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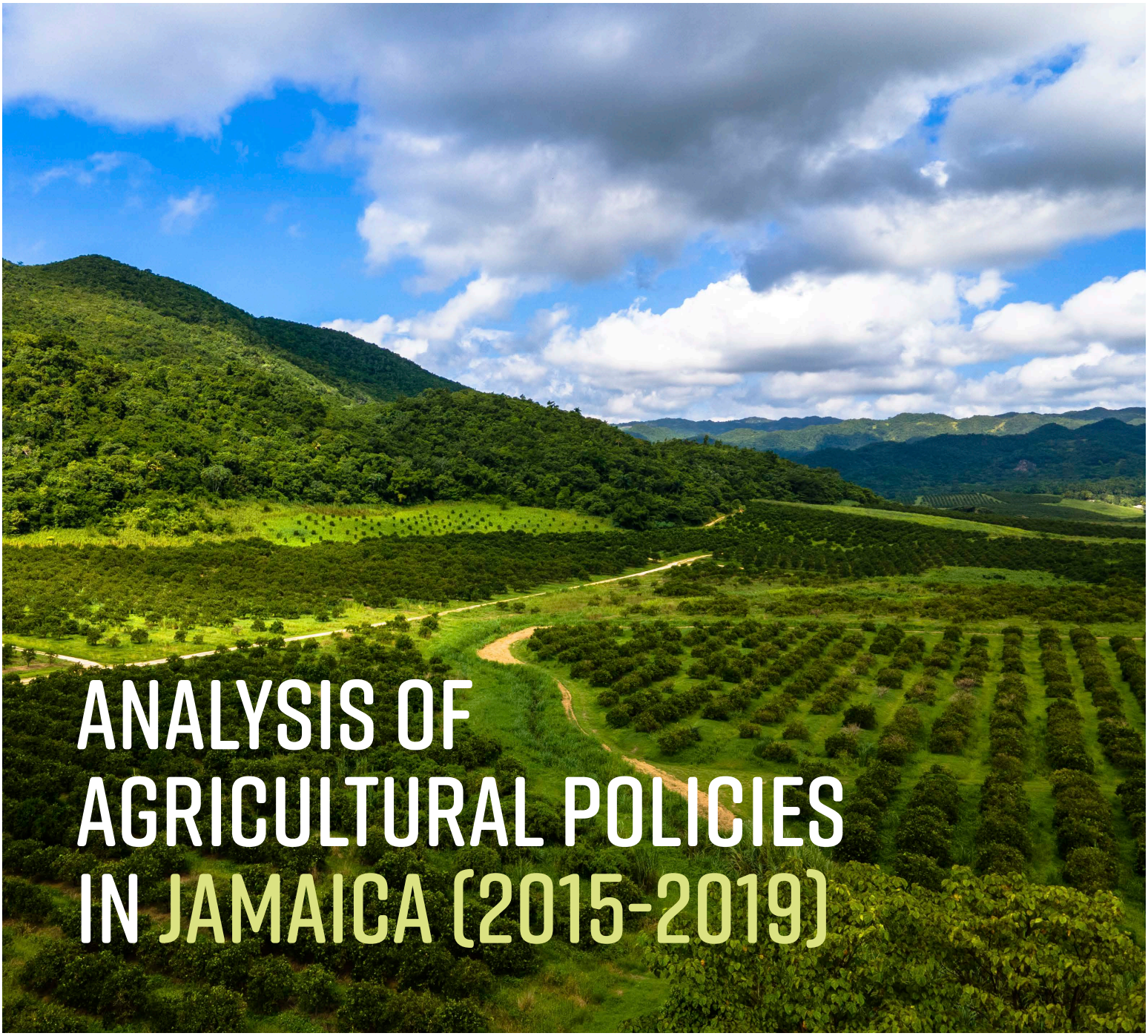

ANALYSIS OF AGRICULTURAL POLICIES IN JAMAICA (2015-2019)

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ABSTRACT

The agricultural sector plays a crucial role in Jamaica's economic development by contributing to employment (15.93% of the active population in 2019; higher than the regional average) and exports (18% of total exports in 2019). This report offers an update of the Producer Support Estimate (PSE) methodology to Jamaica for the period 2015-2019 and documents the evolution of agricultural policies-related GHG emissions over the same period. Between 2015 and 2019, the market price support remained, by far, the main PSE component in Jamaica, heavily concentrated in the poultry subsector, followed by sugar. The positive trend in non-distorting General Service Support Estimate (GSSE) observed between 2012 and 2014 came to a halt. %GSSE even slightly decreased between 2015 and 2019, making Jamaica lag even further behind other countries. Concerning the GHG emissions, the picture has not changed significantly either. The poultry and sugar subsectors remained those that received most policy support and those that emitted the most. Several policy recommendations arise from this report, such as a shift away from an over-reliance of policy support on MPS and an increased focus on less-distortive forms of support, such as GSSE. Additional R&D investments, physical infrastructures, climate risk management systems would help address some of the agricultural sector's most pressing productivity and profitability issues. Lastly, it is advisable to diversify and rebalance the support provided by agricultural policies across subsectors to better align agricultural policy goals with GHG emissions reduction objective.

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LIST OF ABBREVIATIONS

ACE | Agricultural Carbon Emissions

AIBGA | All Island Banana Growers Association Limited

AIC | Agro-Investment Corporation

BAMS | Banana Accompanying Measures

BOJ | Bank of Jamaica

CARICOM | Caribbean Community

CDB | Caribbean Development Bank

CEF | Cane Expansion Fund

CET | Common External Tariff

CIB | Coffee Industry Board

CPI | Consumer Prix Index

CSE | Consumer Support Estimate

DBJ | Development Bank of Jamaica

EU | European Union

FPR | Frosty Pod Rot

GCT | General Consumption Tax

GDP | Gross domestic product

GHG | Greenhouse Gas

GSSE | General Services Support Estimate

ICCO | International Cocoa Organization

IICA | Inter-American Institute for Cooperation on Agriculture

IMF | International Monetary Fund

JACRA | Jamaica Agricultural Commodities Regulatory Authority

JBM | Jamaica Blue Mountain

JCFA | Jamaica's Cocoa Farmers Association

JCGA | Jamaica Citrus Growers Association

JCPA | Jamaica Citrus Protection Agency

JDDB | Jamaica Dairy Development Board

JMD | Jamaica dollar

JSIF | Jamaica Social Investment Fund

MICAF | Ministry of Industry, Commerce, Agriculture and Fisheries

MPD | Market Price Differential

MPS | Market Price Support

NGO | Non-Governmental Organization

NSV | Net Social Value

OECD | Organization for Economic Co-operation and Development

PSE | Producer Support Estimate

RADA | Rural Agricultural Development Authority

SIA | Sugar Industry Authority

SIARD | Sugar Industry Authority Research Division

SIRI | Sugar Industry Research Institute

STATIN | Statistical Institute of Jamaica

STU | Sugar Transformation Unit

TSE | Total Support Estimate

UN | United Nations

UNFCCC | UN Framework Convention on Climate Change

USAID | US Agency for International Development

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INTRODUCTION

This report offers an update of the application of the Producer Support Estimate (PSE) methodology to Jamaica for the period 2015-2019. The PSE is a quantitative approach developed by the Organization for Economic Cooperation and Development (OECD) to assess the level and the composition of the support provided by agricultural policies. It has been previously applied to Jamaica by the Food and Agriculture Organization (FAO) for the period 2006-2010[1] and, more recently, by the Inter-American Development Bank (IDB), for the period 2012-2014 (Shik et al., 2017).[2]

This report also documents the evolution of agricultural policies-related greenhouse gas emissions over the same period, using a methodology developed by the IDB and Professor Tim Josling, and already applied to Jamaica for 2012-2014 (Josling et al., 2017).[3]

The first chapter of the report provides an overview of the role of agriculture in the economy of Jamaica and of agricultural policies which have been in place over the period 2015-2019. The second chapter presents the results of the PSE and offers a comparison of the level and structure of agricultural support in Jamaica with those of other countries in the region. The third chapter describes the results of agricultural policies-related greenhouse gas emissions for the period 2015-2019. The fourth and last chapter provides policy recommendations based on what has been observed by applying these different analytical tools.

THIS REPORT OFFERS AN UPDATE OF THE APPLICATION OF THE PRODUCER SUPPORT ESTIMATE (PSE) METHODOLOGY TO JAMAICA FOR THE PERIOD 2015-2019

1. FAO (2013). *Jamaica. Review of Agricultural Sector Support and Taxation.*
2. Shik, O., Boyce, R. and De Salvo, C. P. (2017). *Analysis of Agricultural Policies in Jamaica.* IDB.
3. Josling et al. (2017). *Agricultural Policy and Greenhouse Gas Emissions in Jamaica.* IDB.

1. OVERVIEW OF THE SECTOR AND POLICIES BETWEEN 2015 AND 2019

1.1. THE ROLE OF AGRICULTURE IN THE ECONOMY

Jamaica is an upper middle-income country. Since 2014, Jamaica has been successful at reducing the unemployment rate from over 13% to 7.7%, as well as its debt-to-gross domestic product (GDP) ratio from over 130% down to 93.9% (falling below 100% for the first time since the year 2000), and at keeping inflation under tighter control **(Figure 1)**. In November 2019, the country

completed a 6.5 year-long Stand-By-Arrangement with the International Monetary Fund (IMF). The IMF praised Jamaican authorities' "exemplary commitment to reforms" but also reminded them that "supply-side reforms were still needed to promote inclusive growth and lower poverty".[4] Jamaica is indeed still struggling with slow growth (1.2% per year, on average, over the period 2014-2019) and a continuous depreciation of its currency (from 111.22 JMD per US$ in 2014 to 134.16 JMD per US$ in 2019; though the currency has become more stable since 2016). Between 2014 and 2017 (the last year for which data is available), the incidence of poverty slightly decreased from 20% down to 19.3%.[5] Similarly, in terms of food security, the prevalence of undernourishment went from 9.7% for 2014-2016 (3-year average) to 8.7% during 2017-2019.[6]

Concerning trade, Jamaica is a member of the Caribbean Community (CARICOM). According to the Global Competitiveness Index, Jamaica's overall competitiveness ranking had slightly improved since 2014 from 86th to 80th in 2019. However, at the Caribbean level, Jamaica has been outranked by both the Dominican Republic (ranked 78th) and Trinidad and Tobago (ranked 79th). According to the 2019 World Bank's Doing Business report, Jamaica only ranks 136th out of 190 countries regarding "trading across borders". The time and costs associated with both exports and imports are higher, on average, in Jamaica than in other countries in the Latin America & Caribbean (LAC) region.[7]

In 2018, the agricultural sector generated 6.87% of Jamaica's GDP, while the rest originated from services (75.28%), the industrial sector (15.23%), and mines (2.62%). The agricultural sector also plays a crucial role in the country's economic development through its contributions to employment (15.93% of the active population in 2019; higher than the regional average, according to Jamaica's 2012-14 PSE Report) and exports (18% of total exports in 2019).

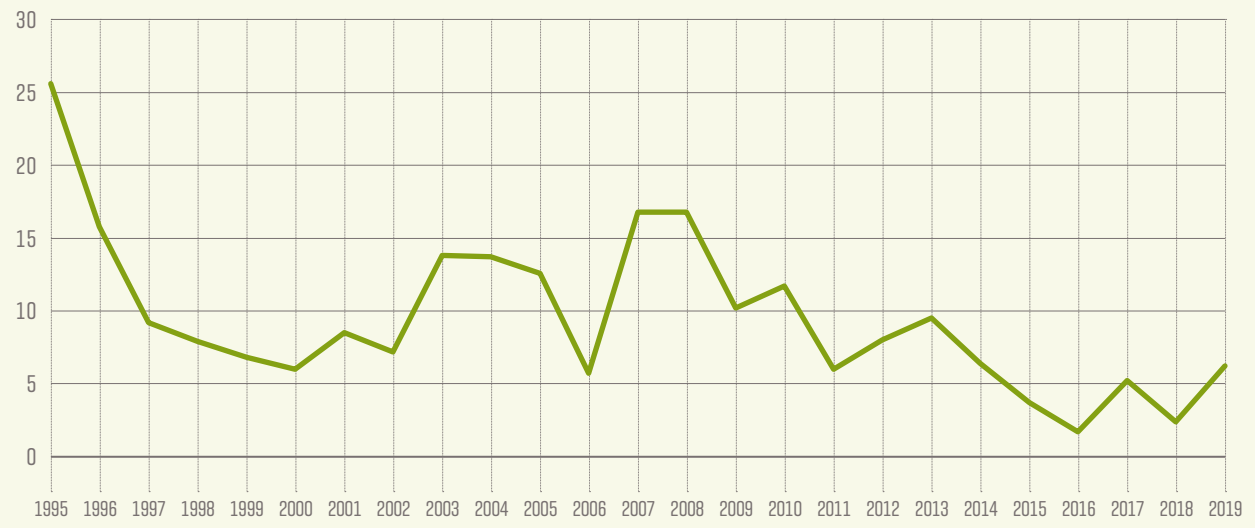
4. https://www.imf.org/en/News/Articles/2019/11/04/pr19393-jamaica-imf-executive-board-completes-sixth-and-final-review-under-the-stand-by-arrangement

5. STATIN.

6. FAO.

7. https://www.doingbusiness.org/en/data/exploreeconomies/jamaica#DB_tab

FIGURE 1: ANNUAL INFLATION RATE (%)



Source: Statistical Institute of Jamaica (STATIN)

Nevertheless, Jamaica's agricultural sector continues to face significant challenges such as:

- **Vulnerability to climate change and adverse climatic events:** the negative impact of droughts on agriculture production in 2014-2015 and 2019 slowed the country's economic growth on both occasions.[8]
- **Vulnerability to world input price shocks:** the continuous depreciation of the Jamaican dollar (JMD) makes key agricultural inputs such as fertilizers, feed, and fuel, which are all imported, more expensive.
- **Low productivity:** The 2012-14 PSE Report emphasized that labor and land productivity had been improving but remained low relative to other Caribbean countries. **Figure 2** and **Figure 3** below show that this remains true until (at least) 2018. In 2018, for instance, the agriculture value added per hectare in Jamaica was US$ 7,332 (in 2010 US$), compared to an average of US$ 8,260 in other Caribbean countries. Labor productivity is also significantly lower in agriculture relative to other sectors of the

8. Caribbean Development Bank (2020). *Country Economic Review 2019 – Jamaica.*

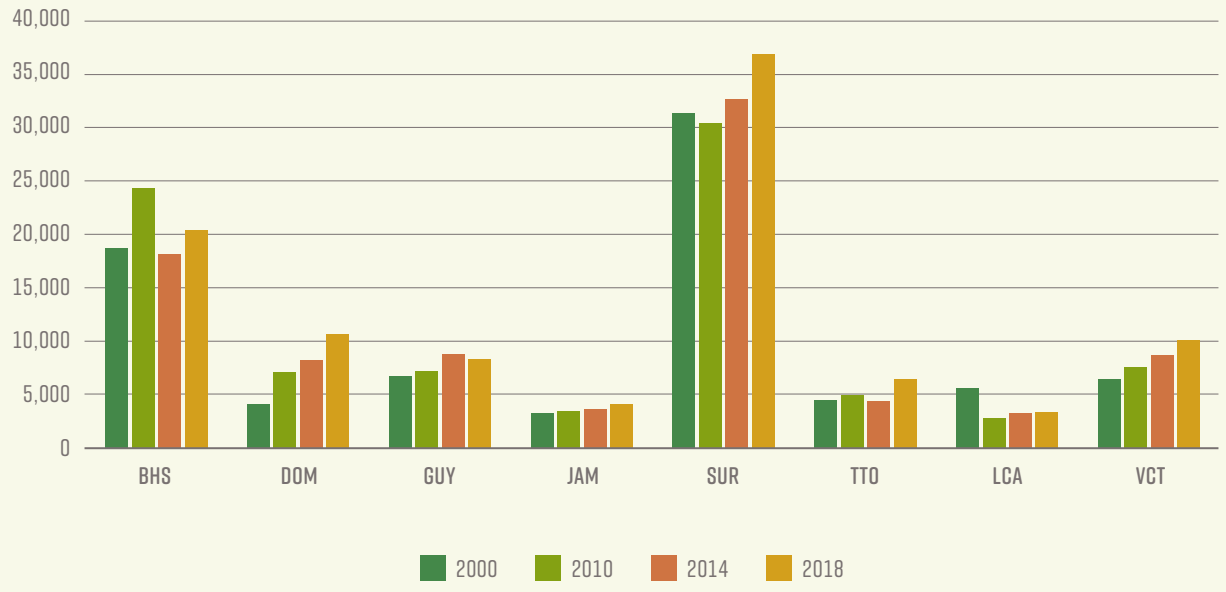
economy **(Figure 4)**. As of 2019, the value-added (VA) per worker in the "agriculture, forestry and fishing" sector represents only 43% of the VA per worker in the service sector and 36% of the VA per worker in the industrial sector.

TABLE 1: SELECTED MACROECONOMIC INDICATORS

INDICATOR	UNIT	2014	2015	2016	2017	2018	2019
GDP (CONSTANT 2007 PRICES)	JMD BN	847.166	855.021	866.783	875.480	892.472	898.719
GDP GROWTH (CONSTANT PRIC-ES)	%	0.4	0.9	1.4	1.0	1.9	0.7
GDP PER CAPITA (CONSTANT PRIC-ES)	JMD'000	270.00	272.73	276.52	278.37	283.74	NOT AVAILABLE
POPULATION	000 PERSONS	2,715.66	2,719.47	2,721.66	2,725.88	2,730.98	2,734.09
TRADE (% OF GDP)	% OF GDP	52.47	44.09	42.41	48.14	51.75	48.15
EXCHANGE RATE	JMD PER US$	111.22	117.26	125.46	128.45	129.59	134.16
DEBT-TO-GDP RA-TIO	%	137.90	121.90	113.70	101.30	94.40	93.90
UNEMPLOYMENT RATE	%	13.8	13.5	13.2	11.7	9.1	7.7
SHARE OF AGRI-CULTURE IN GDP	%	6.36	6.31	7.01	6.72	6.87	NOT AVAILABLE
SHARE OF AGRI-CULTURE IN EM-PLOYMENT	%	18.00	17.75	16.63	16.78	16.23	15.93
AGRICULTURAL EXPORTS (% OF EXPORTS)	%	20.00	22.00	24.00	21.00	14.00	18.00
FOOD TRADE BAL-ANCE	JMD'000	-679,150.00	-612,611.00	-619,674.00	-611,594.00	-690,078.00	-806,371.00
AGRICULTURAL LAND	SQ. KM	4,440.00	4,440.00	4,440.00	4,440.00	4,440.00	4,440.00

Sources: STATIN, World Development Indicators (WDI; World Bank), Bank of Jamaica (BOJ) and IMF.

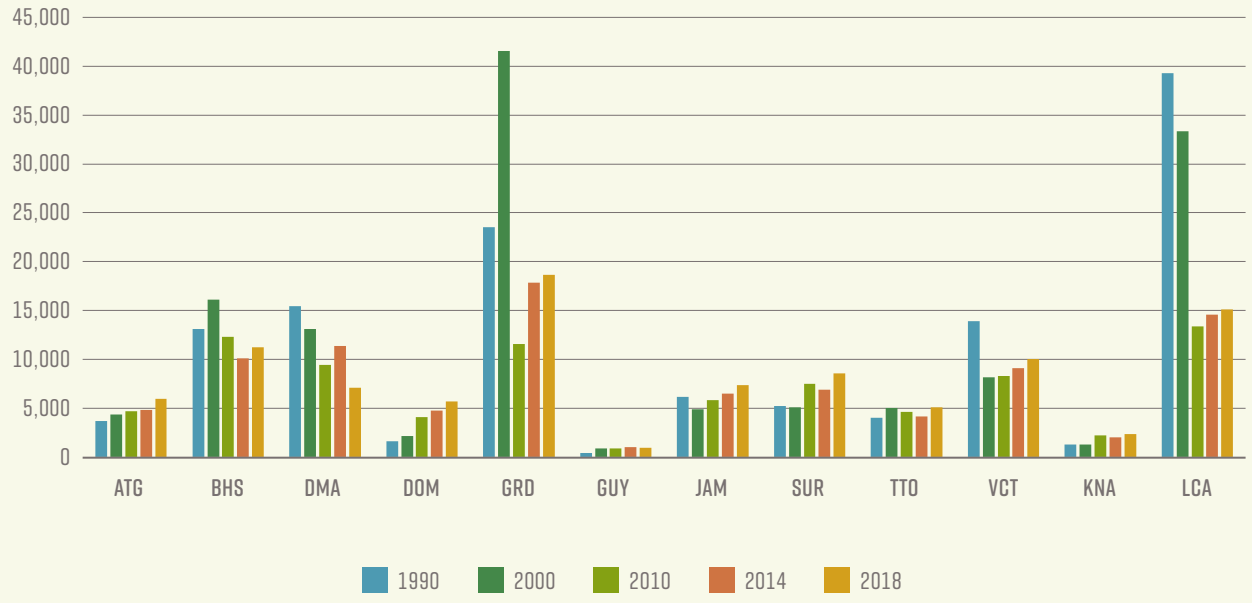
FIGURE 2: AGRICULTURE VALUE ADDED PER WORKER FOR SELECTED CARIBBEAN COUNTRIES (CONSTANT 2010 US$)*



Source: WDI.

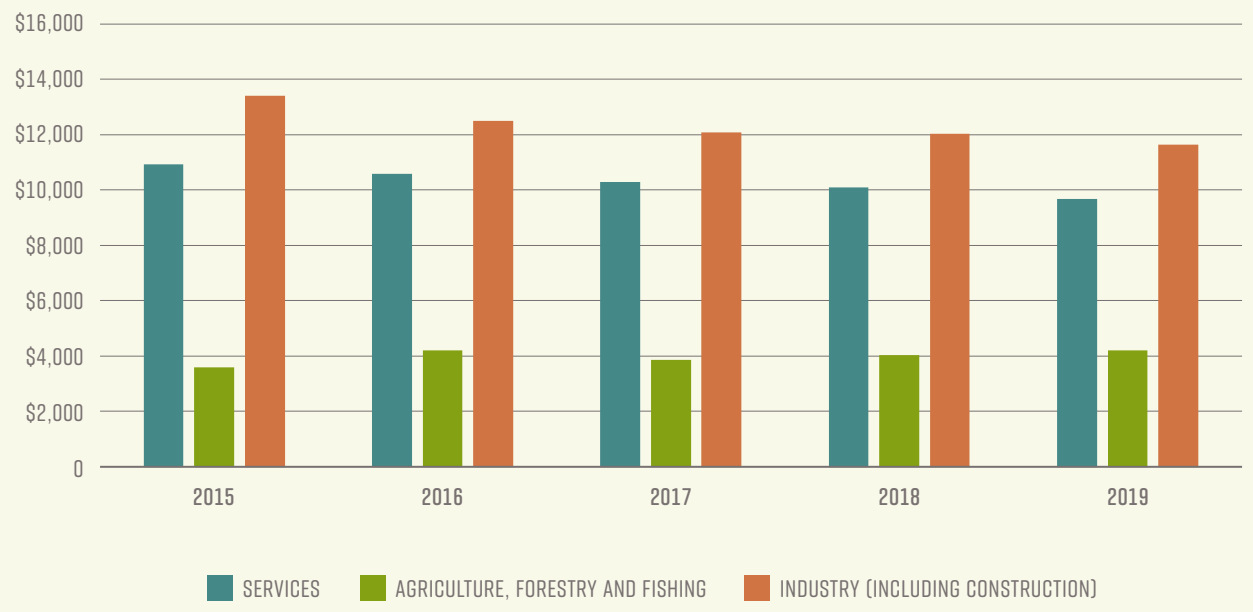
(*) ATG: Antigua and Barbuda; BHS: The Bahamas; DMA: Dominica; DOM: Dominican Republic; GRD: Grenada; GUY: Guyana; JAM: Jamaica; SUR: Suriname; TTO: Trinidad and Tobago; VCT: St. Vincent and the Grenadines; KNA: St. Kitts and Nevis; LCA: St. Lucia.

FIGURE 3: AGRICULTURE VALUE ADDED PER HECTARE OF ARABLE LAND FOR SELECTED CARIBBEAN COUNTRIES (CONSTANT 2010 US$)



Source: WDI.

FIGURE 4: VALUE ADDED PER WORKER PER SECTOR, 2015-2019 (CONSTANT 2010 US$)



Source: WDI.

As illustrated in **Figure 5**, in terms of production value, the agricultural sector in Jamaica is dominated by poultry (an average of 38% of Jamaica's annual gross production value between 2015 and 2019), followed by yam (15%), sugarcane (5%), sweet potato (5%), and banana (4%), respectively.

