered.

A subsequent study (Anríquez *et al.*, 2016) extended the analysis to later years and included more countries, using an updated Agrimonitor data set on agricultural spending. On one hand, the study found out that increases in total public expenditure, while maintaining the mix of spending constant between public and private goods, have relatively small effects on promoting farm sector income. On the other hand, it found out that shifting the mix of spending toward public goods, holding the total expenditure constant, had a significantly larger impact on the sector's value added per capita. For instance, a shift of 10 percentage points of the agricultural budget from private to public goods, maintaining total spending constant, was estimated to increase agricultural value added per capita by about 5 percent; instead, achieving the same increase would have required an increase of some 25 percent or more in total spending, if the mix was held constant.

[21] There are different views about how public, private and "grey" goods are classified. In particular, a distinction may be needed for some subsidies classified under "private" expenditure when they are targeted to poor rural populations as part of social safety nets.

5.2 IFPRI studies

Instead of dividing expenditure into public and private goods; Shenggen Fan *et al* have developed a methodology to estimate the effects of different types of expenditure (IFPRI, 2008), which have been analyzed individually (such as agricultural R&D, irrigation, infrastructure, and so on), on several dimensions of interest such as productivity, poverty reduction, etc. A brief summary of those studies will be provided here, following Mogues *et al.* (2012). It must be noted that there are no similar studies for LAC, therefore the results refer to developing countries in Africa and Asia. Still, it is useful to mention them as a reference for the region (what follows is directly from Mogues *et al.*, 2012).

First, *aggregate* public spending on agriculture seems to have moderate to modest returns on rural welfare, agricultural growth, economic growth, or poverty reduction. This weak positive impact results from lumping together different types of public expenditure. This implies the importance of analyzing different types of public expenditure in and for agriculture so that policymakers may be able to distinguish between high-and low-payoff activities in terms of agricultural growth, increased productivity, poverty reduction, or other desirable outcomes.

Second, a consistent result across a large quantity of studies is that returns to agricultural R&D expenditure are positive and substantial for agricultural productivity and growth. A majority of the estimates of internal rates of return to investments in agricultural research are greater than 20 percent, although returns vary by regions and products.

Third, in several countries where those comparisons have been attempted, public spending on agricultural R&D outperforms other public expenditure *in* agriculture (irrigation, extension, and fertilizer subsidies), in terms of agricultural productivity gains. Agricultural extension expenditure shows relatively high returns, while irrigation appears to be a positive investment in some countries, but not in others.

Fourth, public expenditure in agricultural R&D also ranks high (although not always as the first option, as in the case of agricultural productivity) among the most effective interventions to reduce poverty.

Fifth, some agricultural investments related to nutrition, such as biofortification, also have positive impacts on health and nutritional outcomes and seem highly cost-effective.

Sixth, returns to public investments in and for agriculture have been declining over time, with the exception of agricultural R&D. Considering the time framework is important because the short-and long-term effects of public expenditure seem to be different.

Seventh, besides the type of public expenditure, it may be important to consider the geographical scope of public expenditure. The effects of government expenditure on agricultural development are usually heterogeneous, depending on the geographical area, which highlights the need for coordination between central and subnational governments to define what investments are needed, where are they needed, and whether the level and composition of all public resources applied in a region are adequate for the goals defined.

Eighth, the studies show that agricultural expenditure can improve outcomes in other areas –such as health– while expenditure not directly aimed at agriculture, including energy, rural roads, education, and so on, have strong impacts on agricultural growth and productivity. Therefore, cross-sectoral coordination at the ministerial and agency level, information sharing about amount and characteristics of all public expenditure and their cross-sectoral effects, and resource allocation improvement are necessary in order to achieve multiple development goals. Both the coordination imperative and the geographical scope also call for better understanding of the differential impacts of public expenditure at the national, provincial, and local levels, including the impact of decentralization in the public sector expenditure and interventions in and for agriculture.

5.3 Impact evaluations

Other types of impact evaluation for agricultural interventions are based on randomized control trials and related approaches. López *et al.* (2017) conducted a review of those studies for LAC countries grouped in six categories: (1) land titling, (2) animal and plant health, (3) access to information, (4) technology adoption, (5) government subsidies in the form of direct payments, and (6) rural infrastructure. The results in López *et al.* (2017) are summarized as follows.