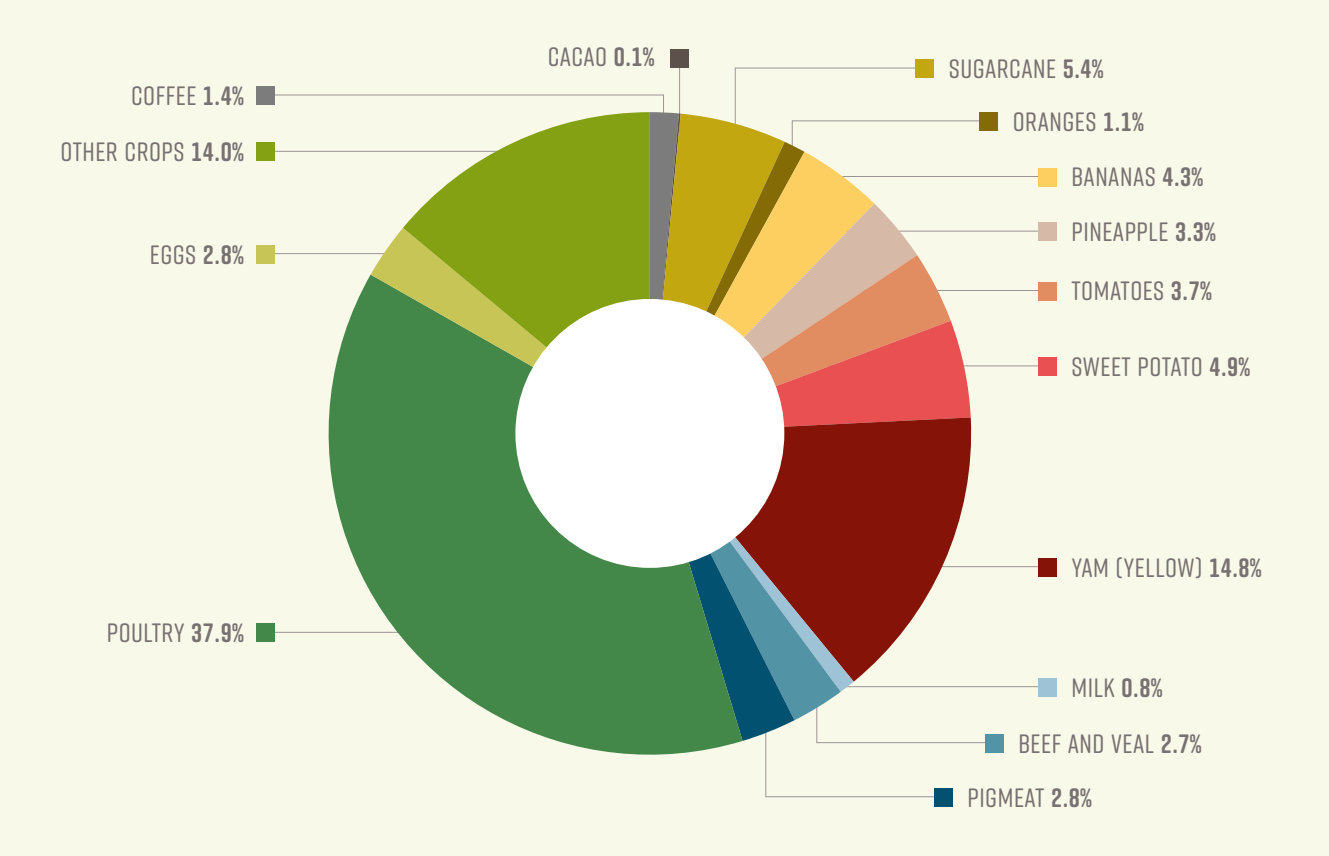
In terms of annual production volume, while it has significantly dropped since 2014 for sugarcane (-50%) and cocoa (-49%), it has increased for bananas (+16%), tomatoes (+18%), poultry (+19%), yam (+27%), pig meat (+29%), and pineapple (+80%).[9] The reasons behind these changes are elaborated in more detail below.

Coffee, citrus, pimento, cocoa, and bananas are seen as Jamaica's traditional export crops. However, as highlighted in the 2012-14 PSE Report, their importance has been declining. While these crops represented 3.14% of total exports in 2009, they only represented 1.36% of exports in 2014 and 1.05% in 2019. Conversely, non-traditional agri-food exports such as sweet potatoes, yams, and ackees have gained significant importance: their share in total exports has increased from 4.40% in 2014 to 5.48% in 2019 **(Table 2)**.[10]

9. Banana includes plantain.

10. STATIN.

FIGURE 5: SHARE OF GROSS PRODUCTION VALUE PER COMMODITY, 2015-2019, % OF TOTAL



Source: Author's estimations based on data from the Ministry of Industry, Commerce, Agriculture and Fisheries (MICAF).

TABLE 2: JAMAICA'S TOP 4 AGRICULTURAL EXPORTS, 2008-2019, CURRENT MILLION JMD

INDICATOR	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	% CHANGE 2015-19
SUGAR	7,436	6,405	3,918	5,326	8,209	5,252	6,140	6,239	1,747	1,852	2,126	1,356	- 78%
COFFEE	1,929	2,979	1,678	1,573	1,2145	1,624	1,491	2,681	3,443	2,489	1,919	1,598	- 40%
YAMS	1,479	1,651	1,642	1,711	1,743	2,229	2,462	2,544	3,222	3,772	3,817	4,027	+58%
ACKEE	653	1,199	1,110	1,064	1,231	1,572	1,328	1,742	2,635	2,033	2,028	2,725	+56%

Source: STATIN.

1.2. AGRICULTURAL POLICIES: PRIORITIES AND IMPLEMENTATION

In Vision 2030, Jamaica's National Development Plan elaborated in 2009, the Government of Jamaica (GOJ) identifies an internationally competitive agricultural sector as a significant contributor for securing the goal of economic prosperity and aims at achieving "an innovative, inclusive, sustainable and internationally competitive" agricultural sector by 2030.

For agriculture, more specific policy goals, or "priorities" are set out in mid-term policy plans. For the period 2019-2023, those are:

1. **To optimize** the production and productivity of key local produce and products toward targeted markets.
2. **To increase** access of select local industries to emerging and existing markets.
3. **To strengthen** Micro, Small & Medium Enterprises (MSME)'s contribution to Jamaica's economy.
4. **To build** climate-resilient agriculture, fisheries, manufacturing, and services sectors.
5. **To improve** the ease of doing business to facilitate investment in Jamaica.
6. **To strengthen** the National Quality Infrastructure.
7. **To strengthen** Agricultural Health and Food Safety Systems.
8. **To build** the capacity of Ministry and entities to efficiently and effectively implement policies, programs, and projects.

At the institutional level, in 2016-17, the Government of Jamaica merged the Ministry of Agriculture and Fisheries (MOAF), the entity responsible for the administration of public sector programs and projects in the agriculture, forestry, and fisheries sectors, with the Ministry of Industry, Investment and Commerce. It formed the Ministry of Industry, Commerce, Agriculture and Fisheries (MICAF). The objective of this institutional rearrangement was to "tackle several key interlinked constraints that continue to inhibit private sector-led investments in the agricultural sector", and so to equip the Ministry better to achieve priorities1, 2, 3, and 5 listed above.

THE GOVERNMENT OF JAMAICA MERGED THE MINISTRY OF AGRICULTURE AND FISHERIES (MOAF) WITH THE MINISTRY OF INDUSTRY, INVESTMENT AND COMMERCE. IT FORMED THE MINISTRY OF INDUSTRY, COMMERCE, AGRICULTURE AND FISHERIES (MICAF)

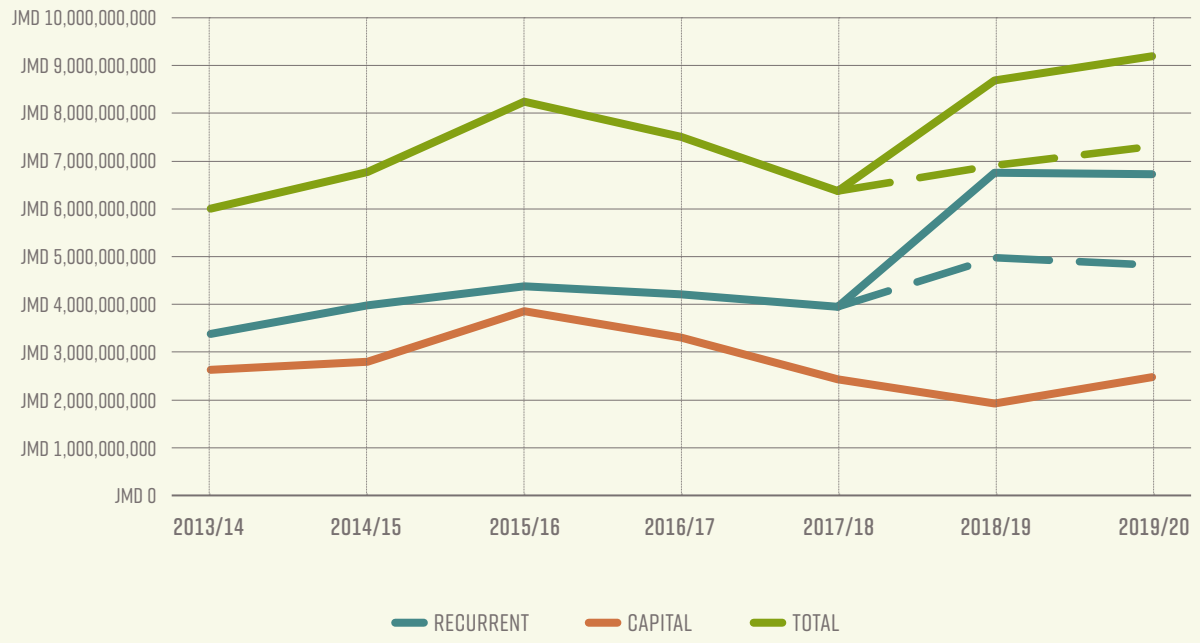
Another significant institutional change within MICAF since the 2012-14 PSE Report is the 2018 merging of the Cocoa Industry Board, the Coffee Industry Board, the regulatory functions of the Coconut Industry Board, and the Export Division (in charge of the promotion of spices such as pimento) into the Jamaica Agricultural Commodities Regulatory Authority (JACRA). With this reform, MICAF intends to improve efficiency in the development, regulation, promotion, and standardization of these commodities (cocoa, coffee, coconut, and spices).

1.3. AGRICULTURAL POLICIES: OVERVIEW OF SUPPORT POLICIES AND ACTIONS

The evolution of MICAF's expenditures since the fiscal year 2013/14 is shown in **Figure 6**. The total (solid green line) is the sum of recurrent (solid blue line; defined as "all the expenses that accrue in the carrying out of services normally rendered by the Government") and capital expenditures (orange line; defined as "expenses connected with the purchase and upkeep of goods such as machinery in factories, school buildings, offices and roads").[11] The spike in recurrent expenditures observed in fiscal years 2018/19 and 2019/20 does not represent an increase in overall public expenditures in agriculture in Jamaica. Instead, expenditures in irrigation services, previously categorized as expenditures from the Ministry of Economic Growth and Job Creation, began being reported as MICAF expenditures starting from the fiscal year 2018/19. For these two fiscal years, the dotted lines in Figure 6 simulate recurrent and total expenditures, had this change in reporting not taken place. Considering this, MICAF's expenditures look relatively stable over 2015-2019, with a total ranging between 6,009 million JMD in 2013/14 and 8,235 million JMD in 2015/16. However, as a share of total government expenditures, MICAF's expenditures remain low and even declined from 1.2% in 2013/14 down to 1.07% in 2019/20 **(Figure 7)**.

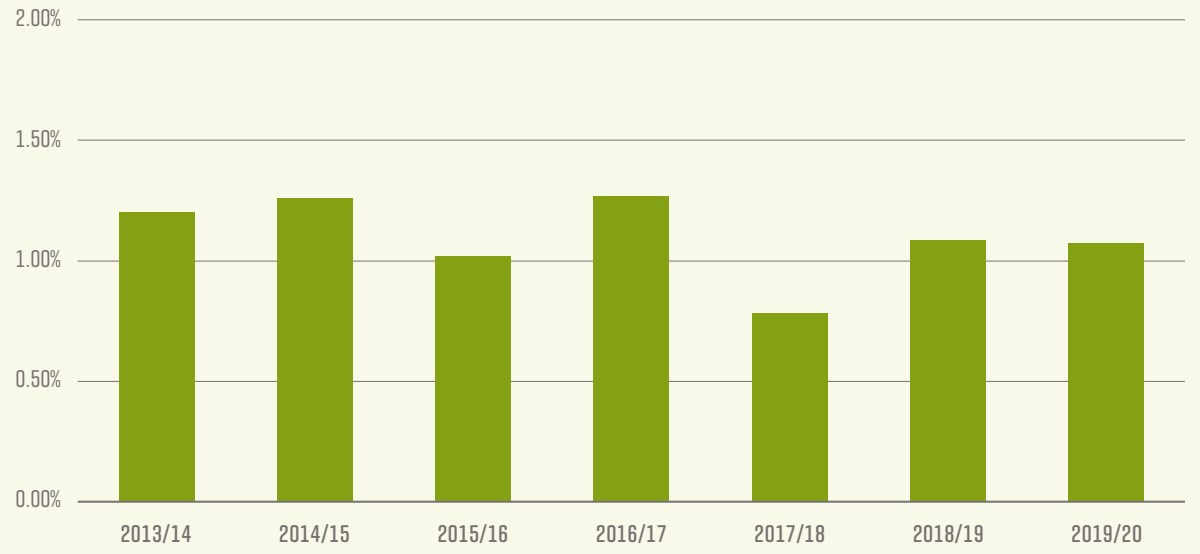
11. https://jis.gov.jm/understanding-the-budget/

FIGURE 6: EVOLUTION OF MICAF'S EXPENDITURES SINCE 2014 (CURRENT JMD)



Source: Ministry of Finance.

FIGURE 7: MICAF'S EXPENDITURES AS A SHARE OF TOTAL GOVERNMENT EXPENDITURES (2013/2014-2019/2020)



Source: Ministry of Finance.

Following the PSE methodology, support policies to agriculture in Jamaica could be divided into two broad categories: those that imply budgetary transfers (or a flow of Government funds) and/or a revenue foregone; and those that instead create a gap between domestic market prices and border (or competitive) prices (price transfers).[12]

BUDGETARY TRANSFERS: PROJECTS, POLICIES AND PROGRAMS

Budgetary transfers include temporary domestic agricultural support provided through projects implemented between 2015 and 2019 by MICAF and other Ministries and entities. The main ones are listed in **Annex 1**. It also includes more permanent domestic agricultural support offered through policies and programs implemented not only by MICAF but also by other Ministries, such as:

For MICAF:

- Standardization, certification, and marketing services, provided in particular by JACRA.
- Value chain development, in particular through the Agro-Investment Corporation (AIC).
- Irrigation infrastructure and farm roads development.
- Extension services and training implemented by the Rural Agricultural Development Authority (RADA).
- Disaster mitigation program, implemented by RADA.
- Research & Development.
- Veterinary services.
- Input supply, in particular through the Production Incentive Program and crop-specific development programs.

12. In line with the PSE methodology, agriculture support policies are here understood as policies that are agriculture-specific or that benefit primarily agricultural producers.

For other Ministries and other public entities:

- Subsidized loans provided by the Development Bank of Jamaica (DBJ) and the Cane Expansion Fund.
- Fiscal policies such as the Duty Concession on Farm Vehicle.[13]
- Consumer protection.
- Agricultural education.

PRICE TRANSFERS: TARIFFS AND DUTIES

Agriculture support policies that generate price transfers are related to trade. According to the World Trade Organization (WTO), Jamaica's average tariff protection in 2019 is 19.2% for agricultural products and 6.8% for non-agricultural products. There has not been any significant change since 2014: then, average tariffs for agricultural and non-agricultural products were 19.3% and 6.7%, respectively. Jamaica's membership in Free Trade Agreements has indeed not changed since 2014. Through its membership in the CARICOM, Jamaica is applying a Common External Tariff (CET) on all imported goods, except on those that are either not produced, insufficiently produced, or produced in substandard quality within CARICOM. Additional import taxes such as the Additional Stamp Duty (ASD), the Environmental Levy (ENVL20), and the Standard Compliance Fee (SCF) are also applied to imports, including to those from other CARICOM members, thus making real protection levels fairly high. **Table 3** below shows import tariffs and duties, from smallest to largest, for a number of key agricultural commodities, which have been selected for the PSE analysis. For instance, for poultry meat and tomatoes, combined protection levels (adding all import tariffs and duties together) reach 260% (same as in 2014).

13. Tax and duty waivers and concessions mentioned in the 2012-14 PSE Report such as the "zero General Consumption Tax (GCT) for food items", the Income Tax Relief and the Productive Input Relief have been either removed or are no longer agriculture-specific (except for corn, soymeal, and wheat, which are used in animal feed production).

TABLE 3: IMPORT TARIFFS AND DUTIES

PRODUCTS	IMPORT DUTY - CET	ASD*	SCF90	ENVL20
COCOA	0.00%	0.00%	0.00%	0.50%
COFFEE	5.00%	0.00%	0.00%	0.50%
SWEET POTATOES	40.00%	0.00%	0.30%	0.50%
YAM	40.00%	0.00%	0.30%	0.50%
MILK	75.00%	0.00%	0.30%	0.50%
PIG MEAT	40.00%	32.86%	0.00%	0.50%
ORANGES	40.00%	32.86%	0.30%	0.50%
BANANAS	40.00%	32.86%	0.30%	0.50%
PINEAPPLE	40.00%	32.86%	0.30%	0.50%
BEEF AND VEAL	40.00%	32.86%	0.30%	0.50%
EGG	40.00%	32.86%	0.30%	0.50%
REFINED SUGAR**	40.00%	63.00%	0.30%	0.50%
POULTRY MEAT	100.00%	80.00%	0.00%	0.50%
TOMATOES	100.00%	80.00%	0.30%	0.50%

Source: https://www.jacustoms.gov.jm

(*) Applied to: value of imports + CET.
(**) Refined sugar for manufacturing, however, can be imported duty-free.

2. ESTIMATE OF SUPPORT TO AGRICULTURE

2.1. METHODOLOGY[14]

The PSE is a *standardized* quantitative approach developed by the Organization for Economic Cooperation and Development (OECD) to measure the support to the agricultural sector. Since 1987, the OECD has been estimating and regularly updating the PSE for its member countries and, increasingly, for other associated countries. Furthermore, since 2003, Agrimonitor, an IDB initiative, has been doing the same for its member countries in the LAC region.

14. OECD (2010). OECD's Producer Support Estimate and Related Indicators of Agricultural Support: Concepts, Calculations, Interpretation and Use (The PSE Manual). Paris, France.

The PSE estimates the support to the agricultural sector coming from policies that imply both budgetary transfers (and/or revenue foregone) and price transfers. While the former can be easily expressed in monetary, and thus comparable, terms, the latter requires an extra layer of analysis in order to compare observed market conditions to a benchmark situation. The aggregated effect of such policies in the supply-demand model is measured by the price ratios in the "with-" and "without-policy" situations. Producer prices (at the farm gate) are thus compared to "reference" (or "border") prices that would be expected without policy interventions (i.e., in a market equilibrium scenario). The impact of price policies is measured by the difference between market and reference prices, also referred to as the Market Price Differential (MPD). If the difference is positive, policies benefit producers. If the difference is negative, it represents an implicit taxation of farmers to the benefit of consumers. When aggregated at the sector's level (by multiplying the MPD by the level of domestic production), the Market Price Support (MPS) is obtained.

Policies that generate budgetary transfers and/or revenue forgone, on the other hand, need first to be sorted. According to the OECD methodology, only agriculture-specific or that benefit primarily agricultural producers need to be included in the measurement of support.[15] For those that fit this criterion, implementation costs such as salaries, travel expenses, and capital goods, which do not produce any transfers to producers, are not considered. These policies then need to be classified according to the nature of the services they provide either to individual producers (PSE), individual consumers (Consumer Support Estimate, or CSE), or to the sector as a whole (General Services Support Estimate, or GSSE). In Jamaica, even though budget expenditures are well detailed, such a classification is sometimes tricky. In the absence of detailed budget expenditure information, and to remain consistent with the 2012-14 PSE Report, the following rules were applied:

- For policies that support both individual producers (PSE) and the sector as a whole (GSSE), 50% of expenditures have been attributed to GSSE and 50%to PSE.

- If most expenditures of a selected policy can be defined as a budget transfer to individual producers, the entire policy is considered to support individual producers (PSE). In turn, if most expenditures of a selected policy can be defined as a budget transfer to the sector as a whole, the entire policy is considered to support the sector as a whole (GSSE).

15. Forestry and fishery support policies are thus excluded.

The **Total Support Estimate (TSE)** "represents the sum of all three components, adjusted for double-counting, given that the transfers associated with MPS policies appear in both the PSE and CSE calculation".

2.2. DATA DESCRIPTION AND ANALYSIS

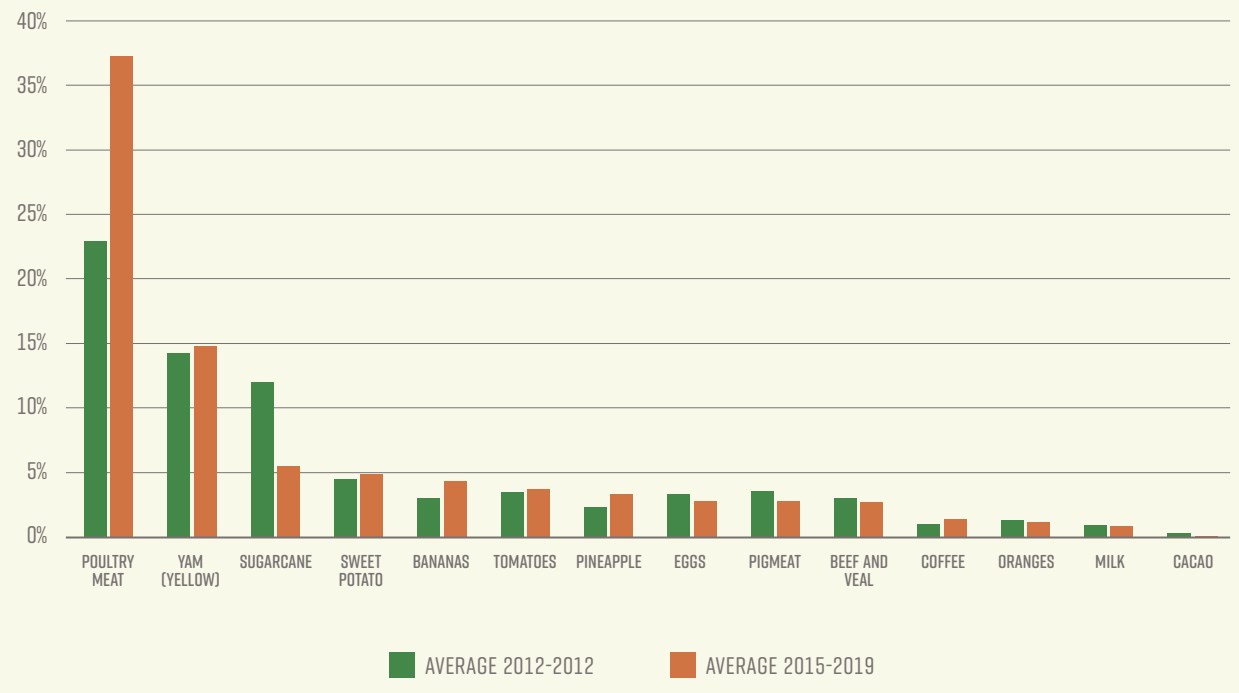
The data used in this analysis comes from different sources. The main ones are listed in **Table 4**.

TABLE 4: DATA SOURCES

DATA	MAIN SOURCES
VOLUMES OF PRODUCTION	MICAF AND STATIN
FARM-GATE PRICES	MICAF AND STATIN
REFERENCE PRICES	UN COMTRADE
TRADE DATA	MICAF, UN COMTRADE AND FAOSTAT
PUBLIC EXPENDITURES	MINISTRY OF FINANCE

In order to estimate the MPS, the OECD recommends selecting a basket of commodities representing at least 70% of the total value of agricultural production on average over the previous three years. **Figure 8** presents the list of selected commodities (or "MPS commodities") and their respective individual shares of the value of agricultural production both in the 2012-14 PSE Report (average 2012-14) and in the present analysis (average 2015-19). Between these two periods, the share of poultry meat has increased from 22.9% to 38.6%, while the share of sugarcane has dropped from 12% to 5.7%. Shares of other MPS commodities have remained relatively stable. Overall, while MPS commodities represented an average of 76% of the value of production over the period 2012-2014, they represent an average of 87% of the production value over the period 2015-2018.

FIGURE 8: AVERAGE SHARE OF SELECTED COMMODITIES TO TOTAL VALUE OF AGRICULTURAL PRODUCTION IN JAMAICA



Source: Author's estimations based on data from MICAF and STATIN.

2.3. RESULTS: LEVEL AND STRUCTURE OF SUPPORT TO PRODUCERS

The results of the PSE for Jamaica over the period 2015-2019 are presented in **Table 5**.

TABLE 5: SUPPORT ESTIMATE IN JAMAICA (2015-19)

INDICATORS		UNITS	2015	2016	2017	2018	2019
I.	**TOTAL VALUE OF PRODUCTION (AT FARM GATE)**	JMD MN	104,698	116,203	125,674	133,626	148,144
	I.1. OF WHICH, SHARE OF MPS COMMODITIES (%)	%	87.8	84.2	87.0	86.7	82.2
II.	**TOTAL VALUE OF CONSUMPTION (AT FARM GATE)**	JMD MN	122,123	133,238	147,640	157,496	180,740
	II.1. OF WHICH, MPS COMMODITIES	JMD MN	107,194	112,235	128,495	136,534	148,510
III.1	**PRODUCER SUPPORT ESTIMATE (PSE)**	JMD MN	39,565	44,039	51,058	56,051	55,372
	A. SUPPORT BASED ON COMMODITY OUTPUTS	JMD MN	36,355	40,535	47,814	53,440	52,716
	A1. MARKET PRICE SUPPORT	JMD MN	36,355	40,535	47,814	53,440	52,716
	BEEF AND VEAL	JMD MN	0	0	0	0	0
	BANANAS	JMD MN	321	2,550	745	1,501	138
	COFFEE	JMD MN	-1,465	-2,627	-1,411	-1,219	-1,205
	COCOA BEANS	JMD MN	-66	-91	-41	-12	-35
	EGGS	JMD MN	0	0	0	0	0
	MILK	JMD MN	68	188	243	353	280
	ORANGES	JMD MN	0	0	0	0	0
	PINEAPPLES	JMD MN	667	978	1,225	1,985	2,781
	PIGMEAT	JMD MN	0	0	0	0	0
	SWEET POTATOES	JMD MN	0	0	0	0	0
	POULTRY MEAT	JMD MN	26,579	31,141	36,716	34,489	32,395
	REFINED SUGAR	JMD MN	2,991	2,007	3,168	4,316	4,421
	TOMATOES	JMD MN	2,815	0	968	3,299	4,556
	YAM	JMD MN	0	0	0	1,616	0
	NON MPS COMMODITIES	JMD MN	4,444	6,390	6,200	7,113	9,384
	B. PAYMENTS BASED ON INPUT USE	JMD MN	3,210	3,504	3,244	2,612	2,656
	B1. VARIABLE INPUT USE	JMD MN	726	1,021	1,287	1,049	1,328
	B2. FIXED CAPITAL FORMATION	JMD MN	1,480	1,372	836	305	87
	B3. ON-FARM SERVICES	JMD MN	1,004	1,111	1,121	1,257	1,241
III.2	**PERCENTAGE PSE**	%	36.7	36.8	39.6	41.1	36.7
IV.	**GENERAL SERVICES SUPPORT ESTIMATE (GSSE)**	JMD MN	3,665	3,776	3,777	4,523	5,027
	H. AGRICULTURAL KNOWLEDGE AND INNOVATION SYSTEM	JMD MN	1,253	1,399	1,435	1,623	1,640
	H1. AGRICULTURAL KNOWLEDGE GENERATION	JMD MN	623	690	723	924	877
	H2. AGRICULTURAL KNOWLEDGE TRANSFER	JMD MN	629	709	712	699	763
	I. INSPECTION AND CONTROL	JMD MN	341	341	434	644	685
	I1. AGRICULTURAL PRODUCT SAFETY AND INSPECTION	JMD MN	118	90	26	11	7
	I2. PEST AND DISEASE INSPECTION AND CONTROL	JMD MN	223	252	407	632	678
	J. DEVELOPMENT AND MAINTENANCE OF INFRASTRUCTURE	JMD MN	2,022	1,979	1,849	2,193	2,636
	J1. HYDROLOGICAL INFRASTRUCTURE	JMD MN	17	124	172	222	512
	J2. STORAGE, MARKETING AND OTHER PHYSICAL INFRA.	JMD MN	1,660	1,445	1,194	1,379	1,504
	J3. INSTITUTIONAL INFRASTRUCTURE	JMD MN	281	342	410	510	534
	J4. FARM RESTRUCTURING	JMD MN	64	67	73	82	87
	K. MARKETING AND PROMOTION	JMD MN	43	45	47	50	54
	K1. COLLECTIVE SCHEMES FOR PROCESSING & MARKET	JMD MN	43	45	47	50	54
	M. MISCELLANEOUS	JMD MN	7	12	12	14	12
V.1	**CONSUMER SUPPORT ESTIMATE (CSE)**	JMD MN	-43,906	-49,850	-56,251	-61,344	-64,369
	O. TRANSFERS TO PRODUCERS FROM CONSUMERS (-)	JMD MN	-37,268	-43,235	-49,148	-54,373	-53,879
	O.1. OF WHICH, MPS COMMODITIES	JMD MN	32,712	36,420	42,775	-47,136	44,271
	P. OTHER TRANSFERS FROM CONSUMERS (-)	JMD MN	-10,719	-10,741	-12,562	-12,859	-16,367
	P.1. OF WHICH, MPS COMMODITIES	JMD MN	-9,409	-9,048	-10,933	-11,148	-13,448
	Q. TRANSFERS TO CONSUMERS FROM TAXPAYERS	JMD MN	4,081	4,126	5,459	5,889	5,877
Q.2.	**NON-COMMODITY SPECIFIC TRANSFERS TO CONSUMERS**	JMD MN	4,081	4,126	5,459	5,889	5,877
V.2	**PERCENTAGE CSE**	%	-37.2	-38.6	-39.6	-40.5	-36.8
VI.	**TOTAL SUPPORT ESTIMATE (TSE)**	JMD MN	47,311	51,941	60,294	66,464	66,277
	S. TRANSFERS FROM CONSUMERS	JMD MN	47,987	53,975	61,710	67,233	70,219
	T. TRANSFERS FROM TAXPAYERS	JMD MN	10,043	8,706	11,146	12,091	12,418
	U. BUDGET REVENUES (-)	JMD MN	-10,719	-10,741	-12,562	-12,859	-16,361
PERCENTAGE TSE (IN GDP)		%	2.9	2.9	3.2	3.3	3.1

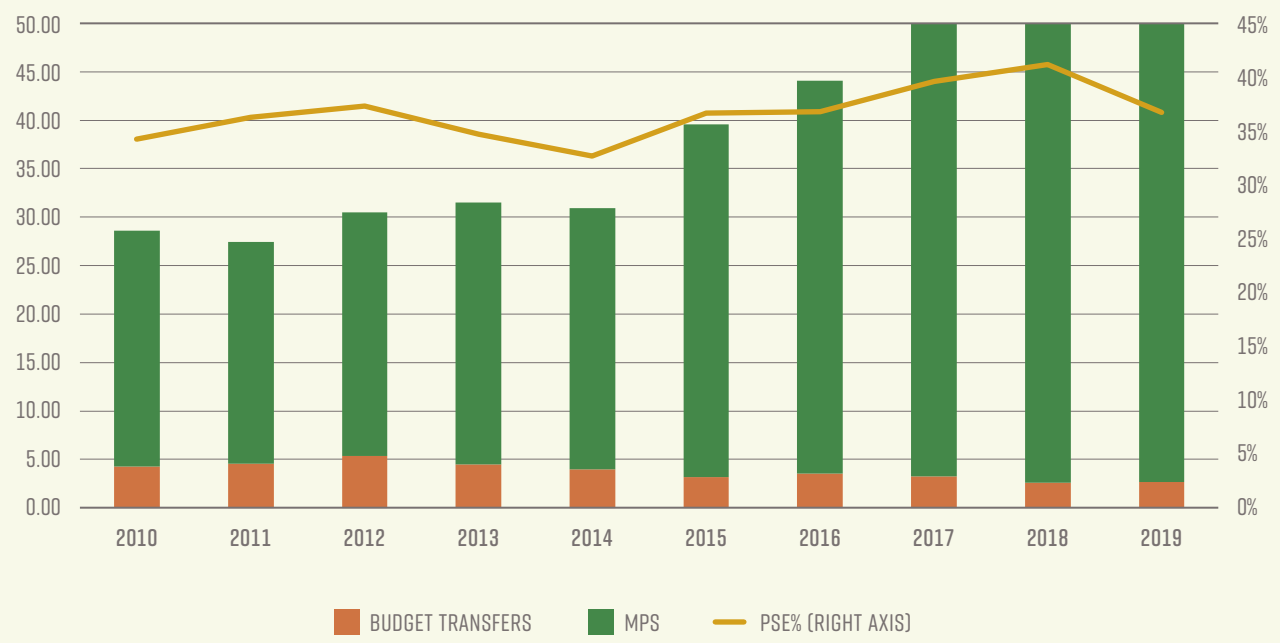
Source: Author's estimations.

2.3.1. ESTIMATES OF SUPPORT TO INDIVIDUAL PRODUCERS

Transfers to individual producers (PSE) reached 55 billion JMD in 2019 **(Table 5)**.

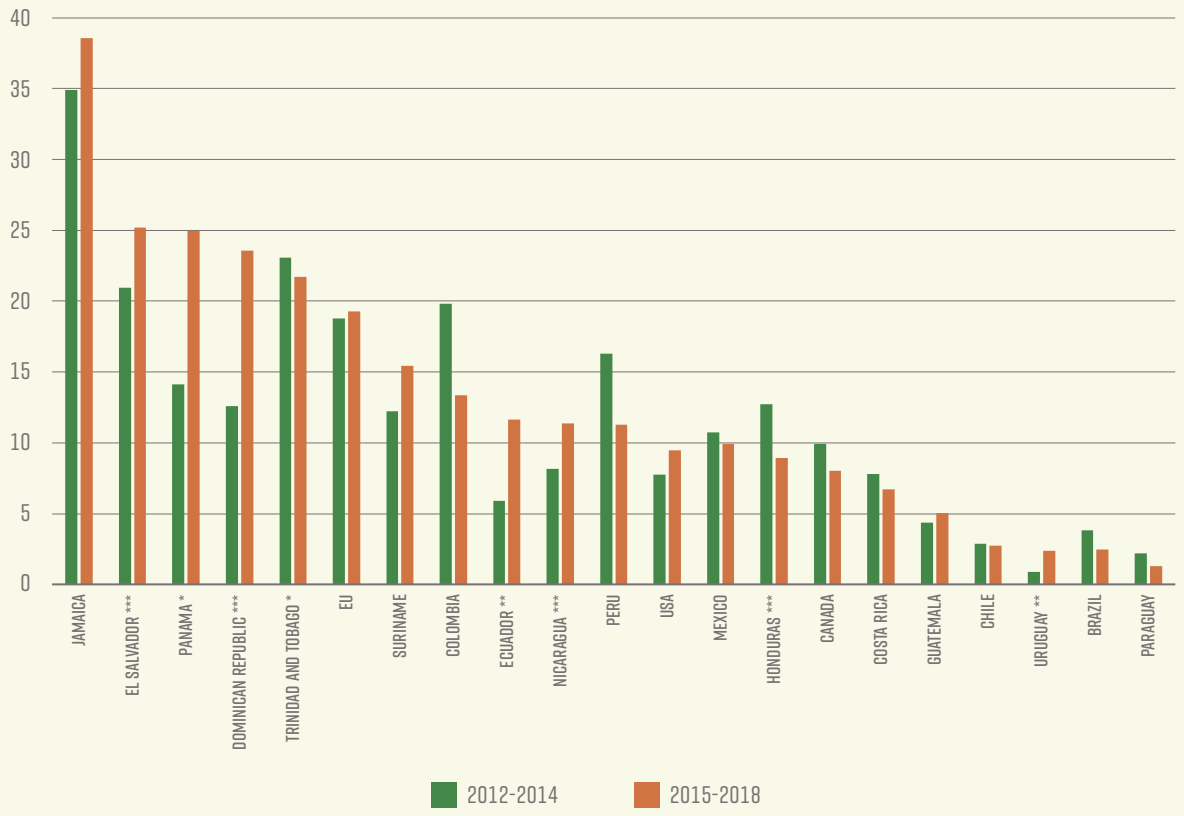
Between 2015 and 2019, the main PSE component in Jamaica remained the MPS **(Figure 9)**. While it represented, on average, 85% of the national PSE between 2012 and 2014, it rose to 94% between 2015 and 2019, despite its potential distorting effects on markets and trade. The percentage PSE (%PSE; the support to producers expressed as a share of gross farm receipts) slightly increased from an average of 34.9% between 2012 and 2014 down to 38.2% between 2015 and 2019. Relative to other countries, Jamaica's PSE% remains high **(Figure 10)**.

FIGURE 9: PSE COMPOSITION IN JAMAICA (2010-2019)



Source: Author's estimations.

FIGURE 10: %PSE IN JAMAICA AND OTHER COUNTRIES (AVERAGE VALUES FOR 2012-2014 AND 2015-2018)

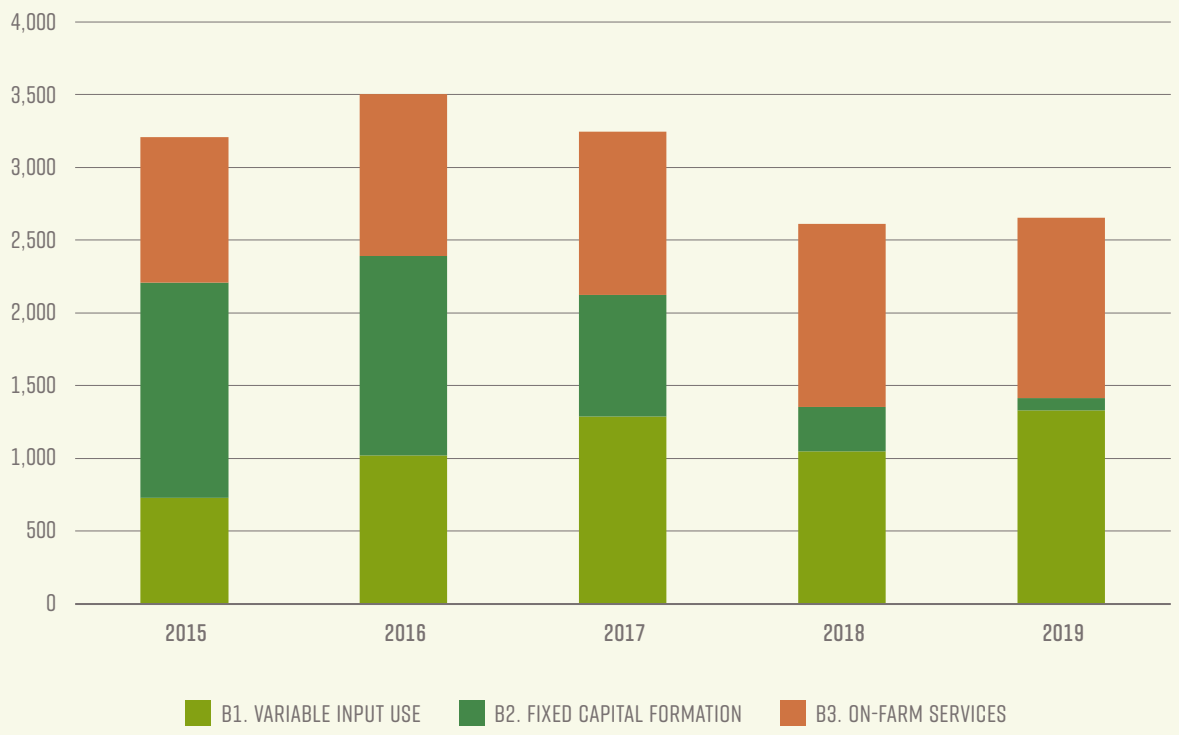


Source: Author's estimations.

* For 2015-18, only 2015
** For 2015-18, average of 2015 and 2016
*** For 2015-18, average of 2015, 2016 and 2017

Conversely, budget transfers to individual producers (expressed in current value) decreased by 17% between 2015 and 2019. On average, between 2015 and 2019, 36% of these budget transfers went to individual producers in the form of variable input subsidies **(Figure 11)**, which are considered some of the most distorting by the OECD because they directly affect production costs and thus producers' production decisions. The rest of budget transfers to individual producers went to support fixed capital formation (27%), mainly in the form of grants to the Sugar Transformation Unit, and on-farm services (38%) through MICAF's extension services **(Figure 11)**.

FIGURE 11: BUDGET TRANSFERS TO INDIVIDUAL PRODUCERS, IN MILLION JMD



Source: Author's estimations.

2.3.2. ESTIMATES OF SUPPORT TO INDIVIDUAL PRODUCERS BY COMMODITY

The level of support to individual producers by commodity is measured first by the MPS and then by the single commodity transfer (SCT), which shows the level of commodity-specific support provided through price support policies (MPS) and budgetary transfers. As illustrated in **Table 6**, between 2015 and 2019, the poultry subsector continued to receive most of the MPS (69.9%), followed by the sugar subsector, whose share in the national MPS remained significant (7.3%) but lower than in 2012-14 (12.4%). The cocoa and coffee subsectors remained implicitly taxed. The tomato, pineapple, banana, and milk subsectors received higher price support in 2015-2019 than in 2012-2014. Subsectors such as pig, beef, and oranges, on the other hand, continued to receive no MPS at all.

TABLE 6: MARKET PRICE SUPPORT PER COMMODITY IN JAMAICA (2010-19)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	% IN NAT'L MPS 2012-14	% IN NAT'L MPS 2015-19
POULTRY MEAT	11,773	14,601	15,076	16,147	18,994	26,579	31,141	36,716	34,489	32,395	60.6%	69.9%
REFINED SUGAR	1,781	3,306	4,706	3,959	1,896	2,991	2,007	3,168	4,316	4,421	12.4%	7.3%
TOMATOES	452	0	0	178	684	2,815	0	968	3,299	4,556	1.0%	5.0%
PINEAPPLE	0	0	0	0	0	667	978	1,225	1,985	2,781	0.0%	3.3%
BANANAS	115	0	276	139	0	321	2,550	745	1,501	138	0.4%	2.3%
MILK	29	15	115	0	0	68	188	243	353	280	0.1%	0.5%
YAM	244	0	0	0	0	0	0	0	1,616	0	0.2%	0.7%
SWEET POTATOES	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
PIG MEAT	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
ORANGES	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
EGGS	0	0	0	496	0	0	0	0	0	0	0.4%	0.0%
BEEF AND VEAL	385	65	0	0	0	0	0	0	0	0	0.4%	0.0%
COCOA	-83	-30	-69	72	-96	-66	-91	-41	-12	-35	-0.2%	-0.1%
COFFEE	-826	-771	-685	-914	-835	-1,465	-2,627	-1,411	-1,219	-1,205	-3.2%	-3.4%
OTHER MPS	10,496	5,695	5,716	6,946	6,334	4,444	6,390	6,200	7,113	9,384	27.8%	14.5%

Source: Author's estimations.

The MPS indicator, however, must be interpreted with care. While its intent is primarily to capture policy effects on agricultural producers and consumers, it does also capture implicit non-policy effects such as:

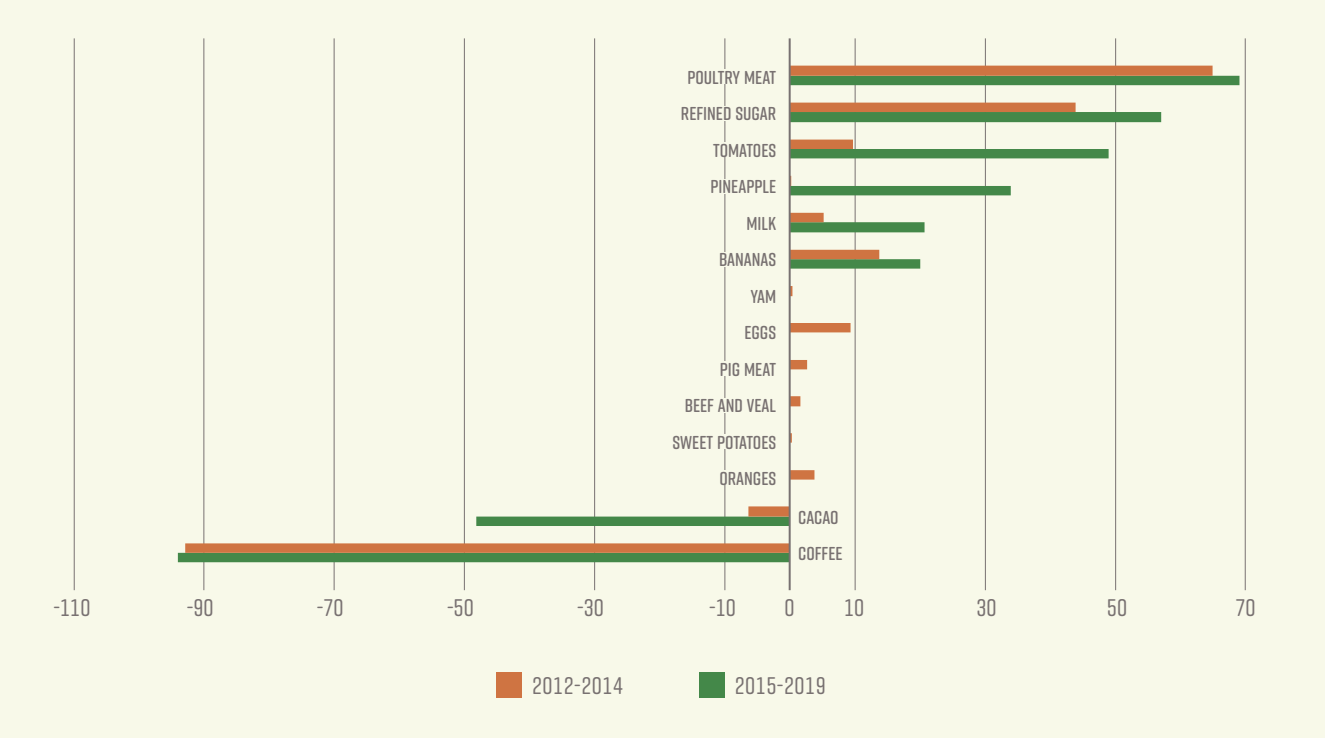
- **Changes in the exchange rate**, which are a significant source of fluctuations in the MPS in a context of weak price transmission. The continuous depreciation of the JMD against the US$, which occurred between 2015 and 2019, is indeed likely to have been a significant contributor to yearly fluctuations in the MPS (beyond changes in world market prices).
- **Lack of physical infrastructures** such as rural roads, irrigation, and drainage systems, and storage facilities, which all drive up production and transport costs.
- **Limited technology in the processing industry**, which constrains value addition in the sector.

- **Low levels of production concentration and value chain organization** create information asymmetries and lower producers' bargaining power, which lowers the prices they receive and increases margins for intermediaries

The PSE's price gap method is based on the underlying principle of comparing "like with like" prices, which requires adjustments for weight and quality, but also for marketing margins (processing, transportation, and handling costs).[16] However, in the absence of detailed marketing margin information, it is not easy to factor in all these value chain characteristics into the calculations, which may, in turn, distort the MPS estimates. One should take that into account when interpreting the MPS.

The banana and sugar subsectors were the only ones to receive commodity-specific support through budgetary transfers between 2015 and 2019. For the remaining subsectors, the SCT equals the MPS. As presented in **Figure 12**, between 2015 and 2019, the average SCT ranged from +69% for the poultry subsector to -94% for the coffee subsector.

FIGURE 12: PRODUCERS SCT IN JAMAICA (%)



Source: Author's estimations.

16. OECD (2010). OECD's Producer Support Estimate and Related Indicators of Agricultural Support (The PSE Manual). Paris, France.

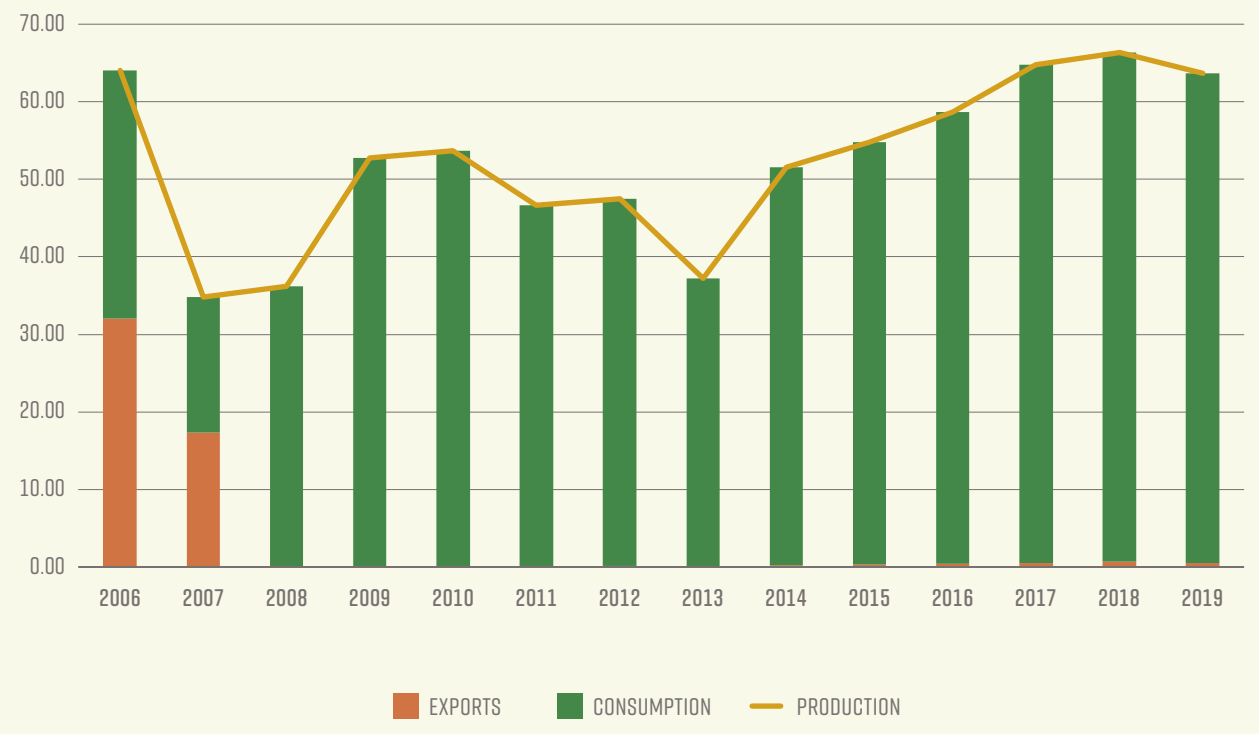
The MPS and SCT indicators are interpreted in more depth in the rest of this section.

2.3.2.1. BANANA SUBSECTOR POLICY

As stated in Vision 2030, the GOJ's vision for the banana subsector is that of "a vibrant industry dominated by internationally certified farms; effective market penetration and development; and supported by an enabling policy framework which results in sustained product competitiveness; financially viable farms and the socio-economic wellbeing of communities".

Over the period 2015-2018, the banana subsector represented 4% of Jamaica's annual agriculture production value, on average. It has grown to become Jamaica's fifth-largest agricultural subsector in terms of value after poultry, yam, sugarcane, and sweet potatoes. In terms of annual production volume, it has significantly increased (+29%) over that same period **(Figure 13)** and has reached its 2006 level again.

FIGURE 13: BANANA PRODUCTION, EXPORTS AND CONSUMPTION (2006-2019), IN TONS



Sources: MICAF and STATIN.

The sharp decline in banana production observed between 2006 and 2008 was due to the Sigatoka disease and two major natural disasters which struck Jamaica at the time: Hurricane Dean in 2007, which led to an estimated loss of 525 million JMD in the subsector and the destruction of 2,359 hectares of banana crops (more than half of the total estimated area occupied by banana crops) followed by Hurricane Gustav in 2008, with equally devastating consequences.[17] In the aftermath of these events, a new National Banana Policy (2009) was elaborated, which put a new strong emphasis on domestic markets. It sought to "ensure that the strong local demand for bananas, with significant potential for growth, will be satisfied by the output of local producers and that a standardized and certified industry will avail access to viable export markets".[18] As illustrated in **Figure 13**, between 2018 and 2019, Jamaica was able to reach again the production level it had back in 2006. However, in line with the new subsector policy objective, the distribution between exports and domestic consumption has shifted. Indeed, while half of the production had been exported back in 2006 (32,000 tons), less than 1% was exported in 2019 (544 tons), and the remaining 99% were consumed domestically.

The Banana Board is the subsector's regulatory body, in charge of promoting the interest and development of the subsector. It is primarily is responsible for:

- **Setting standards of best practice**s, facilitating farmers' compliance with them, and certifying farmers.
- **Undertaking Research & Development (R&D) and extension activities in the subsector**: The Board has an Applied Research Station, a Banana Breeding Station (with a banana germplasm collection), as well as extension officers on the field.
- **Granting export and import permits**.
- **Administering the Banana Industry Catastrophe Fund** (a public insurance scheme financed by the voluntary contribution of farmers).

Since 2013, the Banana Board and its activities have been supported by the EU-financed Banana Accompanying Measures (BAMS) project. It is estimated that this project supplied over 43% of the Banana Board's annual budget, on average, while MICAF provided the rest.[19]

17. Bailey, J. (2017). Post-JBAMS' Sustainability Models. Banana Board Consultancy.

18. Ibid.

19. Bailey, J. (2017). Post-JBAMS' Sustainability Models. Banana Board Consultancy.

The BAMS project, implemented by RADA, ended in 2018. As described in **Annex 1**, its objective was to combat poverty and improve revenue in the banana-dependent areas through improvements in the productivity and resilience of small farmers and the strengthening of the link between small farmers and markets. It aimed not only at supporting the rehabilitation of the subsector in the aftermath of the 2006-2008 crises but also to address some deeper subsector trends such as the decline in both output and competitiveness, which has been taking place since the mid-1990s.