First, evidence shows that land titling programmes have positive effects on the market value of farm plots; there are mixed results regarding the impact on investments; and there is inconclusive evidence on whether it expanded access to credit. There is still much to learn with regards to understanding the heterogeneity of impacts, mechanisms through which titling programmes increase land tenure security, as well as their cost-effectiveness and sustainability. It is necessary to consider the regional and national contexts, as well as aspects such as social relationships, resources, and complementary services at the local level. The findings suggest the need for further institutional reforms within financial, legal and regulatory frameworks so as to fully realize the effects of establishing secure property rights.

Second, the evidence suggests that animal and plant health practices are an effective way of stimulating productivity growth. However, the effects of these measures are likely to be influenced by a set of factors, including but not limited to the quality and quantity of implementing agencies, and the availability of complementary inputs and services at the farm level.

Third, the evidence on the impact of agricultural technology adoption programmes on productivity is mixed, with some studies finding positive and significant effects on agricultural productivity, while others find mixed or no effects on productivity. Several studies pointed out that farmers need time to adjust to the new technology before it can be efficiently applied and translated into more efficient production.

Fourth, regarding access to agricultural information, particularly market-related information, the evaluations suggest that reducing disparities and information gaps have positive and significant impacts on farmers' ability and capacity to negotiate better prices or more attractive terms of sale. Still, countries in LAC may find it difficult to benefit or efficiently adopt information and communication technologies (ICTs) due to limited infrastructure, educational levels, inadequate investments in complementary services or by limited integration of farmers into networks

and value chains. Also, ICTs comprise numerous types of technologies, and therefore impacts will depend on the context and use of specific technologies (Nakasone, Torero, Minten, 2014).

Fifth, the empirical evidence from rural infrastructure projects (i.e. electrification and rural roads) reports significant positive effects on labor, educational, income, and poverty outcomes.

6. Conclusions

Overall, given certain fiscal balances that can be sustained over time, fiscal policy needs to consider both the level and structure of the tax system, and the level and composition of expenditure in relation to the overall growth and equity objectives.

Regarding agriculture taxation, the lack of data makes it difficult to determine the level of explicit direct and indirect taxes paid by farmers in LAC. This data gap may need to be filled to have a complete view of fiscal issues in agriculture. Still, in a region with glaring inequalities in land ownership leading to conflicts and inefficiencies, a new look at the role and operation of land taxes would be warranted.

There is also a need to expand studies on public expenditure beyond only those *in* and *for* agriculture to broader food and nutrition security objectives (Díaz-Bonilla and Centurión, 2018) to have a more detailed view of the current and future effort needed to attain the SDGs in LAC's rural sectors.

Regarding support to producers, governments should consider gradually reducing market price support measures (implemented through protectionist import taxes and related measures) and replacing them with a mix of targeted, decoupled, positive externality-enhancing subsidies and public goods and services, lifting a burden now carried by low-income households who pay higher prices for food.

Also, transitioning from existing input subsidies to decoupled payments would improve productivity, since the former are often inefficient in achieving their goals, as evidence suggests (López *et al.*, 2017).

Moreover, private subsidies used as incentive to achieve environmental goals (while raising farm receipts) could represent a promising choice if they remain linked to well defined targets and minimize market distortions. Payments to poor producers as part of modern safety nets that include social, as well as some productive component (for instance to adjust to climate change) should also be considered as an important additional instrument to be utilized (Winder, Faret, 2019).

Overall, it is important to increase investments in public goods and services, with a special focus on research, innovation, agricultural health, education and infrastructure, which have demon-

strated, to various degrees, their effectiveness and efficiency in delivering positive effects on productivity, rural incomes, and the resilience of food systems to the negative impacts of climate change. In particular, many countries in the region are spending on agricultural R&D much less than the recommended 1 percent of agricultural GDP.

It must be remembered that public expenditure has opportunity costs, not only in terms of alternative uses for those funds, but specially in terms of how expenditure is financed, such as taxes, borrowing, and money creation. Therefore, it is important to be able to justify the need for using public expenditure on agriculture or broader objectives related to food and nutrition security. The typical reasons for public interventions are related to the presence of some sort of market failure or to distributional concerns. Hence, efforts to gather empirical evidence on both the effectiveness and equity of public expenditure should be stepped up to help with the allocation of scarce resources.

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