Concerning price transfers, banana farmers have consistently received higher prices than they would have gotten in the absence of any public policy (positive MPS), which is consistent with explicit public policies in place at the time (significant tariffs and duties for banana imports, in particular, as described in **Table 3**). Nevertheless, this difference was never significant, except in 2016. The larger MPS in 2016 could be explained by the depreciation of the JMD against the US$, which was significant that year, and might have exacerbated fluctuations in the MPS.

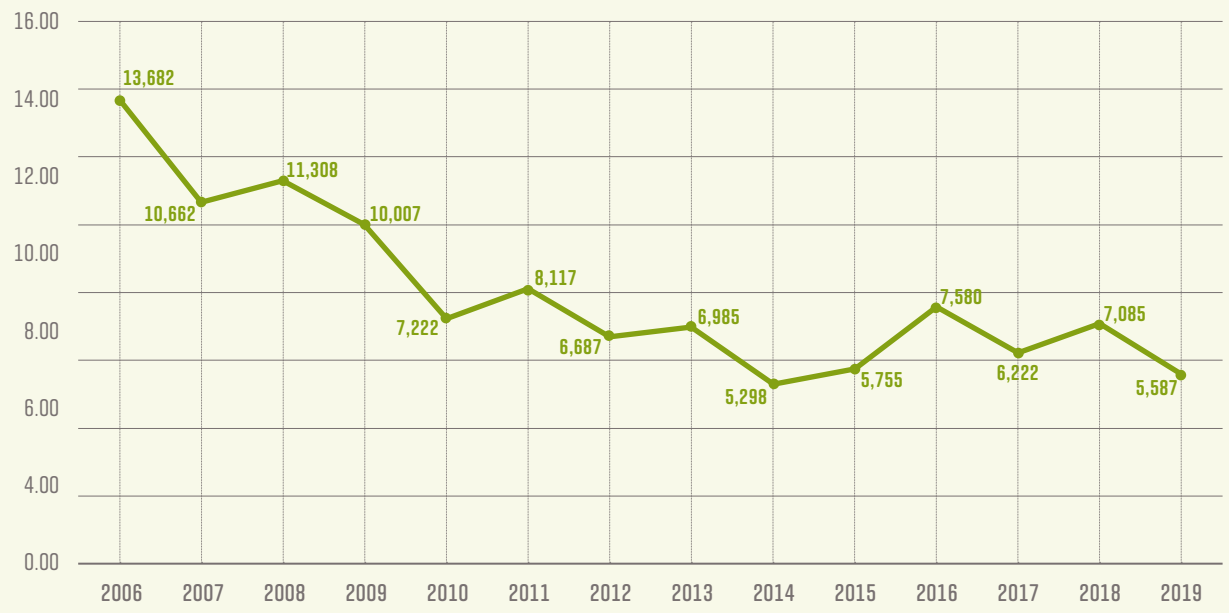
Overall, support estimates over the period 2015-2019 (positive SCT) indicate that the banana subsector policy's effects are slightly positive from producers' point of view.

2.3.2.2. COFFEE SUBSECTOR POLICY

Jamaica's 2013/14 coffee production level was the lowest since 1988/89, mainly because of the coffee leaf rust disease and low prices on the international market.[20] Between 2015 and 2019, the annual volume produced was slightly higher and remained relatively stable over the period **(Figure 14)**.

20. Shik, O., Boyce, R. and De Salvo, C. P. (2017). *Analysis of Agricultural Policies in Jamaica*. IDB.

FIGURE 14: COFFEE (CHERRY) PRODUCTION (2006-2019), IN TONS



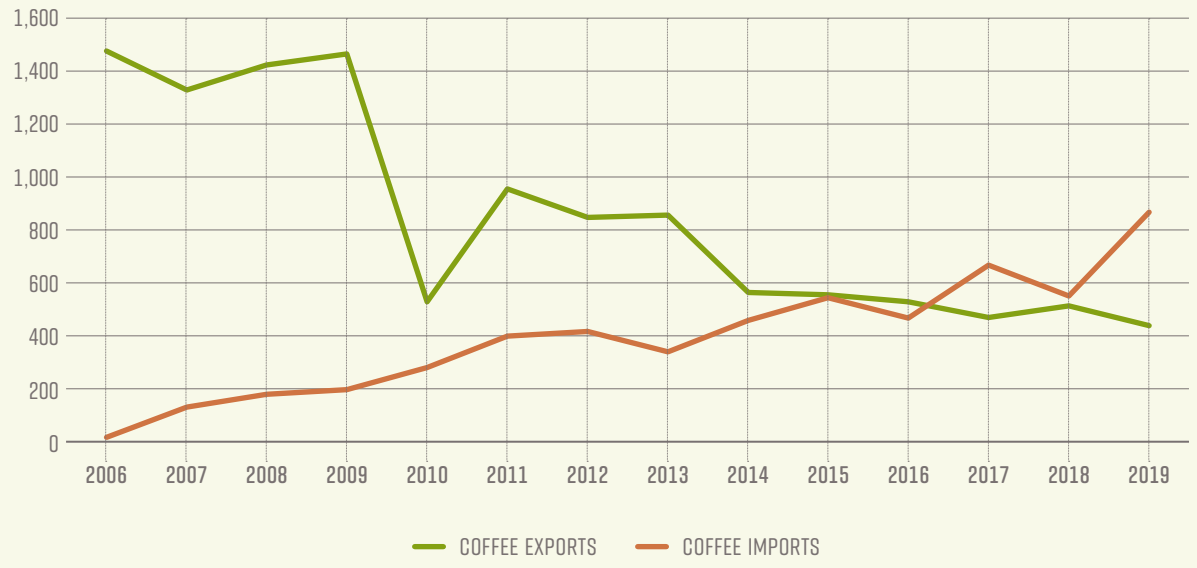
Source: MICAF.

Between 80 and 90% of Jamaica's coffee is cultivated in the Blue Mountains. The highest quality coffee, labeled the Jamaica Blue Mountain (JBM), grows at elevations higher than 900 meters.[21] Over 80% of its production is exported to Japan, Jamaica's primary coffee trading partner.[22] Over the period 2015-2019, exports of coffee have decreased by 21%, while imports have remained on an upward trend **(Figure 15)**.

21. Coffee cultivated between 450 and 900 meters is called High Mountain and coffee cultivated below 450 meters is called Supreme or Low Mountain coffee.

22. Guido, Z. et al. (2018). *The Stresses and Dynamics of Smallholder Coffee Systems in Jamaica's Blue Mountains: a Case of the Potential Role of Climate Services*. Climate Change (2018) 147:253-266.

FIGURE 15: GREEN COFFEE (I.E., NOT ROASTED) EXPORTS AND IMPORTS (2006-2019), IN TONS



Source: MICAF.

JBM's high-quality reputation is such that Jamaica has earned the world's highest unit price for its coffee exports for decades.[23] These high prices, however, have also been extremely variable. Between 2015 and 2017, for instance, the export price of JBM increased by 100%, bringing farm-gate prices to levels higher than ever before, before collapsing by approximately 50% in late 2017.[24] In this context, MICAF proposed in 2017 the introduction of a new import tax (called a "cess") on green coffee beans (US$ 1.41 per kilogram) and coffee-derived finished goods such as instant coffee (US$ 2.4 per kilogram) in an attempt to incentivize production for the domestic market. The cess was implemented in 2018. In addition, MICAF promulgated new blending regulations in an attempt to help non-JBM producers, who generally receive lower prices and institutional support than JBM producers. Those blending regulations require that "no imported coffee shall be processed, roasted or packaged for sale in its pure form without a minimum percentage of locally produced coffee" and are enforced by JACRA.[25]

23. Daly, J., Hamrick, D., Bamber, P. and Fernandez-Stark, K. (2018). *Jamaica in the Arabica Coffee Global Value Chain*. Duke University – Global Value Chains Center.

24. http://www.jamaicaobserver.com/business-observer/coffee-exporters-seek-budgetary-support-for-industry-blue-mountain-brand-took-a-beating-in-japan_182471

25. http://jamaica-gleaner.com/article/business/20171025/coffee-processors-expect-new-look-trade-regulatory-upgrade

Over 2015-2019, the coffee value chain has remained heavily regulated, first by the Coffee Industry Board (CIB) and then, starting from 2018, by the newly created JACRA. The **responsibilities** of both entities have been similar:

- Setting quality standards and certifying compliance.
- Licensing of all the subsector's stakeholders.
- Advisory services or technical support to coffee producers.

While it remains too early to assess the effectiveness of JACRA, the following **observations** can be made about CIB:

- CIB's long history of setting quality standards for growing, harvesting, and processing Jamaican coffee and monitoring compliance has played a key role in maintaining its high-quality reputation and high prices.[26]
- The flip side of these regulations is that they tend to restrict small farmers' access to activities that generate value-added (especially in the case of non-JBM coffee producers). For instance, processing or roasting coffee requires a Coffee Dealer License, whose main prerequisite is a production capacity of at least 6,000 boxes of coffee cherries per year (one box contains about 27 kilograms of coffee cherries), a volume well beyond most farmers' production capacity.[27]
- In addition, following the privatization of CIB's commercial arm, its funding was reduced at the expense of extension and training activities. In 2018, for instance, CIB only had three extension officers.[28]

26. Daly, J., Hamrick, D., Bamber, P. and Fernandez-Stark, K. (2018). *Jamaica in the Arabica Coffee Global Value Chain*. Duke University – Global Value Chains Center.

27. https://gcrmag.com/jamaicas-shades-of-blue/

28. Guido, Z. et al. (2018). *The Stresses and Dynamics of Smallholder Coffee Systems in Jamaica's Blue Mountains: a Case of the Potential Role of Climate Services*. Climate Change (2018) 147:253-266.

CIB then JACRA have been financed by different taxes (also referred to as "cess") paid by all the subsector's stakeholders: producers, processors, manufacturers, exporters, and, more recently (as described above), importers. Export cess range from US$ 0.18 (for the lowest grade coffee) to US$ 0.52 per kilogram (for JBM). On the other hand, industry cess range from 53 JMD to 91 JMD per box of cherry coffee produced or purchased.[29]

CIB then JACRA's extensive market interventions are likely to be one of the main factors behind the implicit taxation of coffee farmers, as evidenced by the subsector's negative MPS. As described in more detail in **Annex 2**, there are also non-policy factors at play, such as the coffee value chain's organizational inefficiencies.

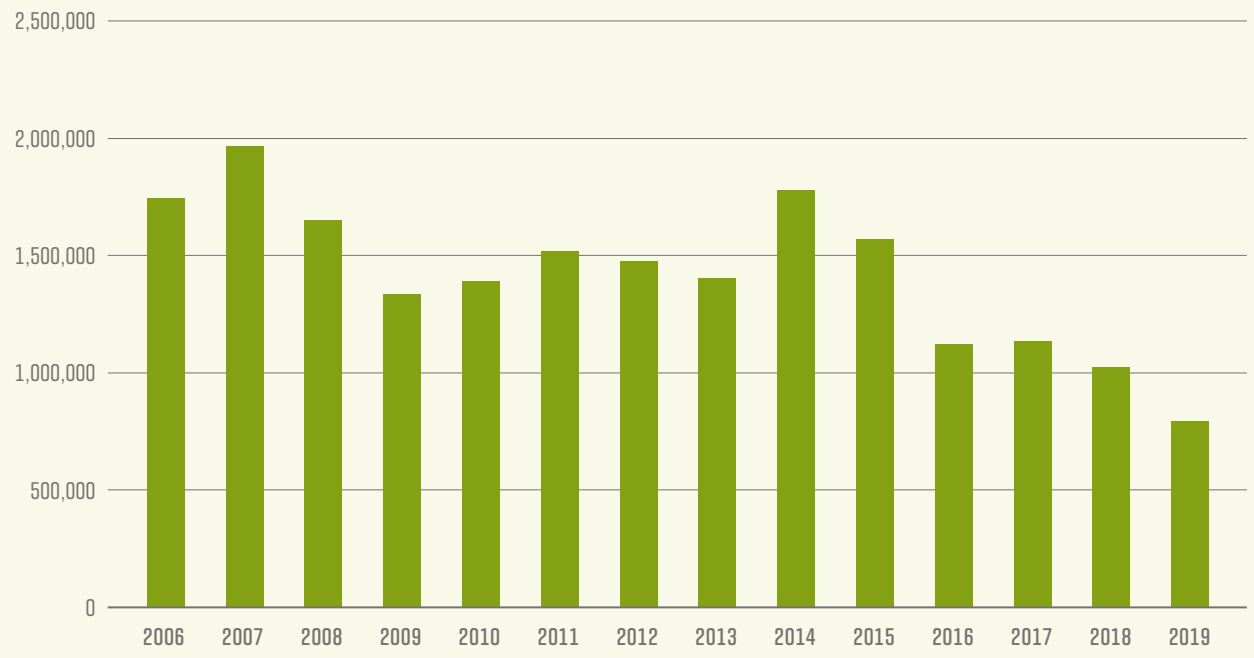
Overall, support estimates indicate that, over the period 2015-2019, the coffee subsector policy's effects, combined with non-policy factors, have remained significant sources of disincentives for coffee producers in Jamaica (negative SCT).

2.3.2.3. SUGAR SUBSECTOR POLICY

Jamaica's 2013/14 coffee production level was the lowest since Between 2015 and 2019, Jamaica's sugar subsector remained on a strong downward trend. Sugarcane production decreased by 50% **(Figure 16)**, and raw sugar exports dropped significantly both in terms of volume (-71%; **Figure 17**) and value (-78%). Raw sugar went from being Jamaica's number one agricultural export, a rank it held for decades, to number four in 2019.

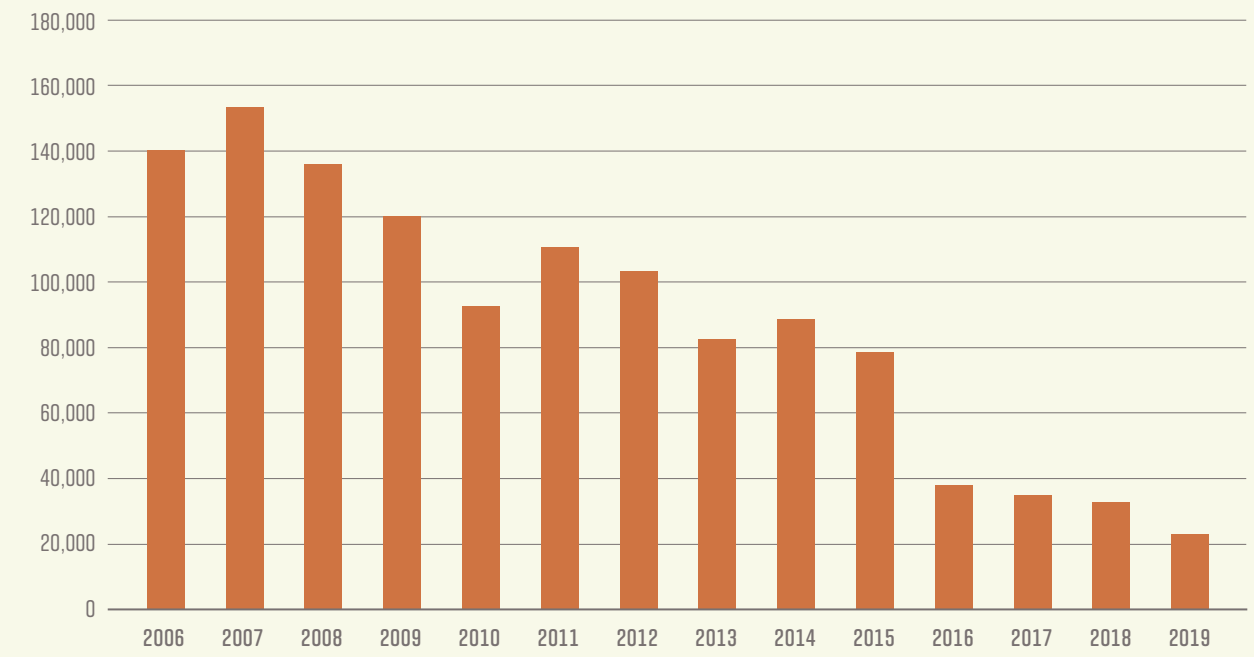
29. https://japarliament.gov.jm/attachments/article/530/The%20Jamaica%20Agricultural%20Commodities%20Regulatory%20Authority%20(Cess)%20Regulations,%202018.pdf

FIGURE 16: SUGARCANE PRODUCTION (2006-2019), IN TONS



Source: Sugar Industry Authority (SIA).

FIGURE 17: RAW SUGAR EXPORTS (2006-2019), IN TONS



Sources: SIA and FAOStat.

There are several factors associated with the decline of this subsector, such as low productivity (-16% between 2015 and 2019, from 56 tons per hectare in 2015 down to 47 tons per hectare in 2019)[30], decreasing area harvested (-43% between 2015 and 2019, from 29,700 hectares in 2015 down to 15,700 hectares in 2019)[31], processing inefficiencies, and the loss in 2009 of preferential access to the EU market (which led to a 36% cut in the price of raw sugar exports to the EU). These different factors are discussed in more detail in the sugar value chain analysis presented in **Annex 2**.

Since 1970, the subsector has been regulated and controlled by the Sugar Industry Authority (SIA), which, among other things, is responsible for:

- Setting standards of production, delivery, and quality.
- Monitoring, testing (quality, in particular), and certifying.
- R&D, through its Sugar Industry Research Institute (SIRI), renamed the Research Division in 2016 (SIARD).
- The marketing of sugar and molasses.

The SIA is funded, primarily, by a cess levied on manufacturers of sugar (6,100 JMD per ton of sugar produced).

The main policy document for the subsector is the Jamaica Country Strategy for the Adaptation of the Sugar Industry (2006-2020), which was approved in 2008 in anticipation of the loss of preferential access to the EU market. According to the GOJ, its main goals are "to develop and maintain a sustainable private sector-led sugar cane industry; and to strengthen the economic diversification, social resilience and environmental sustainability of sugar dependent areas".[32] A strong policy emphasis was put on "diversification", by which MICAF envisioned an expansion of the sugar industry beyond just sugar (understood as processed raw sugar), in new avenues to value creation such as biofuel (ethanol), rum (made from distilled molasse) and other cane-derived alcoholic products.[33]

30. SIA.

31. FAOStat.

32. https://jis.gov.jm/cabinet-approves-revised-country-strategy-for-the-sugar-industry/

33. https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Sugar%20Annual_Kingston_Jamaica_04-15-2020

In 2007 the Sugar Transformation Unit (STU) was established to oversee the effective implementation of this Strategy, with funding from the EU. Until 2018, the STU was responsible for implementing the EU-funded Sugar Transformation Programme (described in **Annex 1**). Over the period of study, capital expenditures by the STU amounted to over 6 billion JMD (approximately US$ 45 million, in 2019 US$).

The Cane Expansion Fund (CEF) was launched in 2008 with the objective "to provide capital injection by way of loans and grants to the sugarcane sector to boost productivity and strengthen the commercial competitiveness of the industry".[34] Between 2008 and 2015, the CEF, managed by the SIA, is estimated to have disbursed some 2 billion JMD in concessionary loans and grants to cane farmers.[35] The CEF continued to operate between 2015 and 2019, despite concerns about inefficiencies in allocating loans.[36]

With respect to trade policy, licenses from the SIA continue to be required to export raw sugar. Imports of refined sugar for the retail market are handled directly by the SIA and are heavily taxed **(Table 3)**. The local retail price of refined sugar is also set by the SIA, based on historical prices.[37] However, refined sugar for manufacturing products such as beverages can be imported directly by manufacturers and duty-free. The latter category represents the majority of Jamaica's imports of refined sugar.

Overall, support estimates indicate that, over the period 2015-2019, the sugar subsector has continued to receive significant public support through both budgetary and price transfers. The subsector's MPS, in particular, is very high. The policy effort to preserve Jamaica's sugar industry has been defended based on social welfare considerations, primarily. It has been estimated, for instance, that some 200,000 people all around Jamaica derive their income directly and indirectly from this industry. However, this policy has not only become increasingly costly for both taxpayers and consumers but has also failed to prevent the subsector's continuous decline.

34. https://www.jamaicasugar.org/background.html

35. http://jamaica-gleaner.com/article/news/20160629/auditor-general-makes-bitter-findings-cane-loan-fund-management

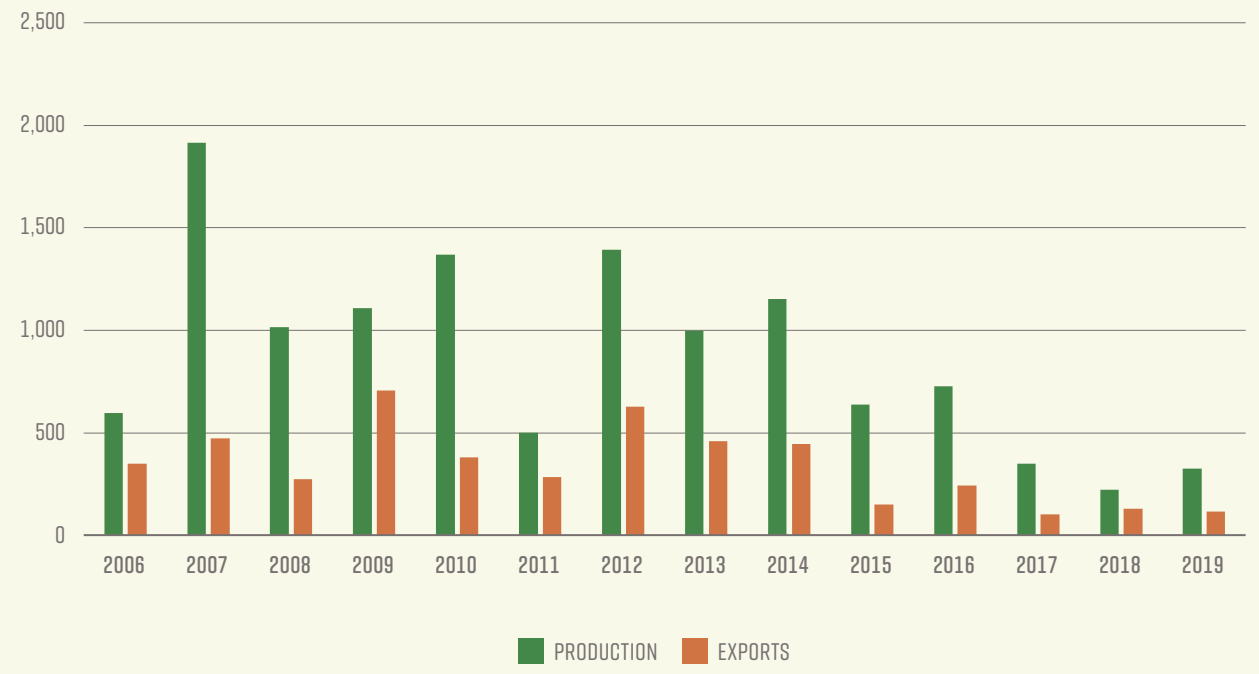
36. http://jamaica-gleaner.com/article/commentary/20160702/editorial-eu-wants-answers

37. https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=Sugar%20Annual_Kingston_Jamaica_4-15-2019.pdf

2.3.2.4. COCOA SUBSECTOR POLICY

Between 2015 and 2019, Jamaica's cocoa subsector declined. Production dropped by 49% and exports by 23% **(Figure 18)**.

FIGURE 18: COCOA PRODUCTION AND EXPORTS (2006-2019), IN TONS



Source: MICAF.

The world cocoa market makes a distinction between "fine and flavor" cocoa beans and "bulk" or "ordinary" cocoa beans. According to the International Cocoa Organization (ICCO), approximately 95% of Jamaica's cocoa exports consist of "fine and flavor" cocoa. The "fine and flavor" cocoa market is small, with a few specialized players, and its price is higher than "bulk" cocoa but also more volatile. While the premium for "fine and flavor" cocoa was narrowing in the nineties, it is now growing again due to the increasing demand for high-quality chocolate.[38]

38. https://www.icco.org/fine-or-flavor-cocoa/

Despite having access to this niche market, Jamaica's cocoa industry has been declining over the past 15 years for different reasons such as:

- Ageing cocoa trees, lack of tree maintenance and disease infestations.[39]
- Natural disasters (hurricanes, in particular) followed by insufficient recovery support.
- Excessive market interventions, which disincentivized production and investment in the subsector.[40]

These different factors are discussed in more detail in the cocoa value chain analysis presented in **Annex 2**.

Between 2015 and 2017, the Cocoa Industry Board remained a major player within the cocoa value chain. Established in 1957, the Cocoa Industry Board was not only responsible for regulating the subsector and providing technical support to farmers, but it was also operating a cocoa farm as well as four fermentaries throughout the country to process wet cocoa beans, setting cocoa's farm-gate price, and acting as the sole marketing agent for dried fermented cocoa beans.[41] However, the decline in production made it increasingly difficult for the activities of the Cocoa Industry Board to remain economically viable. The lack of funds dedicated to maintenance and investments, in particular, negatively impacted its competitiveness and ability to maintain high-quality standards.[42] In 2018, the Cocoa Industry Board was dismantled as part of a policy effort to open up the subsector and encourage private investment. Its regulatory and monitoring functions were transferred to JACRA, the process to privatize its commercial assets (initiated in 2014) was intensified by the DBJ, and the commercialization of cocoa was partly deregulated.[43]

39. Bedasse, J. (2017). *Assessment of the Vulnerability of Jamaica's Agricultural Sector to the Adverse Consequences of Severe Weather Events*. Inter-American Institute for Cooperation on Agriculture (IICA).

40. Ruf, F., O., and Tschannen, A. (2009). *Why and How to Re-Launch the Cocoa Sector in Jamaica?* CIRAD / USAID.

41. Fermentaries were located in Hanover, St Mary, Clarendon and Kingston.

42. Ruf, F., O., and Tschannen, A. (2009). *Why and How to Re-Launch the Cocoa Sector in Jamaica?* CIRAD / USAID.

43. http://dbankjm.com/uncategorized/privatisation-of-the-commercial-assets-of-the-cocoa-industry-board-cib/

Some commercial functions of the Cocoa Industry Board were transferred to MICAF's Export Division. As of 2019, the Export Division continues to buy, transform, and sell (and export) cocoa but must this time compete with the private sector.

The Cocoa Industry Board, and then JACRA, have been financed by different cess: an export cess equivalent to 2% of the value of the export shipment; a cess on the import of finished goods of US$ 0.22 per kilogram; and an industry cess of 55 JMD per box of cocoa produced.[44]

In 2016, an outbreak of Frosty Pod Rot (FPR) disease was reported in Clarendon. It is a disease caused by an airborne fungus, which spreads rapidly (especially during droughts) and can reduce cocoa yields by up to 80%.[45] In 2018, the GOJ allocated 200 million JMD to an FPR management project, which included, among other activities, chemical control, surveillance as well as research and evaluation.[46]

Different donor-financed projects also invested in the cocoa subsector:

- **The Jamaica Rural Economy and Ecosystems Adapting to Climate Change II** (JA REEACH II; described in **Annex 1**) financed by the US Agency for International Development (USAID; US$ 12 million) and implemented by ACDI/VOCA between 2015 and 2019. This project trained 50 farmers in post-harvest processing (in line with national and international standards) with respect to cocoa.

- **The Rural Economic Development Initiative** (REDI; described in Annex 1) financed by the World Bank (US$ 17.5 million) and implemented by the Jamaica Social Investment Fund (JSIF) until its closure in 2017. Concerning cocoa, this project financed a cocoa drying facility worth 21.3 million JMD (approximately US$ 164,000, in 2018 US$).

Between 2015 and 2019, cocoa farmers continued to receive lower prices than they would have received in the absence of policy interventions (negative MPS). This implicit taxation is the result, to a large extent, of price regulations by the Cocoa Indus-

44. https://japarliament.gov.jm/attachments/article/530/The%20Jamaica%20Agricultural%20Commodities%20Regulatory%20Authority%20Regulations,%202018—h.pdf

45. http://www.jamaicaobserver.com/agriculture/jamaica-agricultural-commodities-regulatory-authority-injects-4-million-in-cocoa-industry_205300?profile=1442

46. http://jamaica-star.com/article/news/20200618/agriculture-ministry-allocates-141-million-safeguard-cocoa-banana-industries

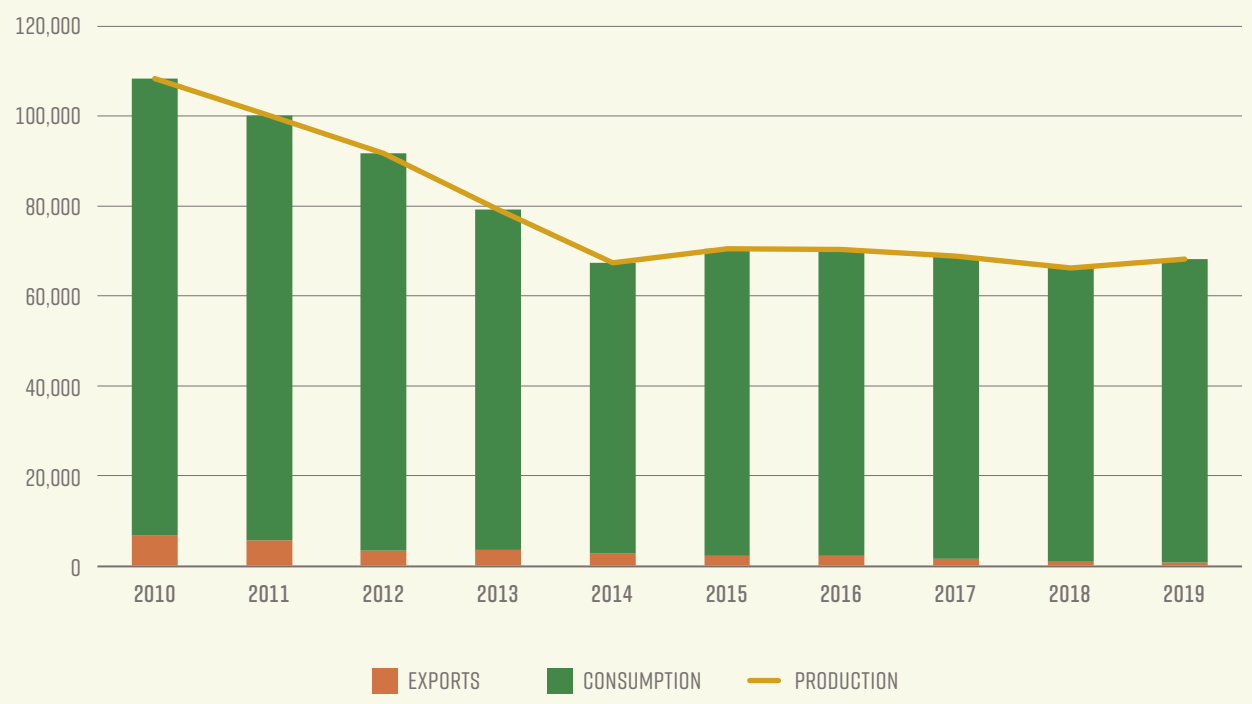
try Board, which have disrupted price transmission at the farm-gate level.[47] As of 2019, it is too early to assess the impact of the dismantling of the Cocoa Industry Board on the subsector.

Overall, support estimates indicate that, over the period 2015-2019, the cocoa subsector policy's net effect has remained a significant source of disincentives for cocoa producers in Jamaica (negative SCT).

2.3.2.5. ORANGES SUBSECTOR POLICY

Sweet oranges, or oranges, represent over 90% of the volume of citrus crops produced in Jamaica (which also include grapefruit, ortanique, and ugli). Over the period 2015-2019, the production of sweet oranges decreased by 6%. Exports dropped significantly (-71%), while domestic consumption remained quite stable (-1%; **Figure 19**).

FIGURE 19: ORANGES PRODUCTION, EXPORTS AND CONSUMPTION (2010-2019), IN TONS



Source: MICAF.

47. Ruf, F., O., and Tschannen, A. (2009). *Why and How to Re-Launch the Cocoa Sector in Jamaica?* CIRAD / USAID.

This decline, and more generally the decline of the entire citrus subsector, began in 2010 with the discovery of the citrus greening disease. In the absence of a cure and in a context where over 90% of the industry consists of small farmers with limited resources, disease management has proved challenging. In 2014, MICAF developed an integrated management response program with the support of FAO, which involved, among other things, the clustering of citrus farmers and the requirement to use "only certified citrus plants produced in covered nurseries".[48] Between 2015 and 2019, MICAF also supported the subsector by maintaining a germplasm collection at the Bodles Research Station and through the Production Incentive Program, whereby 15 million JMD were committed to training farmers.[49]

Two organizations administer the subsector:

- **The Jamaica Citrus Protection Agency (JCPA)**, which is responsible, among other things, for implementing a mandatory citrus certification scheme, and providing extension services to citrus growers and nurseries (including on the identification and the management of the citrus greening diseases).[50]

- **The Jamaica Citrus Growers Association (JCGA)**, which was established in 1944 and represented, as of 2017, about 7,000 citrus farmers.[51] The JCGA runs a plant nursery, which distributes seedlings to citrus farmers.[52] In 1949, the JCGA established the Jamaica Citrus Growers Limited (JCG), a company to process citrus farmers' production surplus into frozen concentrate citrus juices. Following problems of liquidity and underutilization, the GOJ started winding up the JCG in 2017.[53]

Between 2015 and 2019, farm-gate prices of oranges continued to remain lower than international reference prices (negative MPS). However, in the absence of policies in place that could explain this gap, the MPS is set to zero, and the overall policy effect is considered neutral.

48. http://www.jamaicaobserver.com/news/fight-continues-against-citrus-greening-disease-_17938103

49. https://jis.gov.jm/govt-committed-to-safeguarding-citrus-industry/

50. http://extwprlegs1.fao.org/docs/pdf/jam17954.pdf

51. http://jamaica-gleaner.com/article/business/20170811/jamaica-citrus-growers-company-be-wound

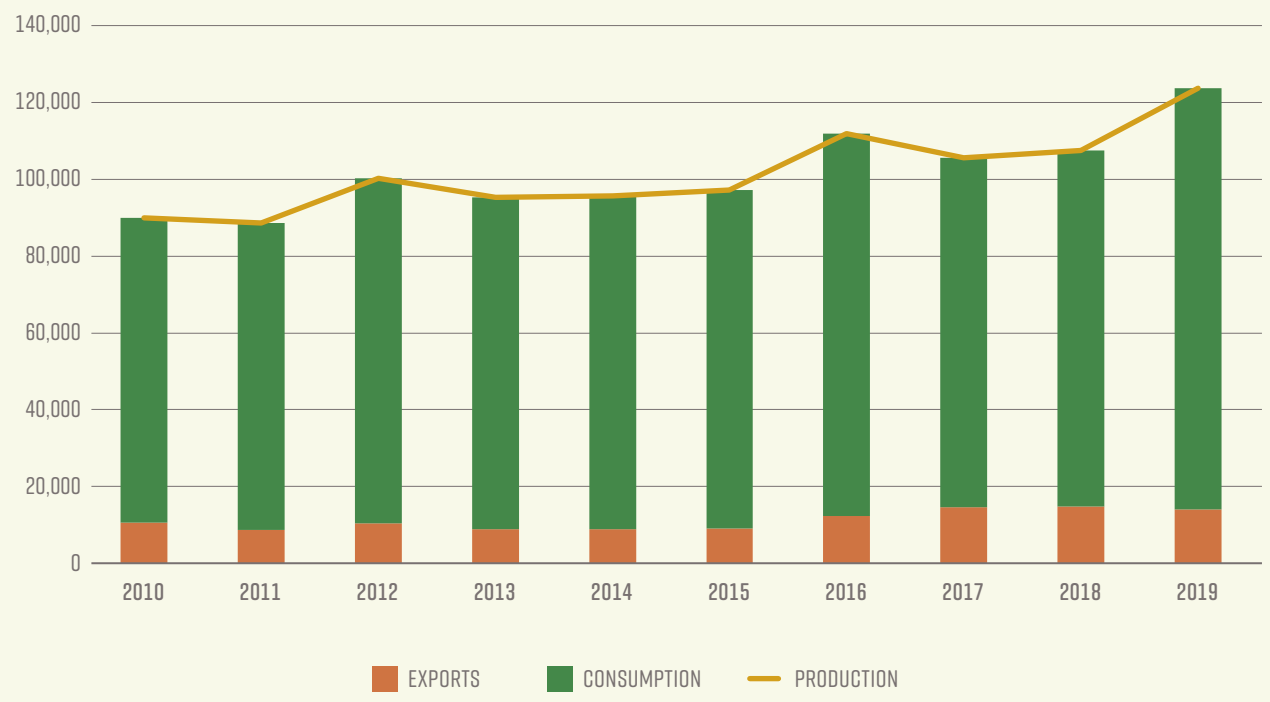
52. Ibid.

53. Ibid.

2.3.2.6. NON-TRADITIONAL EXPORT CROP SUBSECTOR POLICY

In 2019, **yellow yam** represented 75% of Jamaica's yam production, of which 10% was exported (to the United States, primarily, and then to Canada and the United Kingdom).[54] Between 2015 and 2019, the volume of yellow yam produced in Jamaica increased by 27% and exports by 53% **(Figure 20)**. In terms of agricultural production value, yellow yam is Jamaica's second-largest commodity, after poultry **(Figure 5)**.

FIGURE 20: YELLOW YAM PRODUCTION, EXPORTS AND CONSUMPTION (2010-2019), IN TONS



Source: MICAF.

54. https://dobusinessjamaica.com/wp-content/uploads/Resources/SandorPike_Yam_15Nov2016.pdf

Exports are predominantly directed at African and Caribbean immigrant communities. Improvements in food safety and plant health standards have facilitated access to this market.[55] MICAF is also supporting this subsector providing planting material and technical assistance through RADA, and research on issues such as pest and disease control through its R&D Division.[56] Between 2015 and 2019, farm-gate prices of yellow yams continued to remain lower than international reference prices (except in 2018). Since this price gap was within the marketing margin, the overall policy effect is considered neutral.

With respect to **sweet potatoes**, between 2015 and 2019, the production volume increased by 7%. Over that period, farm-gate prices of sweet potatoes continued to remain significantly lower than international reference prices. However, in the absence of policy or non-policy factors creating obstacles to exports that could explain this gap, the MPS is set to zero, and the overall policy effect is considered neutral.

Between 2015 and 2019, Jamaica's **tomato** production increased by 18%. Because this subsector is protected by significant import tariffs and duties (see **Table 3** above), its negative 2016 MPS is set to zero, while it is left unchanged for the remaining years. The overall policy effect is considered positive from the point of view of producers.

Pineapple production increased by 80% between 2015 and 2019. The subsector's import tariffs and duties can explain the observed price gap (positive MPS) (see Table 3 above). The overall policy effect is considered positive from the point of view of producers.

55. Henson, H., Jaffee, S. (2005). *Jamaica's Trade in Ethnic Foods and Other Niche Products. The Impact of Food Safety and Plant Health Standards*. World Bank.

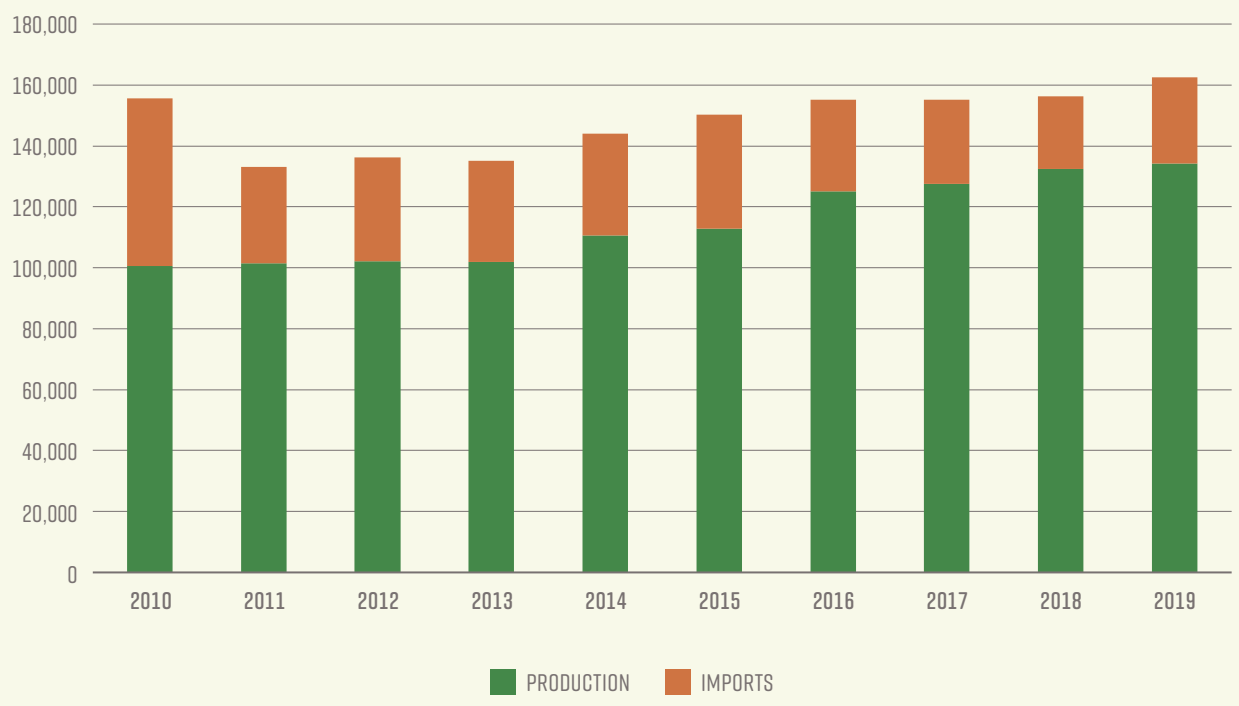
56. Ministry of Agriculture & Fisheries – Agricultural Services Units (2013). *Demand Study for Yellow Yam*.

2.3.2.7. LIVESTOCK SUBSECTOR POLICY[57]

Between 2015 and 2019, the **poultry** subsector represented, on average, 38% of Jamaica's annual agricultural production value. It is, by far, Jamaica's largest agricultural subsector in terms of production value **(Figure 5)**. Over that period, poultry production increased by 19%, while imports decreased by 24% **(Figure 21)**. As of 2019, Jamaica still imports about 17.5 of the chicken it consumes.

As illustrated in **Figure 22**, the poultry value chain is dominated by two large firms: Jamaica Broilers and Caribbean Broilers. Both companies are vertically integrated, producing not only chicken meat but also eggs, chicks, animal feed, and other agricultural products.

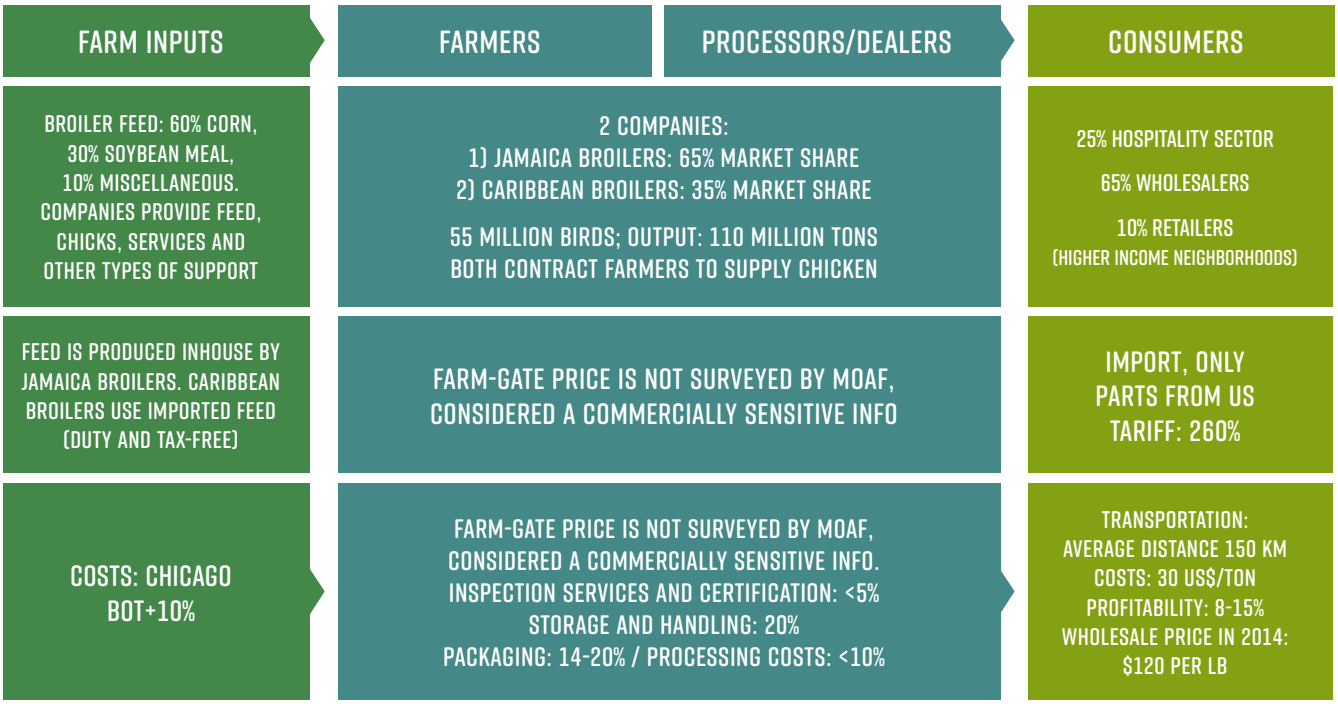
FIGURE 21: POULTRY PRODUCTION AND IMPORTS (2010-2019), IN TONS



Source: MICAF.

57. Livestock here comprises the poultry subsector, the pig subsector, the beef subsector and the egg subsector.

FIGURE 22: JAMAICA POULTRY VALUE CHAIN (2014)*



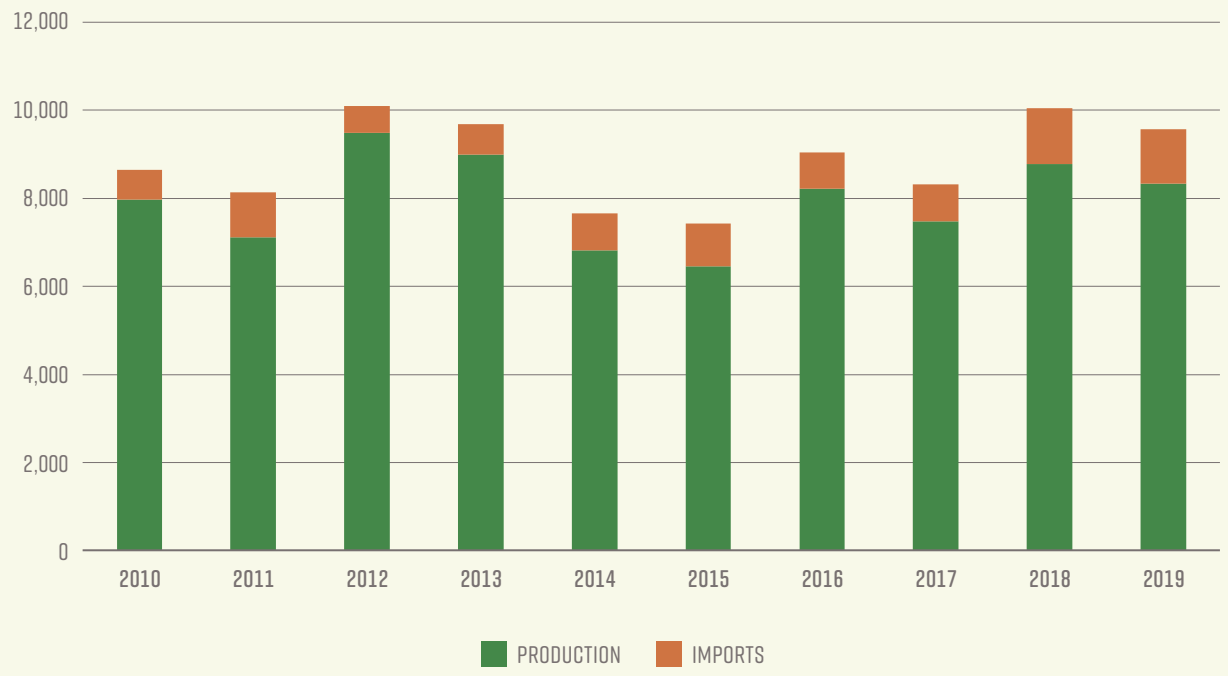
Source: Shik, O., Boyce, R. and De Salvo, C. P. (2017). *Analysis of Agricultural Policies in Jamaica*. IDB.
(*) As of 2019, chicken wholesale prices range between 200 and 220 JMD (http://jamaica-gleaner.com/article/lead-stories/20200908/two-weeks-chicken-shortage-breaks-coronavirus-picks-pockets-appetite).

About the **egg** subsector, production volume increased by 58% over the period 2015-2019. It reached a peak in 2018 with the production of 192 million eggs and slowed down in 2019 to 167 million. Jamaica is self-sufficient in the production of fresh eggs, but the subsector's profitability is affected by the fluctuating prices of imported raw materials (soybean meal, in particular), which are used to produce poultry feed.

The **pig** and the **beef** subsectors share similar characteristics. Between 2015 and 2019, both represented, on average, 3% of Jamaica's annual agricultural production value **(Figure 5)** and were characterized by small-scale production, high production costs (for animal feed, in particular, which can account for up to 60% of pig production costs for instance) and below-international-standards processing facilities.[58] Both subsectors have grown over the same period (pig meat production increased by 29% and beef production by 13%) but not as quickly as domestic consumption. As a result, pig meat imports increased by 28% **(Figure 23)**, while beef imports increased by 46% **(Figure 24)**.

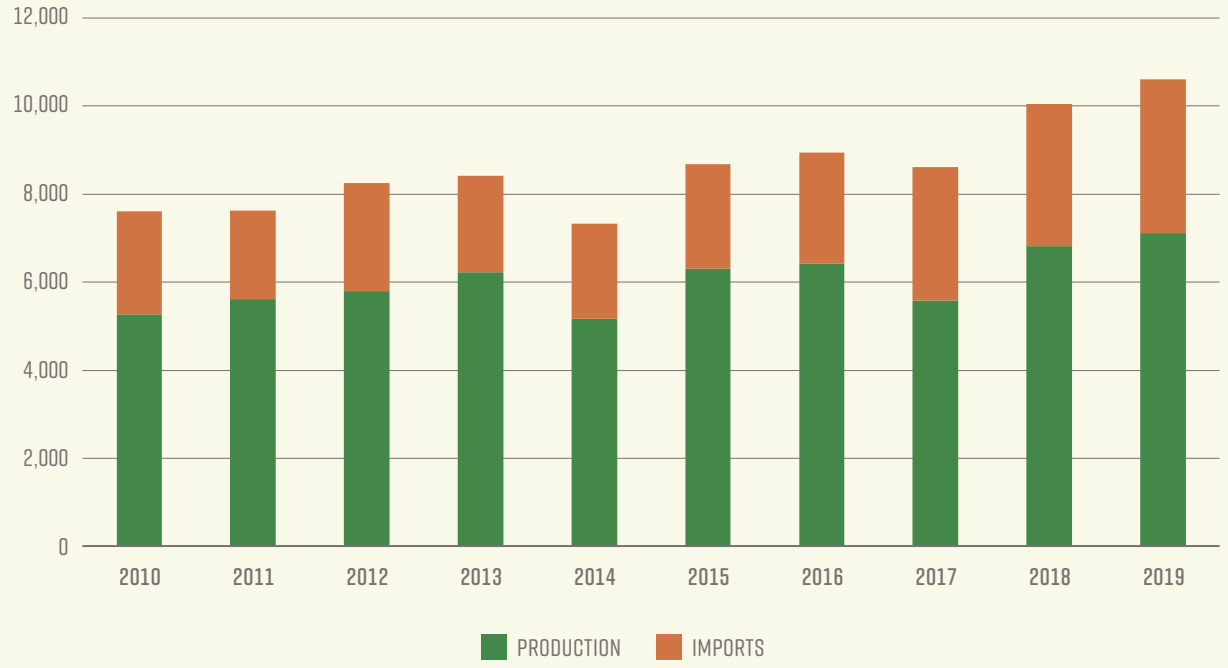
58. CIRAD (2016) – *The Jamaica Pig/Pork Industry*.

FIGURE 23: PIG MEAT PRODUCTION AND IMPORTS (2010-2019), IN TONS



Source: MICAF.

FIGURE 24: BEEF AND VEAL PRODUCTION AND IMPORTS (2010-2019), IN TONS



Source: MICAF.

Different policies are in place to support livestock subsectors, such as:

- Livestock research and improvement by MICAF's R&D Division.
- Ingredients used in the fabrication of animal feed such as corn, wheat, and soybean meal are imported free of GCT and duties.
- Livestock subsectors all benefit from significant levels of import protection: in addition to sanitary restrictions on meat imports, combined protection levels range from approximately 90% for eggs, beef, and pork, to 260% for poultry.

To conclude, price gaps in the beef and pork subsectors are negative for 2015-2019. In the absence of explicit public policies that could explain these gaps, those are likely to result from non-policy factors such as high transaction costs associated with the collection of beef and pork meat from small-scale and geographically dispersed farmers. As a result, MPS for both subsectors are set to zero, and overall policy effects are considered neutral.

Similarly, the price gap is also negative for the egg subsector for the period 2015-2019. It is set to zero, as well, in the absence of public policies in place that could lead to an implicit taxation of egg producers, and the overall policy effect is considered neutral.

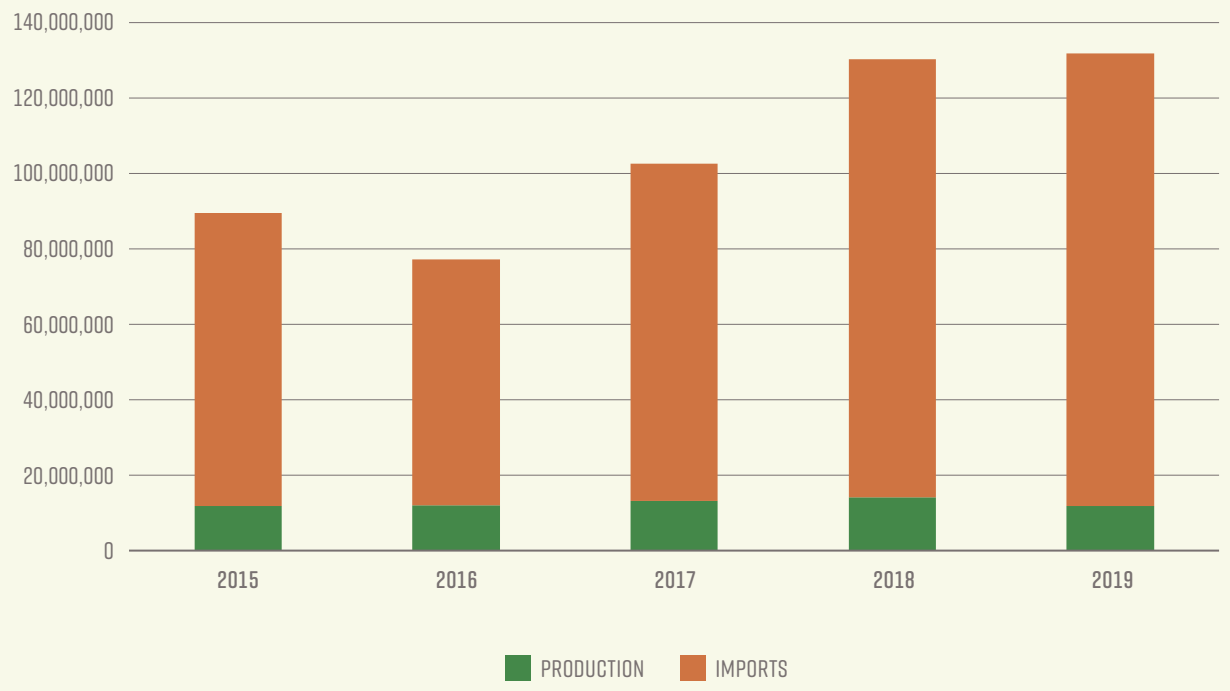
On the other hand, the poultry sector benefits from a high level of support with a %SCT of +69%. Most of this explicit import substitution policy is financed by the MPS (over 32 billion JMD in 2019), in other words, by domestic consumers who end up paying more for chicken than international prices. While the poultry subsector has continued to grow, remain profitable, and even expand (in Haiti and the US for Jamaica Broilers, for instance) over the period 2015-2019, such high levels of protection are reducing incentives within the value chain to improve competitiveness and might thus become a threat to its long-term viability, should they be removed.

2.3.2.8. DAIRY SUBSECTOR POLICY

Between 2015 and 2018, fresh milk production increased by 19% to 14.2 million liters. In 2019, however, it fell back to 11.89 million liters, which is equivalent to the production level of 2015. These figures are far below the objective to increase local production of milk to 55 million liters by 2017, set out in the MICAF's 2008 Dairy Sector Revitalization Program (DSRP). Over the same period, dairy imports, expressed in fluid equivalent, increased by 49% to 116

million liters (approximately US$ 52 million).[59] In other words, as of 2019, Jamaica imports over 90% of the dairy products (including milk) it consumes. Imports mainly consist of milk powder, which is then processed into liquid milk, cheese, ice cream, and condensed milk, as well as finished products such as cheese. There are no imports of fresh milk.

FIGURE 25: FRESH MILK PRODUCTION AND DAIRY IMPORTS (IN FLUID EQUIVALENT) (2015-2019), IN LITERS



Source: JDDB.

The **Jamaica Dairy Development Board (JDDB)** was established in 2009 to revitalize the dairy subsector. Its main functions are to formulate and monitor policies for the subsector, regulate trade, and supervise as well as arbitrate contractual milk agreements. Since 2011, it has been mainly funded by a cess on both locally produced milk (shared between milk producers and processors) and imported dairy products.

59. http://jamaica-gleaner.com/article/lead-stories/20191203/get-moo-ving-govt-looks-revive-dairy-sector

Between 2015 and 2019, the JDDB provided support to the dairy subsector through the following projects and activities:

- **A Concessionary Loan Facility** (as part of DSRP) to dairy and beef farmers (through the DBJ).
- **An upgrade of dairy programs** (or curriculum) in 4 selected Agricultural Educational Institution (AEI) in order "to have dairy units at the respective institutions function as centers of best practices".[60]
- **The Heifer Redeployment Program** aims to increase Jamaica's dairy herd to 9,500 by 2020 (as of 2018, however, it stands only at 5,650).[61]
- **The Fodder Conservation Program**, which aims at increasing fodder production in order to improve herd nutrition and reduce production costs.
- **The Dairy Herd Watering Program**, which aims at improving animals' access to potable water.

Support to dairy farmers was also provided by (i) MICAF's R&D Division (on animal nutrition and genetics, in particular), (ii) RADA which provided training through its livestock officers and (iii) through the USAID-financed JA REEACH II project (described in **Annex 1**).

With respect to price policies, the JDDB is responsible for setting the farm-gate price of milk and for making recommendations to the GOJ concerning the milk powder allocation (or import quota) regime. A CET of 75% applies to imports of milk from outside CARICOM **(Table 3)**.

As a result of these policies, between 2015 and 2019, milk producers received higher farm-gate prices than international reference prices (positive MPS). The overall policy effect is considered positive from the point of view of producers.

60. https://www.jddb.gov.jm/page/our-services

61. http://jamaica-gleaner.com/article/lead-stories/20191203/get-moo-ving-govt-looks-revive-dairy-sector

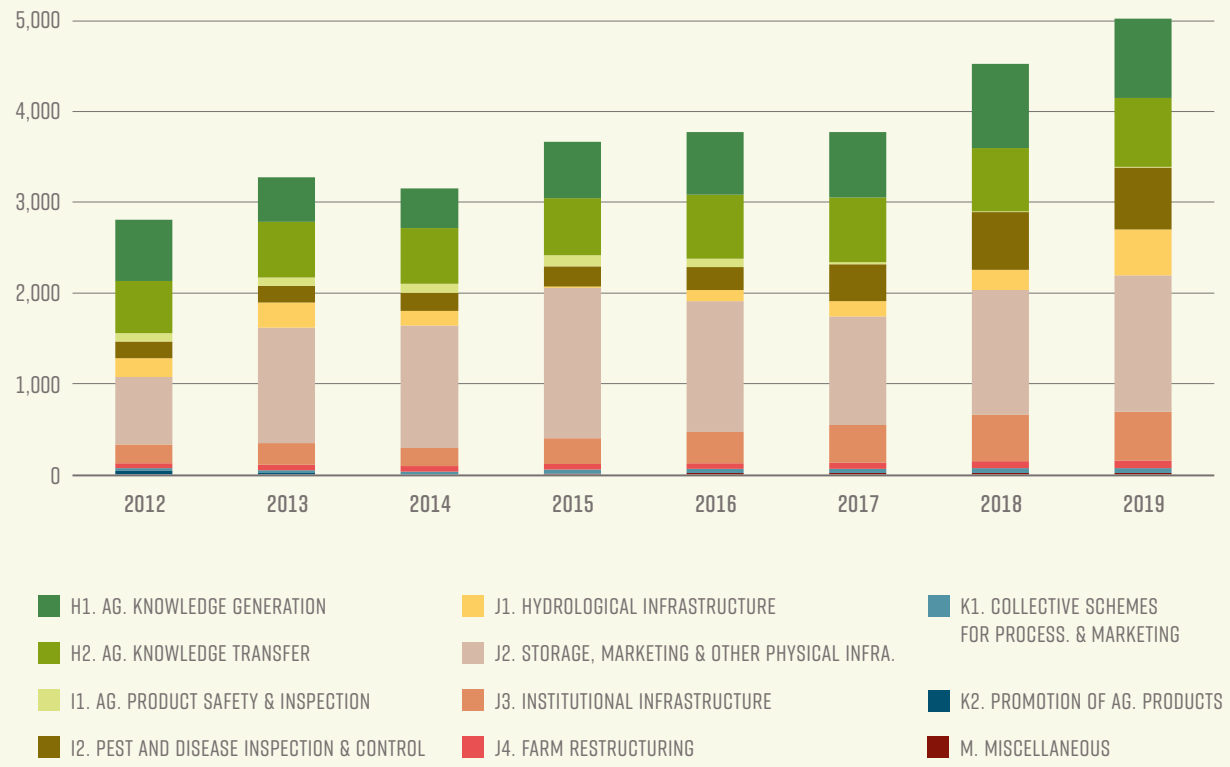
2.3.3. ESTIMATES OF SUPPORT TO GENERAL SERVICES

General Services Support Estimate (GSSE) is a measure of budget transfers for services provided to producers collectively. Jamaica's GSSE reached 5 billion JMD in 2019 **(Table 5)**.

As illustrated in **Figure 26**, between 2015 and 2019, the main GSSE component in Jamaica remained the support to "storage, marketing, and other physical infrastructures" (35%, on average, over the period 2015-2019), followed by "agricultural knowledge generation "(18.5%) and "agricultural knowledge transfer" (17%).

With respect to "hydrological infrastructures", transfers increased from 158 million JMD in 2014 to 512 million JMD in 2019 (+225%). Various irrigation development, rehabilitation, and maintenance programs and projects were initiated in 2018 in different country areas such as the Southern Plains and St. Catherine.

FIGURE 26: GSSE COMPOSITION, IN MILLION JMD



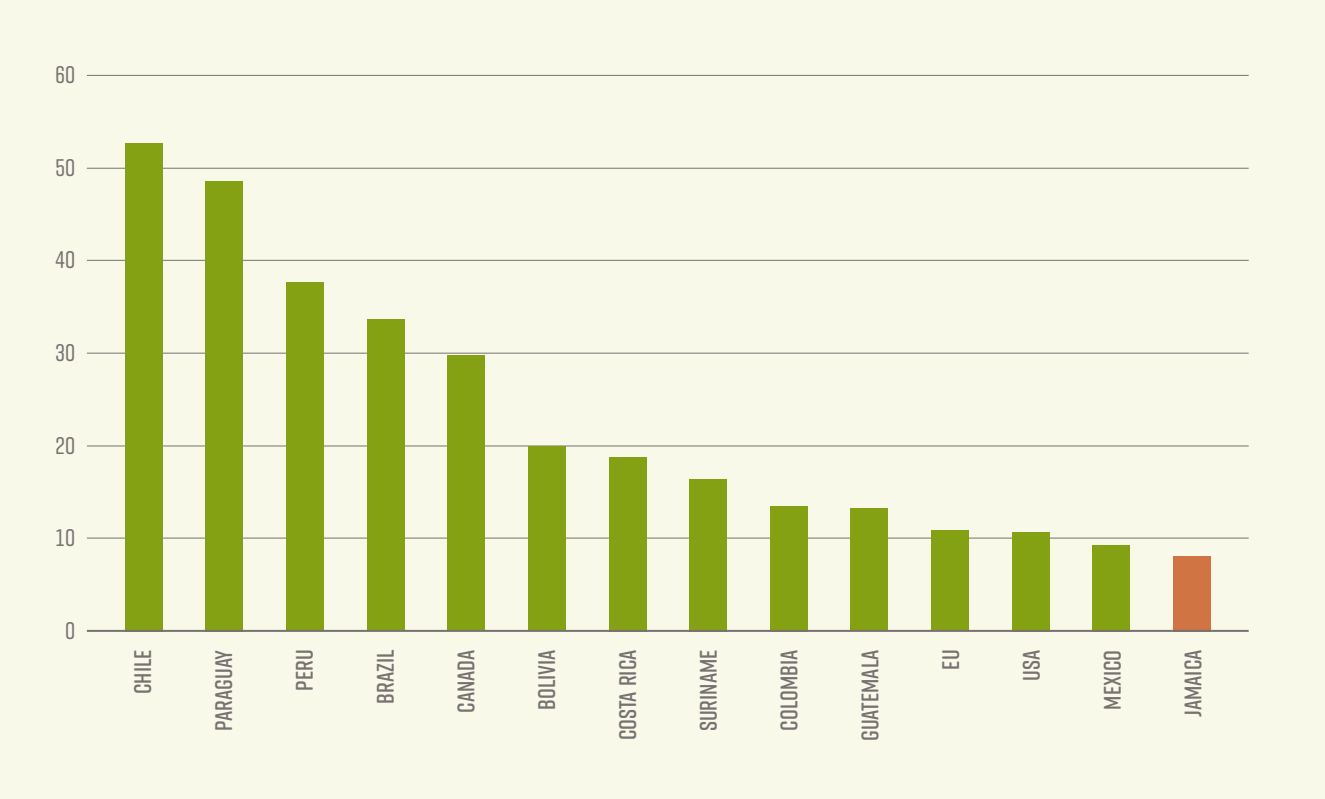
Source: Author's estimations.

"Storage, marketing and other physical infrastructures" development transfers used to take place, primarily, through the Sugar Transformation Unit (STU). A significant shift took place, and as of 2019, most of these transfers now occur via programs aiming at developing farm roads, rehabilitating research centers, and improving irrigation infrastructures.

Transfers to "agricultural knowledge generation" and "pest and disease inspection and control" increased significantly between 2015 and 2019. +41% for the former, mainly through the National Land Agency and its Land Administration, Settlement and Reform program; +203% for the latter via MICAF's Plant Quarantine and Produce Inspection Division and Veterinary Services.

Relative to other countries, Jamaica's %GSSE is low, as shown in **Figure 27**.

FIGURE 27: %GSSE IN JAMAICA AND OTHER COUNTRIES (2015-2019 AVERAGE)



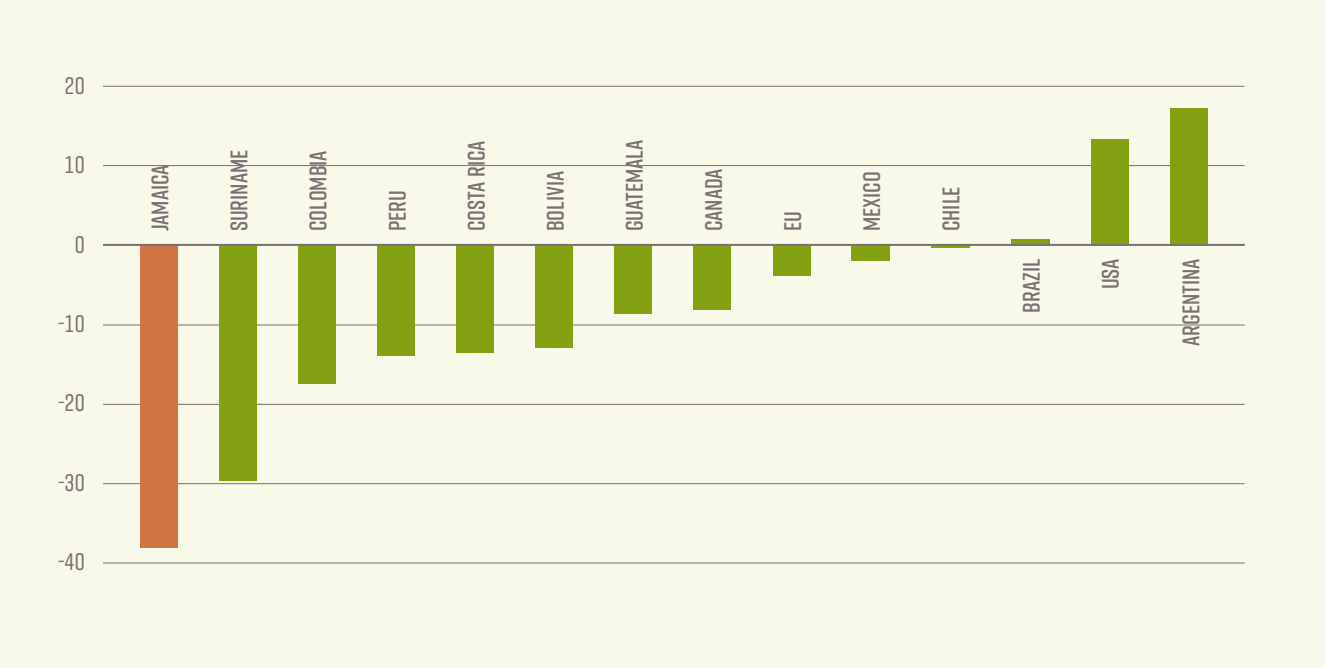
Source: Author's estimations.

2.3.4. ESTIMATES OF SUPPORT TO CONSUMERS

Jamaica's CSE reached -64 billion JMD in 2019, which indicates that support to producers in Jamaica continued to be mainly financed by transfers from consumers **(Table 5)**. In other words, Jamaican consumers pay higher prices for agricultural commodities as a result of government policies. As illustrated in **Figure 28**, over the period 2015-2019, Jamaica's negative percentage CSE (%CSE; the CSE expressed as a share of total consumption expenditures, at farm-gate, net of taxpayer transfers to consumers) was high relative to other countries.

Transfers to consumers (worth almost 6 billion JMD in 2019), such as grants to schools (for student nutrition) and grants to the social welfare program PATH, are not enough to compensate for higher prices paid by Jamaican consumers. While "transfers to consumers" have increased between 2015 and 2019 (+44%), "transfers to producers from consumers" and "other transfers from consumers" have increased faster (+45% and +53%, respectively).

FIGURE 28: %CSE IN JAMAICA AND OTHER COUNTRIES (2015-2019 AVERAGE)



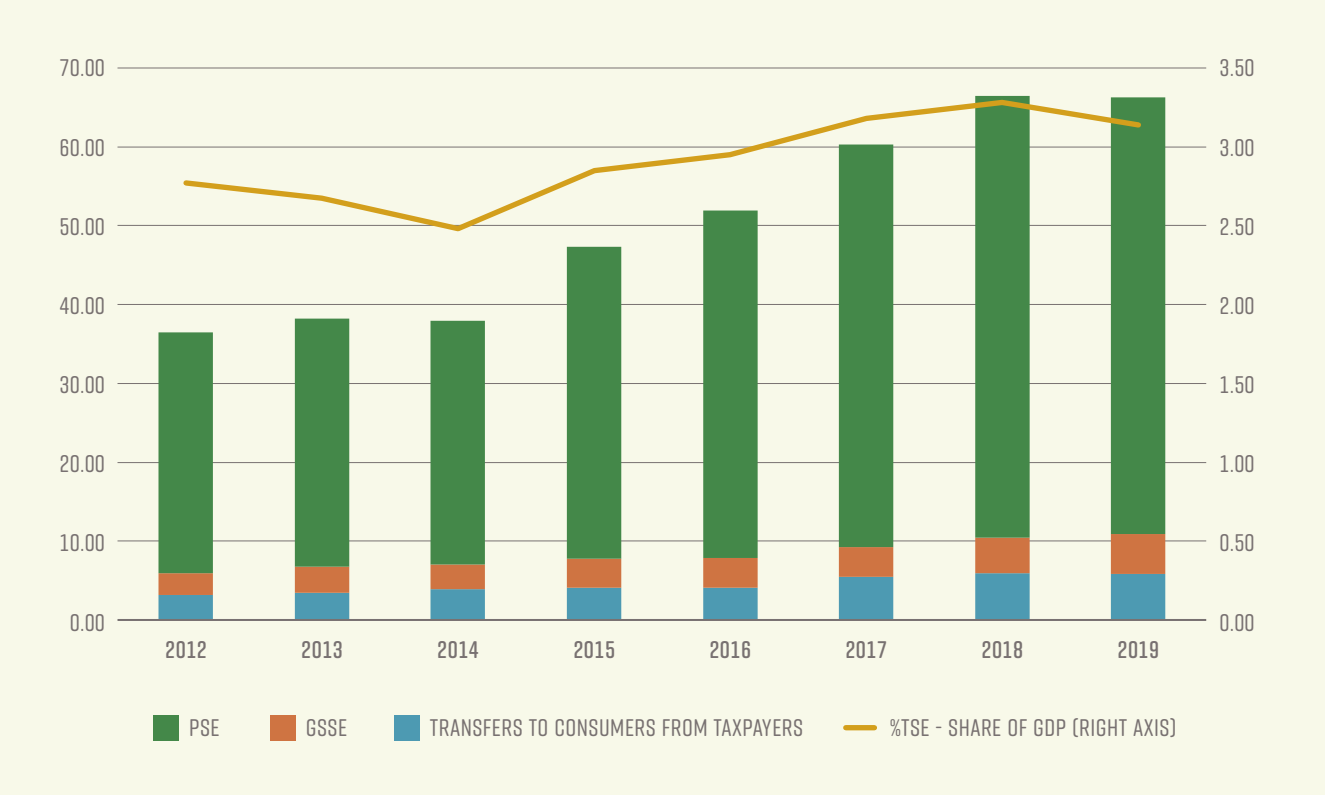
Source: Author's estimations.

2.3.5. ESTIMATES OF TOTAL SUPPORT TO AGRICULTURE

The Total Support Estimate (TSE) is the sum of the PSE, the GSSE, and transfers to consumers from taxpayers. Between 2015 and 2019, Jamaica's percentage TSE (%TSE; the TSE expressed as a share of GDP) increased from 2.85% to 3.14% **(Figure 29)**.

With respect to the composition of Jamaica's TSE, it has remained stable since the 2012-14 PSE Report. As of 2019, the main component, by far, remains the PSE (83.5%), followed by transfers to consumers from taxpayers (9%) and GSSE (7.6%).

FIGURE 29: TSE COMPOSITION, IN MILLION JMD



Source: Author's estimations.

In the 1980s, the MPS used to be the main tool to support producers in OECD countries. Since then, there has been a shift in favor of a less-distorting approach based on payments decoupled from (or not related to) production, input use, or commodity price. Such a shift has also taken place in several countries within the LAC region, but less so in Jamaica. Since budget transfers to individual producers in Jamaica are based on input use and thus

not decoupled, the level of decoupled support is best estimated by looking at the GSSE. Jamaica's percentage GSSE (%GSSE; the GSSE expressed as a share of the TSE) went down from an average of 7.7% over 2012-2014 to 7.6% in 2015-2019. However, there is a growing body of evidence suggesting that support to general services is less distorting and contributes the most to long-term growth and competitiveness in agriculture. A recent regional study, for instance, shows that a shift of 10 percentage points of the agricultural budget from private goods (or transfers to individual producers) to public goods (general services), while keeping total spending constant, leads to an estimated 5% increase in value-added per capita. To achieve the same increase would require an increase of approximately 25% or more in total spending while holding the mix (or the distribution between private and public goods) constant.[62]

62. Anriquez, G. et al. (2016). *Public Expenditures and the Performance of Latin American and Caribbean Agriculture*. IDB Working Paper Series.

3. GREENHOUSE GAS EMISSIONS AND AGRICULTURAL POLICY

3.1. INTRODUCTION

The objective of this chapter is to discuss the relationship between commodity-specific policies discussed above and the environmental impact of these commodities. In particular, it aims to shed light on the impact of agricultural policies in Jamaica on greenhouse gas (GHG) emissions. This is an update of *Agricultural Policy and Greenhouse Gas Emissions in Jamaica*, a report published by the IDB in 2017, covering 2006-2014.[63] Using the same approach, the chapter focuses on the period 2015-2019.

63. Josling, T. et al. (2017). *Agricultural Policy and Greenhouse Gas Emissions in Jamaica.* IDB Agricultural Policy Report.

The GOJ has an obligation to communicate GHG emission levels to the United Nations (UN) under the UN Framework Convention on Climate Change (UNFCCC) provisions. Jamaica's Third and latest National Communication took place in January 2019 and provides data on GHG emissions by sectors in the country up to 2012.[64] The Paris Climate Change Agreement of December 2015 (COP 21) called for "Intended Nationally Determined Contributions" (INDC) to be defined by signatories. In June 2020, Jamaica submitted an updated Nationally Determined Contribution (NDC) in which the agriculture sector is identified as "a critical sector of importance for both mitigation and adaptation".

3.2. METHODOLOGY

The methodology has been developed by the IDB and Professor Tim Josling, and already applied to Jamaica for the period 2012-2014 in Josling (2017). Data on GHG emissions come from the same source (Aether, 2015), in the absence of more recent data. It is then matched with data on policy transfers, using the Producer Single Commodity Transfer (SCT) indicators estimated in the previous chapter (SCT measures commodity-specific transfers, which provide direct incentives to produce that particular commodity).

The matching of GHG emission data with policy transfers is an estimation whose precision is, by definition, limited.[65] Emissions are indeed dependent on farming practices and other conditions that can vary, and the policy incidence depends on the market conditions as well as the details of policy administration. However, the results presented in this study do still provide a starting point for more detailed research into the relationship between agriculture policy and climate change.

MAIN ASSUMPTIONS

GHG EMISSIONS DATA

As described above, data on GHG emissions comes from the same source as Josling (2017): Aether, 2015. This study focuses on direct emissions from livestock and crop cultivation and thus does not account for other emissions associated with the use of

64. Referred to as "Aether, 2015" in Josling (2017).

65. This is why GHG emissions data is presented here as an average over several years instead of per year.

fuel and energy inputs, for instance. Estimates of the latter, however, will be included and discussed in the next section. In Aether (2015), emissions are not presented by commodity but instead grouped by categories, as shown in **Table 7**. Since data on GHG emissions is only provided up to 2012, it is assumed that emissions for each category then grow at the same yearly rate as the production of the main crop or livestock that generates them. Using this approach, total annual GHG emissions from agriculture are estimated for the period 2015-2019, and the annual average over the same period is presented in **Table 8**. Total emissions from agriculture were estimated at 3,765 Gigagrams (Gg) CO2 equivalent per year, on average, for the period 2006-2014 in Josling (2017), and are estimated at 4,284 Gg CO2 equivalent per year, on average, for the period 2015-2019 in the present study. Of the latter, the main contributors remain N2O emissions from manure management (45% of total crop and livestock emissions), organic fertilizers (30%), and soil leaching (12%).

TABLE 7: LIST OF EMISSION CATEGORIES (FOLLOWING AETHER, 2015)

SOILS
DIRECT EMISSIONS FROM MANAGED SOILS: N2O (SYNTHETIC/ORGANIC/GRAZING ANIMALS/CROP RESIDUES)
INDIRECT EMISSIONS FROM MANAGED SOILS: N2O (SOIL DEPOSITIONS/LEACHING, RUNOFF)
LIMING: CO2
UREA APPLICATION: N2O
RICE CULTIVATION: CH4
BIOMASS BURNING: CO / NOX / N2O / CH4 / NMVOC
INDIRECT GHG: NOX / NMVOC
LIVESTOCK
ENTERIC FERMENTATION: CH4
MANURE MANAGEMENT: CH4 / N2O
INDIRECT EMISSIONS FROM MANURE MANAGEMENT: NMVOC / NOX / CO

Source: Aether (2015), quoted in Josling (2017).

TABLE 8: TOTAL EMISSIONS FROM AGRICULTURE (USING CATEGORIES FROM AETHER, 2015)		
	UNIT	ANNUAL AVERAGE 2015-2019
SYNTHETIC N FERTILIZER	GG NO2/YR, CO2 E	51.0
ORGANIC N FERTILIZER	GG NO2/YR, CO2 E	1,285.4
CROP RESIDUES	GG NO2/YR, CO2 E	7.2
DRAINED/MANAGED ORGANIC SOILS	GG NO2/YR, CO2 E	61.8
INDIRECT N2O EMISSIONS:		
SOILS DEPOSITION	GG NO2/YR, CO2 E	5.7
SOILS LEACHING/RUNOFF	GG NO2/YR, CO2 E	497.4
EMISSIONS OF CO2 FROM LIME	GG CO2	0.3
EMISSIONS OF CO2 FROM UREA APPLICATION	GG CO2	2.1
EMISSIONS OF CH4 FROM RICE CULTIVATION	GG CH4/YR, CO2 E	0.4
EMISSIONS OF CH4 FROM FIELD BURNING	GG CH4/YR, CO2 E	4.5
EMISSIONS OF N2O FROM FIELD BURNING	GG NO2/YR, CO2 E	1.4
TOTAL CROPS	**GG CO2 E**	**1,917.3**
GHG EMISSIONS FROM LIVESTOCK:		
GRAZING ANIMALS	GG NO2/YR, CO2 E	225.5
ENTERIC FERMENTATION (CH4)	GG CH4/YR CO2 EQ	119.8
MANURE MANAGEMENT (CH4)	GG CH4/YR CO2 EQ	101.3
MANURE MANAGEMENT (N2O)	GG N2O/YR CO2 EQ	1,920.6
TOTAL LIVESTOCK	**GG CO2 E**	**2,367.2**
TOTAL CROPS AND LIVESTOCK	**GG CO2 E**	**4,284.5**

Source: Aether (2015), Josling (2017) and author's own calculations using data from MICAF..

ALLOCATION OF GHG EMISSIONS TO PSE COMMODITIES

Using the approach described in Josling (2017), total GHG emissions from agriculture are converted from the categories set out in Aether (2015) to individual PSE commodities in order to facilitate the matching with SCT indicators. GHG emissions by individual PSE commodities are presented in **Table 9** and are estimated at 3,775 Gg CO2 equivalent per year, on average, for 2015-2019 (relative to 3,831 Gg CO2 equivalent per year, on average, in Josling, 2017). The subsector that emits the most is poultry (49% of total crop and livestock emissions), followed by sugar (18%) and beef (8%).

TABLE 9: GHG EMISSIONS BY INDIVIDUAL PSE COMMODITIES

	UNIT	AVERAGE 2015-2019
SUGAR		681.7
BANANAS		220.0
COFFEE		25.8
COCOA		6.3
ORANGES		10.7
PINEAPPLE		12.6
TOMATOES		14.2
SWEET POTATO		66.0
YAMS	GG CO2 E	206.1
MILK		80.7
BEEF		299.9
PIG MEAT		147.6
POULTRY		1,839.1
EGGS		43.1
OTHER PRODUCTS		121.7
TOTAL		**3,775.4**

Source: Josling (2017) and author's own calculations using data from MICAF.

SEQUESTRATION OF GHG EMISSIONS BY AGRICULTURAL PRODUCTS

The positive contribution of crops (tree crops, in particular) which absorb GHG needs to be factored in. Following Josling (2017), preliminary sequestration estimates by different crops such as coffee, sugar cane, bananas, and cocoa are incorporated (though they remain pretty small).

CARBON PRICING

A carbon price is required in order to be able to compare the cost of GHG emissions to the cost of financial transfers to producers of specific commodities. In the absence of a single carbon market, and thus price (over 40 different countries now operate carbon-pricing initiatives), and in order to facilitate comparisons with Josling (2017), the same carbon price is used here: US$ 10 per metric ton of carbon dioxide. The key results obtained using this carbon price are then compared with those obtained using a higher price of US$ 45 per metric ton of carbon dioxide.

3.3. RESULTS

The first results of this analysis are presented in **Table 10**. In terms of the value of output (or production), the selected PSE commodities are dominated by poultry (38% of the total value of agricultural production) and followed by yam (15%) and sugar (5%). The column SCT reflects policy priorities. Here again, poultry (69%) and sugar (9%) are ahead, which indicates positive price support (Jamaica's main PSE component), while cocoa and coffee are implicitly taxed.

The poultry and sugar subsectors are also those with the highest GHG emissions. Because of cattle's enteric fermentation, the beef subsector accounts for 8% of GHG emissions, despite contributing to less than 3% of the production value. Similarly, the poultry subsector accounts for 38% of the value of production and 49% of GHG emissions due to manure management. Conversely, coffee, oranges, pineapple, tomatoes, sweet potatoes, and yams contribute less to GHG emissions than their shares in the total value of production.

Agricultural carbon emissions (ACE) are expressed in monetary value. They include not only direct GHG emissions from livestock and crop cultivation but also emissions associated with the use of fuel and energy inputs in field operations, harvesting, and processing (estimated here using the approach described in Josling, 2017). In addition, it accounts for carbon sequestration. The picture that ACE gives is not so different from the GHG column, except when it comes to milk (**Table 10** and **Figure 30**). The milk subsector accounts for about 2% of GHG emissions but for over 18% of ACE. This results from the high emissions associated with the fuel the milk subsector uses in field operations and processing.

The Net Social Value (NSV) is the total production value net of both the cost of carbon emissions (ACE) and transfers through agricultural policies (SCT; **Table 10**). If producers had to pay for the GHG emissions associated with the commodities they produced and were not receiving any transfers through commodity-specific policies, the total production value would be equal to the NSV.

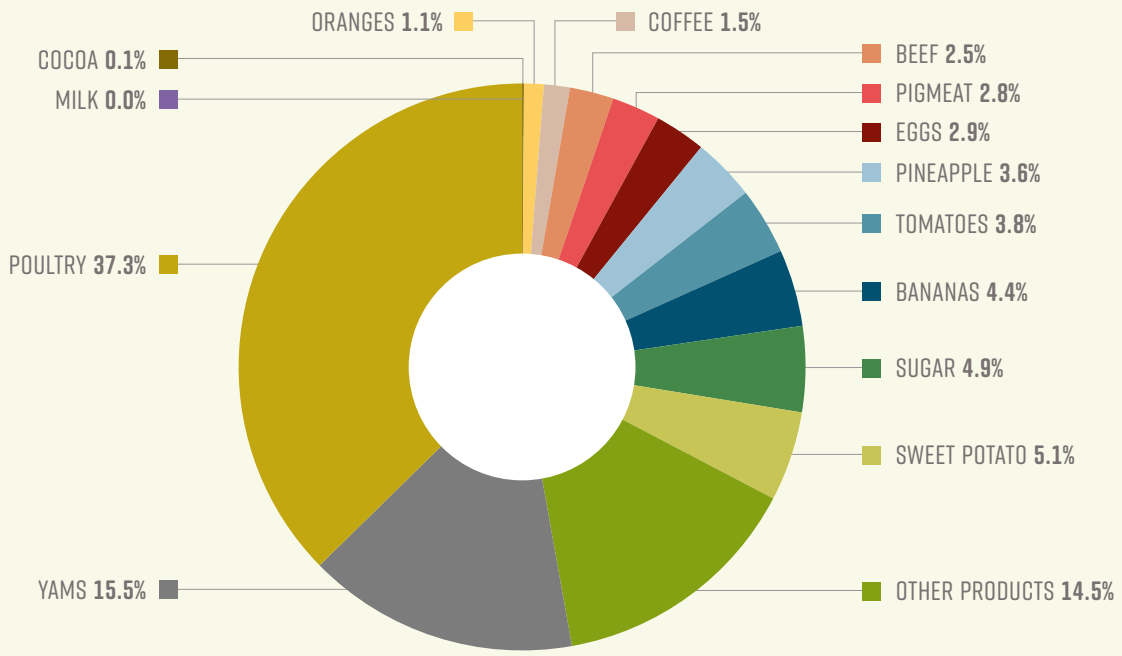
TABLE 10: SHARES OF SELECTED PSE COMMODITIES IN SUPPORT AND EMISSIONS (2015-2019 AVERAGE)

	VALUE OF OUTPUT (VOP)	SINGLE COMMODITY TRANSFER (SCT)	GREENHOUSE GAS EMISSIONS (GHG)	AGRICULTURAL CARBON EMISSIONS (ACE)	NET SOCIAL VALUE (VOP-SCT-ACE)
SUGAR	5.37%	8.60%	18.06%	15.51%	2.51%
BANANAS	4.33%	2.43%	5.83%	3.36%	5.63%
COFFEE	1.40%	-3.41%	0.68%	-0.16%	4.60%
COCOA	0.08%	-0.11%	0.17%	-0.22%	0.22%
ORANGES	1.09%	0.00%	0.28%	0.22%	1.86%
PINEAPPLE	3.44%	3.28%	0.33%	0.27%	3.78%
TOMATOES	3.68%	5.00%	0.38%	0.34%	3.08%
SWEET POTATO	4.95%	0.00%	1.75%	1.53%	8.39%
YAMS	15.00%	0.00%	5.46%	4.77%	25.39%
MILK	0.82%	0.49%	2.14%	18.52%	-0.32%
BEEF	2.70%	0.00%	7.94%	6.88%	4.11%
PIGMEAT	2.79%	0.00%	3.91%	3.36%	4.53%
POULTRY	37.54%	69.35%	48.71%	41.87%	16.85%
EGGS	2.82%	0.00%	1.14%	0.98%	4.77%
OTHER PRODUCTS	13.98%	14.35%	3.22%	2.77%	14.61%
TOTAL	**100.0%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Source: Josling (2017) and author's own calculations using data from MICAF.

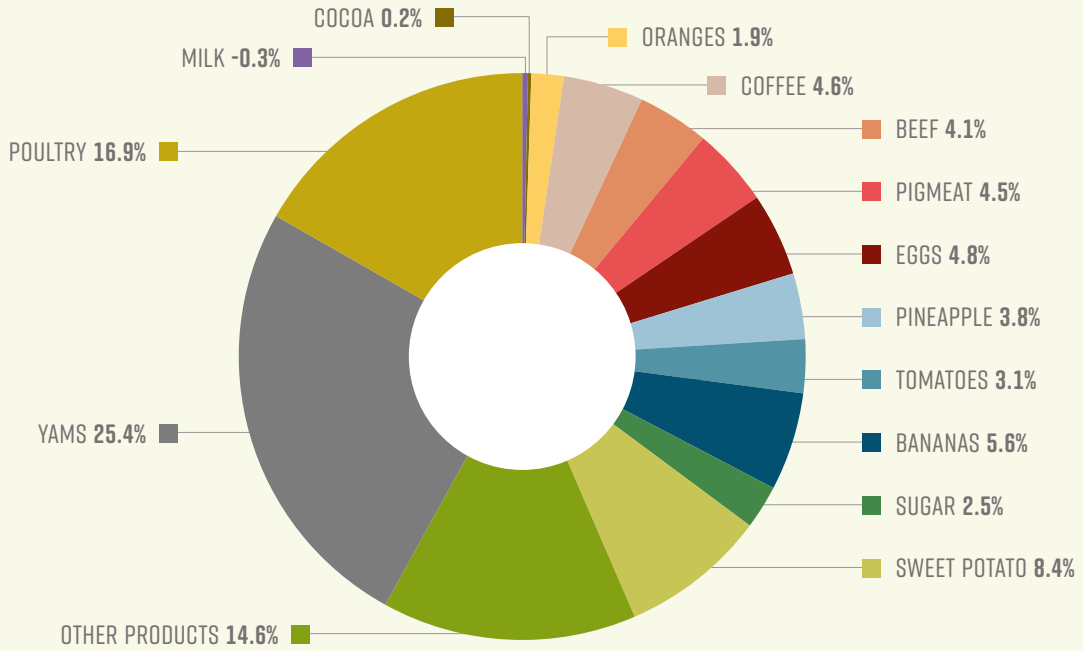
Figure 31 shows the relative importance of the selected PSE commodities in terms of NSV. hen removing the value of transfers from agricultural policies, the share in the poultry subsector's production value drops dramatically from 37% **(Figure 30)** to 17%. Conversely, the share of the yam subsector increases significantly from 16% to 25%.

FIGURE 30: SHARES IN VALUE OF PRODUCTION NET OF ACE (2015-2019 AVERAGE)



Source: Josling (2017) and author's own calculations using data from MICAF.

FIGURE 31: SHARES IN VALUE OF PRODUCTION NET OF ACE AND SCT (NET SOCIAL VALUE; 2015-2019 AVERAGE)



Source: Josling (2017) and author's own calculations using data from MICAF.

The main objective of this analysis is to measure the extent to which policy transfers incentivize or disincentivize GHG emissions. As shown in **Table 10**, poultry and sugar, in that order, are the commodities that receive most of the policy support and that, at the same time, contribute the most to GHG emissions. This suggests that supporting these two subsectors might not be entirely consistent with GHG emissions reduction objectives. As illustrated in Table 11, however, this relationship is not as straightforward. With respect to crops, banana is the crop that has the highest GHG emissions per hectare, followed by coffee and sweet potato. For all three, the use of organic fertilizers is the primary GHG contributor. When considering sequestration and emissions associated with the use of fuel and energy inputs (ACE), the results change only for coffee, which becomes a net absorber. Under this scenario, bananas, sweet potatoes, and now sugar are the most emitting crops.

With regard to livestock, looking first at total ACE, poultry remains the most emitting subsector, followed by milk. When the ACE is expressed as a share of the value of production, however, milk dominates with over 104%, which means that the subsector's GHG emissions value is higher than its actual production value. Poultry is only at 5%, which is lower than other subsectors such as sugar, beef, and pig meat.

Table 11's last column looks at the whole picture by considering the cost of commodity-specific policy transfers (SCT). The value of production, net of such transfers, is divided by the ACE. The result shows how much is produced from the point of view of society (social value) per unit of environmental costs. Pineapple, tomatoes, and oranges have the highest ratios (because coffee and cocoa's ACE are negative, their ratio is not calculated). Milk, sugar, poultry, and beef, on the other hand, have the lowest ratios. In other words, while the social value of producing pineapple is 181 times the ACE, it is only 6 times the ACE for poultry, 3 for sugar, and 1 for milk.

TABLE 11: GHG AND ACE PER UNIT OF COMMODITY (2015-2019 AVERAGE)

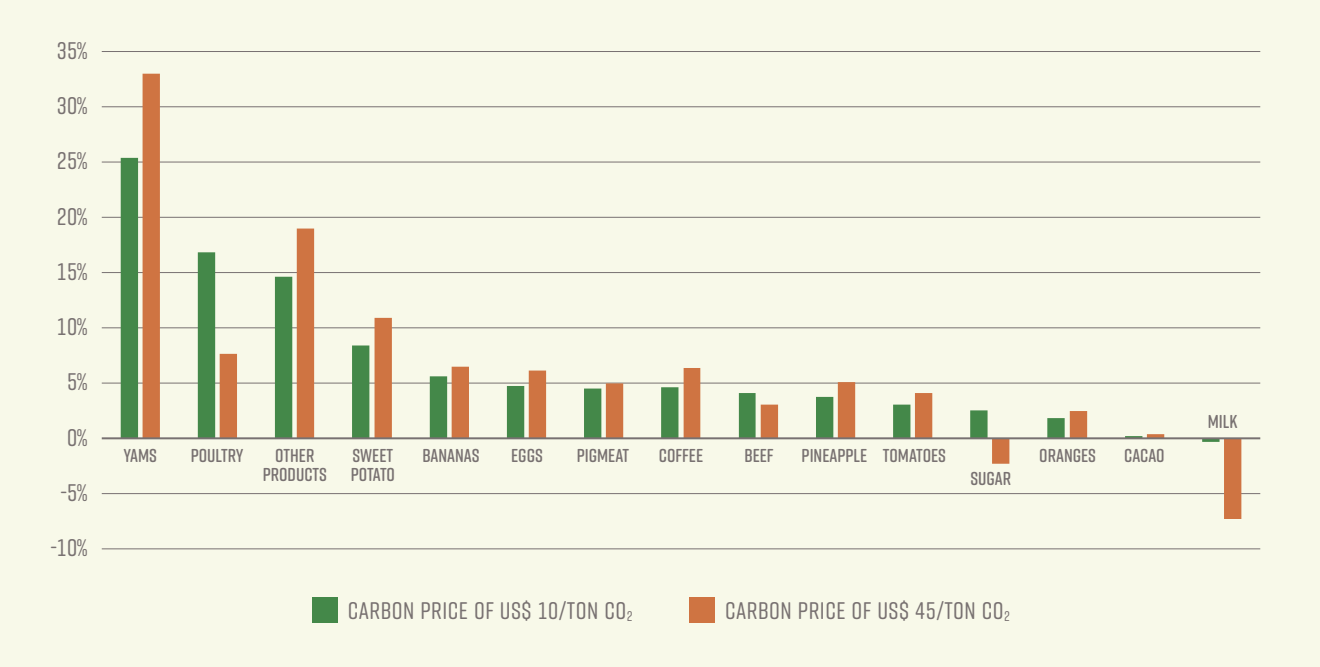
	GHG EMISSIONS MET. TONS CO2E/HA	ACE J$/HA	ACE J$ MN	ACE AS % OF VOP %	VOP-SCT/ACE RATIO
SUGAR	23.4	29,941	866.9	13.5%	3
BANANAS	60.5	51,652	187.7	3.5%	23
COFFEE	41.4	(14,224)	(9.0)	-0.6%	
COCOA	25.3	(50,237)	(12.6)	-14.0%	
ORANGES	11.7	13,460	12.3	0.9%	111
PINEAPPLE	9.1	10,892	15.2	0.4%	181
TOMATOES	9.4	12,672	19.2	0.4%	118
SWEET POTATO	26.4	34,190	85.6	1.4%	72
YAMS	23.1	29,900	266.8	1.4%	70
MILK			1,035.5	104.1%	1
BEEF			384.7	11.6%	9
PIGMEAT			187.8	5.4%	19
POULTRY			2,341.1	5.0%	6
EGGS			54.9	1.6%	64
OTHER PRODUCTS			154.8	0.9%	70

Source: Josling (2017) and author's own calculations using data from MICAF.

Increasing the price of carbon to US$ 45 per metric ton has some influence over the results of this analysis **(Figure 32)**, but does not affect the overall picture presented in **Figure 31**. The share in the Net Social Value of yam increases significantly from 25% to 33%, while the share of poultry decreases further from 17% down to 8%. The share of sugar turns negative, from 2.5% to -2.3%, while the share of milk becomes even more negative: from -0.3% to -7.3%.

Table 11 is replicated using a price of carbon of US$ 45 per metric ton and the results are presented in **Table 12**. The ranking of commodities according to how much each one produces from the point of view of society (social value) per unit of environmental costs does not change, but the ratios are significantly lower for all commodities. Using a price of carbon to US$ 45 per metric ton, the social value of producing pineapple is 40 times the ACE, while it is only 1 time the ACE for poultry, 1 for sugar and 0 for milk.

FIGURE 32: SHARES IN NET SOCIAL VALUE FOR DIFFERENT CARBON PRICES (2015-2019 AVERAGE)



Source: Josling (2017) and author's own calculations using data from MICAF.

TABLE 12: GHG AND ACE PER UNIT OF COMMODITY FOR CARBON PRICE OF US$ 45 (2015-2019 AVERAGE)

	GHG EMISSIONS MET. TONS CO2E/HA	ACE J$/HA	ACE J$ MN	ACE AS % OF VOP %	VOP-SCT/ACE RATIO
SUGAR	23.4	134,733	3,900.9	60.8%	1
BANANAS	60.5	232,432	844.5	15.8%	5
COFFEE	41.4	(64,007)	-40.3	-2.5%	
COCOA	25.3	(226,068)	-56.5	-63.1%	
ORANGES	11.7	60,572	55.2	4.1%	25
PINEAPPLE	9.1	49,013	68.6	1.8%	40
TOMATOES	9.4	57,026	86.5	1.9%	26
SWEET POTATO	26.4	153,853	385.0	6.3%	16
YAMS	23.1	134,548	1,200.6	6.5%	16
MILK			4,659.6	468.4%	0
BEEF			1,731.0	52.2%	2
PIGMEAT			844.9	24.5%	4
POULTRY			10,534.9	22.7%	1
EGGS			247.2	7.0%	14
OTHER PRODUCTS			696.7	4.2%	15

Source: Josling (2017) and author's own calculations using data from MICAF.

4. CONCLUSIONS AND POLICY RECOMMENDATIONS

This report offers an update of the application of the Producer Support Estimate (PSE) methodology to Jamaica for the period 2015-2019 and also documents the evolution of agricultural policies-related GHG emissions over the same period.

Between 2015 and 2019, the market price support remained, by far, the main PSE component in Jamaica. However, differences across subsectors persisted: the poultry subsector continued to receive most of the MPS (69.9%), followed by sugar (7.3%), while the cocoa and coffee subsectors remained implicitly taxed. These

two subsectors, which were heavily regulated during 2012-2014, have been reformed in an effort to increase private sector involvement and improve competitiveness. Nevertheless, both subsectors continued to decline between 2015 and 2019 (other "key challenges" for both subsectors are discussed in more detail in **Annex 2**). On the other hand, the sugar subsector is still heavily regulated and, despite significant public support through budgetary and price transfers, declined even further

High MPS for commodities such as chicken and sugar means that Jamaican consumers continued to pay higher prices for those commodities than international reference prices between 2015 and 2019. Nevertheless, just like in 2012-2014, transfers to consumers through social welfare programs remained too small to compensate for these higher prices: in 2019, for instance, while transfers to consumers were worth almost 6 billion JMD, transfers from consumers to poultry producers, alone, amounted to 32 billion JMD.

The positive trend in non-distorting GSSE observed between 2012 and 2014 came to a halt. %GSSE even slightly decreased between 2015 and 2019, making Jamaica lag even further behind other countries **(Figure 27)**. However, as discussed in **Annex 2**, the need for additional investment in hard and soft infrastructures is growing in several subsectors.

With respect to GHG emissions, the picture has not changed significantly either. The poultry and sugar subsectors remained not only those that receive most policy support, but also those that emit the most. The milk and beef subsectors, although not emitting as much overall because their shares in the production value are smaller, continued to generate some of the lowest social returns per unit of environmental costs.

Based on these different observations, **the following policy recommendations** can be made:

1. **Shift away from an over-reliance on MPS and instead towards less-distortive forms of support such as GSSE.** Lower consumer prices as well as medium- to long-term growth benefits associated with investments in GSSE would compensate the short-term fiscal implications resulting from lower outputs in the most protected subsectors and from the financing of such investments. Additional GSSE investments in R&D, physical infrastructures, climate risk management systems, as well pests and diseases control and management would, in fact, help address some of the agricultural sector's most pressing productivity and profitability issues (as evidenced in **Annex 2**).

2. **Diversify and rebalance the support provided by agricultural policies across subsectors** and, in the same way, better align agricultural policy goals with GHG emissions reduction objectives.

3. **Contribute to reverse the decline of the coffee and cocoa subsectors** by strengthening JACRA to provide valuable information to the different actors, to set research and development agendas, to support value chain integration, and to foster market opportunities at both national and international levels. The private sector would also need a credible signal that JACRA is to stay away from market interventions.

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ANNEX 1: MAIN DOMESTIC SUPPORT POLICY INITIATIVES

PROJECTS	YEARS*	FINANCING	EXECUTION	OBJECTIVE
AGRICULTURAL COMPETITIVENESS PROGRAMME (ACP)	2015-2019	IDB	MICAF	Facilitating the linkage of the primary productive sector with the marketing chain with the view of generating value added through market access and export promotion.
JAMAICA BANANA ACCOMPANYING MEASURES (BAMS) PROJECT	2015-2018	EU	RADA	Combating poverty and improving revenue in the banana-dependent areas through improvements in the productivity and resilience of small farmers and strengthening the link between small farmers and markets.
DIVERSIFICATION OF CARIBBEAN LIVESTOCK THROUGH THE PRODUCTION OF SMALL RUMINANTS	2015-2018	GOJ	MICAF	Improving the production, productivity and quality of small ruminants' meat and the availability of breeding stock in order to enhance the income and food security of small-scale mutton and chevron farmers and meat processors in Jamaica.
ENHANCING THE RESILIENCE OF THE AGRICULTURAL SECTOR AND COASTAL AREAS	2015-2019	GOJ / ADAPTATION FUND	MICAF	Increasing livelihoods, food security of the population in the targeted communities and the overall climate resilience of the agricultural sector.
ESSEX VALLEY IRRIGATION INFRASTRUCTURE DEVELOPMENT PROGRAMME	2015-2016	CDB	MICAF	Enhancing production and productivity of farmers in Essex Valley in a sustainable, socially-inclusive, gender-equitable and climate-sensitive manner.
RURAL ECONOMIC DEVELOPMENT INITIATIVE	2015-2018	WORLD BANK	JSIF (OFFICE OF THE PRIME MINISTER)	Improving market access for micro and small-scale rural agricultural producers.
SUGAR TRANSFORMATION PROGRAMME (OR PROJECT)	2015-2018	GOJ / EU	SUGAR TRANSFORMATION UNIT (MICAF)	Modernizing and transforming the sugar industry, enhancing competitiveness in the industry while addressing social needs.
JAMAICA RURAL ECONOMY AND ECOSYSTEMS ADAPTING TO CLIMATE CHANGE II (JA REEACH II)	2015-2019	USAID	ACDI/VOCA	Increasing climate change resilience of targeted livelihoods and ecosystems.

(*) Years covered by each project during the 2015-2019 period.

ANNEXES

ANNEX 2: VALUE CHAIN ANALYSIS

1. BANANA VALUE CHAIN ANALYSIS

Background

Output and productivity in the banana subsector have been declining since the mid-1990's. To a large extent, this is the result of an increase in the frequency of natural disasters such as droughts and hurricanes, combined with other factors such as pest and disease infestations, low technology, high production costs, and insufficient marketing. Between 2006 and 2007, most notably, banana production in Jamaica decreased by 46% and banana exports dropped from 32,000 tons per year to 0, mainly as a result of the Sigatoka disease and hurricanes (Hurricane Dean in 2007 and Hurricane Gustav in 2008). In 2009, the banana subsector policy started prioritizing domestic markets over exports. As of 2019, while Jamaica has regained its production volume level in 2006, its banana export volume (544 tons in 2019) still represents only a fraction of what it was in 2006 (32,000 tons). However, this has been compensated for by a significant increase in domestic consumption. In terms of value, over the period 2015-2018, the banana subsector represented 4% of Jamaica's annual agriculture production value, on average, thus making it Jamaica's fifth-largest agricultural subsector.

Farmers[66]

Banana production in Jamaica is fragmented. In 2015, it was estimated that the banana subsector employed 3,177 farmers over 4,443 hectares of land, distributed across 13 of the country's 14 parishes. Of those 4,443 hectares:

- 29% were cultivated by large and medium farmers (cultivating more than 2 hectares).
- 59% by small farmers (cultivating between 0.4 and 2 hectares).
- 12% by micro-farmers (cultivating less than 0.4 hectares).

66. Bailey, J. (2017). Post-JBAMS' Sustainability Models. Banana Board Consultancy.

Jamaica's largest private banana farms are St. Mary Banana Limited (162 hectares) and Tulloch Estates Limited (54 hectares, located in St. Catherine). Combined, they represent around 9% of the total land under banana production.

In terms of technology use[67], those 4,443 hectares could also be distributed as follows:

- 5% were cultivated by high technology producers.
- 22% by medium technology producers.
- 73% by low technology producers.

Low technology producers are between 20 and 30% less productive than high and medium technology producers, which indicates that the subsector's competitiveness possesses significant room for improvement.

Farm inputs and Farm-Gate Prices

The banana subsector is both labor- and material-intensive. Materials, which include, among other things, suckers, fertilizers (N.P.K., in particular), Sigatoka disease and weed control products, and nematicide, amount to approximately 59% of production costs. The remaining 41% are labor costs. Taken together, production costs represent an estimated 71% of the farm-gate price.[68]

For the most part, materials are imported (without preferential terms) and thus are becoming increasingly expensive as the JMD depreciates. Regarding suckers, the Banana Breeding Station multiplies and distributes banana varieties that are resistant or tolerant to Sigotaka and other pests or diseases and generate higher yields. Distribution of farm inputs to farmers has also taken place during the BAMS project through the All Island Banana Growers Association Limited (AIBGA), the subsector's largest non-governmental organization (NGO).

Farm-gate prices of bananas are free and not set by the Banana Board or any other public entity.

67. Defined as "the level of technology employed on the farm (including irrigation) and the frequency with which standardized cultural practices are carried out".

68. Bailey, J. (2017). Post-JBAMS' Sustainability Models. Banana Board Consultancy.

Markets and Consumers

According to a 2016 study of the subsector[69], the current banana production level can only meet 48% of domestic demand for bananas, 62% of domestic demand for plantains and less than 1% of banana export demand.[70] Even though the export volume in 2019 was still low compared to pre-2007 levels, it is growing rapidly (+71% over the period 2015-2019). The same study indicates that the subsector offers internationally competitive prices. Overall, this represents a major opportunity for the banana subsector.

For the domestic market, the Banana Board has established a domestic certification program for farmers complying with standards of best practices in production, harvest, packaging, and processing, in order to ensure food, worker, and environmental safety.

For export markets, as of 2019, the Banana Board has certified 52 farms and 10 exporters in Global Good Agricultural Practices (GAP). Global GAP is not only a requirement to export bananas to overseas markets; it is also increasingly demanded by high-end domestic markets such as hotels and restaurants. The Banana Board sets no export quotas. However, export permits are required and are issued at a fee of 2.2 JMD per kilogram.

Key Challenges

- **Vulnerability to climate change, natural disasters, diseases, and pests:** The end of the BAMS project means fewer resources for the Banana Board to undertake R&D as well as diseases and pests' control and management, which are critical public investments and interventions for the sustainability of the subsector. Additional investments in irrigation infrastructures and management are also key to improve the subsector's resilience to climate risks.

- **Attracting youth:** Banana farmers are aging (more than 61 years old, on average) and often have low educational attainment, which is a constraint to technology adoption and investment, as well as compliance with industry standards.[71]

69. Bailey, J. (2017). Post-JBAMS' Sustainability Models. Banana Board Consultancy.

70. According to Bailey (2017), export demand is especially high from the Cayman Islands, Trinidad and Tobago, Canada, and the United Kingdom.

71. Bailey, J. (2017). Post-JBAMS' Sustainability Models. Banana Board Consultancy.

- **Low technology adoption and rising production costs:** As described above, most banana farmers are low technology producers. To a large extent, they depend on imports for farm inputs, becoming more expensive as the JMD depreciates.

- **Market integration:** Because of its fragmentation, the banana subsector's value chain is difficult to integrate. With the support of the BAMS project, both the Banana Board and AIBGA have improved the subsector's cooperation and coordination with markets, in particular through certification programs and marketing support, but much remains to be done.

2. COFFEE VALUE CHAIN ANALYSIS

Background

As described above, Jamaica has earned the world's highest unit price for its coffee exports for decades. At the same time, Jamaica's coffee subsector is characterized by its low productivity and only represents 0.05% of the world's overall annual coffee production, according to the Coffee Industry Board (CIB). With respect to productivity, within the LAC region, the average production per acre (1 acre is equivalent to 0.4 hectares) in Jamaica ranges from 8 boxes for small farmers to 37 for larger ones. In contrast, Colombia averages 57 boxes per acre and Costa Rica 97 boxes per acre (one box contains about 27 kilograms of coffee cherries).[72] Overall, the subsector's competitiveness has been decreasing as a result of several factors such as natural disasters (droughts, in particular), diseases, high production costs, and insufficient marketing.

Farmers

With approximately 7,000 coffee farmers, coffee production in Jamaica is quite fragmented and weakly organized. 80% of these farmers cultivate coffee and other crops on plots of 10 acres (or 4 hectares) or less, according to CIB. And only a handful of them has sustainability certifications such as the Rainforest Alliance.[73] Most of Jamaica's coffee is produced by a small number of medium and large coffee farms located in the Blue Mountains.

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72. http://www.ciboj.org/content/cess-be-imposed-coffee-imports-aid-vulnerable-local-farm-fri-05152015-1200

73. Daly, J., Hamrick, D., Bamber, P. and Fernandez-Stark, K. (2018). *Jamaica in the Arabica Coffee Global Value Chain*. Duke University – Global Value Chains Center.

Overall, and due to these different factors, coffee producers have little power within the value chain.

In addition, the policy support they receive is limited. As described above, over time, CIB, and now JACRA, have concentrated their efforts on certification and exports, and are no longer engaging with farmers on a large scale, or providing meaningful extension and training services. Private attempts to support farmers in this regard, by processors in particular, have had limited successes.[74]

Processing, Markets and Consumers

According to the Jamaican coffee value chain analysis (VCA) conducted by the Duke Global Value Chains Center, "downstream chain segments" are highly integrated. Mavis Bank Coffee Factory, Wallenford, and Coffee Traders, which all act as both processors and traders, represent more than 80% of the export market for JBM coffee, while six Japanese trading companies have remained, for some time now, the main buyers of Jamaican coffee.[75] These processors are also key players in the domestic market (hotels and supermarkets, in particular). Mavis Bank, for instance, owns Jablum, a brand of roasted and ground JBM coffee that supplies more than 60% of the domestic market.[76]

As described above, however, heavy subsector regulations have also created some bottlenecks at the processors' level, thus excluding small farmers from processing activities that generate value-added. For instance, processing or roasting coffee requires a Coffee Dealer License, whose main prerequisite is a production capacity of at least 6,000 boxes of coffee cherries per year, a volume well beyond most farmers' production capacity. Farmers are thus forced to sell their production to one of 15 licensed processors, with whom they generally do not have strong relationships as they sell to the one offering the highest prices (this also goes to explain why attempts by processors to provide extension and training services, described above, have often failed).[77]

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74. Ibid.

75. Ueshima Coffee Company (UCC), Ataka, Kanematsu, MC Foods, Wataru and Yutaka.

76. Daly, J., Hamrick, D., Bamber, P. and Fernandez-Stark, K. (2018). Jamaica in the Arabica Coffee Global Value Chain. Duke University – Global Value Chains Center.

77. https://gcrmag.com/jamaicas-shades-of-blue/

Key Challenges

- **Insufficient marketing:** Jamaica´s coffee exports are dependent on one export market, Japan. This makes Jamaica's coffee subsector highly vulnerable to demand shocks and price volatility.[78]

- **Low productivity:** Vulnerability to the coffee leaf rust disease and to climate change (droughts, in particular), aging trees and lack of tree maintenance, made worse by the absence of extension and training services as well as limited access to finance, are key factors behind the subsector's low productivity.[79]

- **High production costs:** High production costs are the result of a combination of factors such as rising labor costs (as farmers are aging, it is increasingly difficult to find labor) as well as input costs (as the JMD depreciates), poor road infrastructures (in the Blue Mountain, in particular) and low mechanization (in the Blue Mountains, coffee is cultivated in steep slopes, which makes it difficult to mechanize and forces all producers, even large ones, to harvest by hand).[80]

3. SUGAR VALUE CHAIN ANALYSIS

Background

Jamaica's sugar industry is in sharp decline. Just over the period 2015-2019, sugarcane production decreased by 50% **(Figure 13)**, and sugar exports dropped significantly both in terms of volume (-71%; **Figure 14**) and value (-78%).

In 1975, Jamaica, along with other African, Caribbean, and Pacific (ACP) countries, was guaranteed preferential prices for its sugar exports to the EU market under the EU Sugar Protocol. This led Jamaica to adopt a strategy that consisted of exporting its raw sugar production to the EU at a high price and to satisfying domestic consumption by importing raw sugar from somewhere else at a lower price. However, starting in 2009, the EU gradually started to eliminate this preferential treatment. First, the gap between ACP and world prices was reduced in 2009, which led to a 36% cut in the price of raw sugar exports from Jamaica to

78. Daly, J., Hamrick, D., Bamber, P. and Fernandez-Stark, K. (2018). *Jamaica in the Arabica Coffee Global Value Chain*. Duke University – Global Value Chains Center.

79. Ibid.

80. Ibid.

the EU. Then, in 2017, guaranteed sugar quotas were abolished.[81] This forced Jamaica's sugar industry, already plagued by low productivity and processing inefficiencies, among other factors, to start competing with other more efficient sugar-producing countries. Inevitably, it led to profitability issues within the industry and a shift in Jamaica's marketing strategy for raw sugar. As of 2019, the majority of the sugar produced in Jamaica is sold on the domestic market, while the rest is exported at market price to the US (on a pre-determined annual quota), the EU, and CARICOM countries.[82]

However, within Jamaica's agricultural sector, the sugar industry remains one of the main contributors in terms of GDP, foreign exchange, and jobs. According to the SIA, in 2014, the sugar subsector represented 40,000 jobs (including seasonal ones), from production to manufacturing. It is the industry that has "the highest level of vertical integration in Jamaica", both "backward with sectors that supply and /or service farm machinery, tools, fertilizer, weedicides, pesticides, that provide transportation (field to factories) and finance", and "forward with sectors such as transportation (factories to warehouses and port), rum, finance, shipping, civil aviation, and legal services".[83]

Production

Independent cane farmers and private estates produce sugarcane. In 2019, independent cane farmers produced 41% of Jamaica's sugarcane and estates 59%.[84]

Estates are large producers who also process sugarcane through their factories and market final products. Back in 2015, six estates were in operation and produced 836,270 tons of sugarcane altogether. As of 2019, three of them closed down because of unsustainable production costs and high debts, among other factors.[85] This led to a significant decrease in the volume of sugarcane produced in 2019 by estates: 436,139 tons, 48% less than in 2015.[86]

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81. https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=Sugar%20Annual_Kingston_Jamaica_4-15-2019.pdf

82. https://www.fas.usda.gov/regions/jamaica

83. *The State of the Jamaican Sugar Industry.* Sugar Industry Authority. November 2010.

84. Post Crop Booklet 2019. Sugar Industry Authority.

85. https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Sugar%20Annual_Kingston_Jamaica_04-15-2020

86. The 3 remaining estates are Pan Caribbean Sugar Company (PCSC; Chinese-owned), Appleton Estate and Worth Park Estate.

According to the All Island Jamaica Cane Farmers Association, 1,947 independent cane farmers delivered sugarcane to factories in 2019, down from 2,432 the year before. Their production volume also went down significantly, from 736,097 tons in 2015 to 305,542 tons in 2019. A collapse of 58% in less than 5 years.[87]

Processing, Markets and Consumers

As of 2019, sugarcane is processed by the three factories mentioned above into raw sugar and molasses. These same entities have been granted marketing licenses by the GOJ and are thus also responsible for selling their final products both locally and internationally.

Low and decreasing sugarcane production, as described above, is the value chain's main bottleneck and threatens the economic viability of the entire industry. Despite the closing down of three factories over the last 5 years, the remaining three are still operating "at levels significantly below capacity" because of sub-optimal levels of cane supply.[88] In areas where factories closed down, independent cane producers are indeed producing less as a result of not receiving agricultural inputs that they usually obtain from these factories (in exchange for selling their production to those factories). In addition, high transportation costs are making it unviable to transfer harvested sugarcane from those areas to the more distant factories that are still operating.[89]

In the aftermath of the EU trade policy reform, Jamaica's marketing strategy for raw sugar shifted with respect to markets. As of 2019, most of the raw sugar produced in Jamaica is sold on the domestic market (approximately 46,000 tons in 2019, or 60% of the sugar production).[90] The SIA works to ensure that the domestic demand for raw sugar is met by domestic production and that no imports of raw sugar are needed. In the absence of a local refinery of sugar (which, according to SIA, would not be profitable considering the current level of sugarcane production), Jamaica does, however, import refined white sugar (approximately 68,000 tons in 2019), mainly from Guatemala and Colombia, for both the retail market (in which case, imports are handled directly by the SIA and heavily taxed) and manufacturers (in which case, imports are

87. *Post Crop Booklet 2019*. Sugar Industry Authority.

88. https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=Sugar%20Annual_Kingston_Jamaica_4-15-2019.pdf

89. Ibid.

90. https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=Sugar%20Annual_Kingston_Jamaica_4-15-2019.pdf

handled by manufacturers and duty-free).[91] While the domestic demand for raw sugar presents the advantage of being relatively stable, it is unlikely to grow as a result of increasing health-related concerns with respect to sugar consumption. In addition, in the absence of a local refinery, the industry is unable to compete against imports of refined sugar.

The rest of the raw sugar produced in Jamaica is exported. The EU remains Jamaica's largest sugar export market (20,000 tons, or 55% of total sugar exports, in 2017/18), followed by the US (11,000 tons, or 30% of total sugar exports, in 2017/18; in compliance with the pre-determined annual quota) and CARICOM countries (4,500 tons, or 15% of total sugar exports, in 2017/18).[92] If the sugar industry manages to overcome its cane production bottleneck, the export market represents its main opportunity for expansion.

Key Challenges

- **Low productivity:** Between 2015 and 2019, the average cane productivity went down from 56.02 tons of cane per hectare to 46.8 tons of cane per hectare. Several factors lay behind Jamaica's low sugarcane productivity:
  - Production areas in Jamaica are more fragmented than in other sugar-producing countries such as Brazil, making it harder to mechanize and to reach economies of scale.[93]
  - Losses caused by "illicit cane fires, poor weather conditions, and labor supply disruptions", which affect, on average, 15% of the area planted in cane.[94]
  - High input costs, which decrease input utilization and lower cane quality.
  - Losses caused by pests, and by the sugarcane moth borer in particular.[95]
  - Vulnerability to climate change and natural disasters (hurricanes, droughts, and floods).[96]

91. Ibid.

92. Ibid.

93. http://jamaica-gleaner.com/article/commentary/20200723/editorial-holness-right-sugar

94. https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=Sugar%20Annual_Kingston_Jamaica_4-15-2019.pdf

95. *Post Crop Booklet 2019*. Sugar Industry Authority.

96. https://www.jamaicasugar.org/files/SUGINDISO1110_nef4zl18.pdf

- **Inefficient processing:** As described above, between 2015 and 2019, half of Jamaica's sugar factories closed down. Unsustainable production costs, related to a lack of maintenance (and resulting mechanical breakdowns) and recurrent issues to meet sugar factories' demand for cane, are likely to have been key contributing factors.[97] The latter, which also impacts the remaining 3 sugar factories still in operation, can be explained by low and decreasing productivity levels for both independent cane producers and estates, as well as other structural issues such as the costly and inefficient logistics for transporting harvested cane and, to a lesser extent, the existence of a black market where independent cane producers might find it easier to sell their cane production.[98]

4. COCOA VALUE CHAIN ANALYSIS

Background

Within the last 15 years, the volume of cocoa produced in Jamaica fell from 2,000 tons per year to about 200-400 tons per year. As described above, this results from a combination of factors such as lower productivity (due to aging cocoa trees, lack of tree maintenance, low technology use, and disease infestations, among others) and natural disasters. However, because approximately 95% of Jamaica's cocoa exports consist of "fine and flavor" cocoa, Jamaica still has access to a niche market where demand largely exceeds supply, which represents an opportunity to revitalize the subsector in a sustainable way.

The cocoa value chain is currently in the process of reorganization. Between 1957 and 2017, the Cocoa Industry Board, the subsector's then regulatory body, was not only involved in cocoa production but also acting as the main processor of wet cocoa beans and the sole marketing agent for dried fermented cocoa beans. The value chain had then reached a fairly high degree of integration, but it was done at the expense of the subsector's competitiveness and of the private sector's involvement. Excessive market interventions from the Cocoa Industry Board disincentivized production and investment in the subsector. In 2018, the Cocoa Industry Board was dismantled as part of a policy effort to open the subsector and encourage private investment. Its regulatory and monitoring functions were transferred to JACRA,

97. Ibid.

98. http://jamaica-gleaner.com/article/lead-stories/20191217/sugar-production-set-fall-20

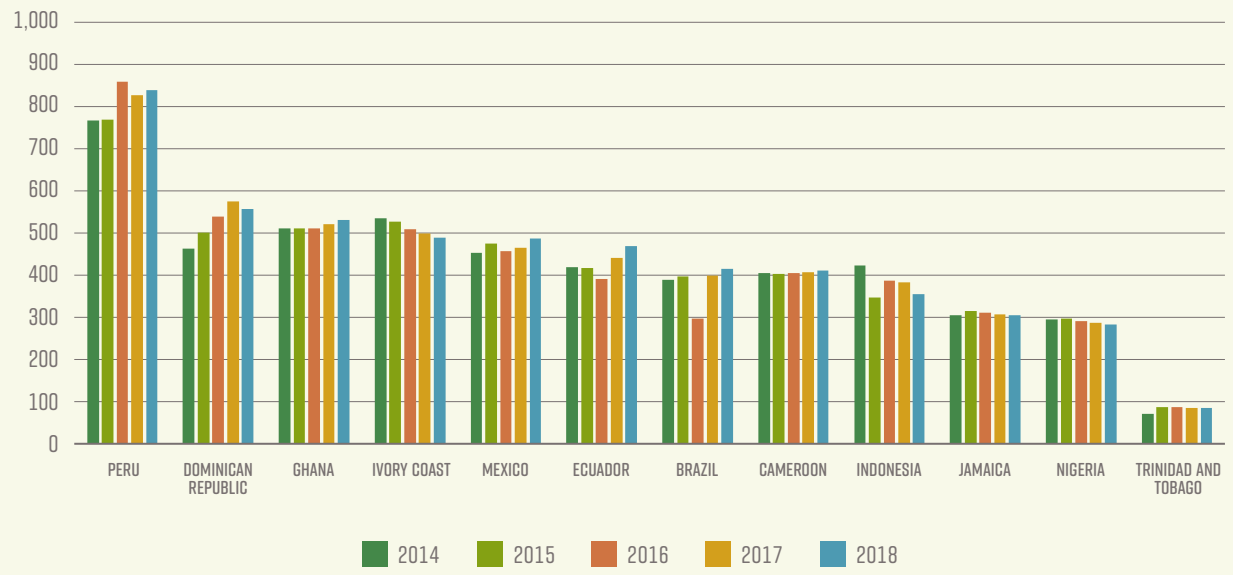
the process to privatize its commercial assets (initiated in 2014) was intensified by the DBJ, and the commercialization of cocoa was partly deregulated.[99] Some commercial functions of the Cocoa Industry Board were transferred to MICAF's Export Division.

Farmers

An estimated 6,000 farmers produce Jamaica's cocoa, most of them (90%) cultivating on small farms of less than 5 acres (or a little over 2 hectares).[100]

Production remains highly labor-intensive, with over 60% of production costs corresponding to labor.[101] It is also characterized by low levels of technology, fertilizer use, and investment.[102] As a result, compared to other cocoa-producing countries, the productivity of Jamaica's cocoa is low: 30% less than the average cocoa yields in other cocoa-producing countries in 2018, for instance **(Figure A)**.

FIGURE A: COCOA YIELDS IN JAMAICA AND OTHER COCOA-PRODUCING COUNTRIES (2014-2018), IN KILOGRAM PER HECTARE



Source: FAOStat.

99. http://dbankjm.com/uncategorized/privatisation-of-the-commercial-assets-of-the-cocoa-industry-board-cib/

100. https://jis.gov.jm/cocoa-industry-returning-path-growth/

101. Shik, O., Boyce, R. and De Salvo, C. P. (2017). *Analysis of Agricultural Policies in Jamaica*. IDB.

102. Bedasse, J. (2017). *Assessment of the Vulnerability of Jamaica's Agricultural Sector to the Adverse Consequences of Severe Weather Events*. IICA.

Processing, Markets and Consumers

Once harvested, wet cocoa beans are collected by middlemen (or collectors) and supplied to Jamaica's two main wet cocoa beans processors:

- **The Cocoa Industry Board:** The Board purchases beans at a farm-gate price that it itself sets: 200 JMD per kilogram until 2016 and 260 JMD afterward. In 2014, the GOJ initiated a process to divest the board´s commercial assets (including 3 processing facilities) but has had little success doing so. As of 2019, the 3 processing facilities are still up for sale and 2 of them remain in operation.[103]

- **The Jamaica Cocoa Farmers' Association (JCFA):** The JCFA was established in 2008 by cocoa farmers to revitalize the subsector through farmer engagement, partnerships within the industry, and the provision of technical assistance and training.[104] The JCFA also operates a processing facility and has been offering more favorable prices than the Board to cocoa farmers.

Until 2018, the Board acted as the sole marketing agent for dried fermented cocoa beans. As of 2019, the Export Division, which took over some commercial functions of the Board, continues to buy, transform, and sell (and export) cocoa but must this time compete with the private sector. The main export markets for Jamaica's "fine and flavor" cocoa are Europe (Switzerland, Holland, and France, more specifically), Japan, and the United States.[105] Between 2015 and 2019, while the world price of cocoa fell by 25% according to the ICCO, the price of Jamaica's cocoa exports increased by 6% thanks to its access to the "fine and flavor" niche market.[106]

103. http://dbankjm.com/uncategorized/privatisation-of-the-commercial-assets-of-the-cocoa-industry-board-cib/

104. https://jis.gov.jm/cocoa-stakeholders-hold-consultations-tuesday/

105. http://www.jamaicaobserver.com/editorial/jamaican-cocoa-could-be-sweet-again_48936

106. FAOStat.

Key Challenges

- **Low productivity:** Between 2015 and 2019, cocoa yields decreased by 7% in Jamaica: from 304 kilograms per hectare down to 281.5 kilograms per hectare. In 2018, compared to other cocoa-producing countries, average yields were 30% lower in Jamaica **(Figure A)**. The main factors behind this low productivity are:

  – The production structure: small and aging farmers.[107]

  – Disease infestations: The Frosty Pod Rot (FPR) and black pod disease, in particular. A 2015 survey of cocoa farmers shows that 91% of them had been affected by such diseases, thus making them the main challenge experienced by Jamaican cocoa farmers.[108]

  – Low investments, which have led to low technology use, aging cocoa trees and poor tree maintenance. One significant driver of low investments is excessive market interventions in the subsector. As detailed in the PSE analysis, between 2015 and 2019, cocoa farmers received lower farm-gate prices than they would have received in the absence of policy interventions. This implicit taxation is the result, to a large extent, of price regulations by the Cocoa Industry Board, which have disrupted price transmission at the farm-gate level and thus disincentivized farmers from investing in cocoa production.

- **Lack of attractiveness of the subsector for private actors:** Issues faced by the GOJ to find private investors willing to acquire the commercial assets of the Cocoa Industry Board indicate that the subsector is not yet perceived as a viable investment opportunity. Persistently low cocoa production volumes, in particular, represent a significant bottleneck that threatens the economic viability of the subsector as a whole, despite its privileged access to the "fine and flavor" market.[109]

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107. Shik, O., Boyce, R. and De Salvo, C. P. (2017). *Analysis of Agricultural Policies in Jamaica*. IDB.

108. Eitzinger A. et al. (2015). *Jamaica: Assessing the Impact of Climate Change on Cocoa and Tomato*. Policy Brief No. 28. International Center for Tropical Agriculture (CIAT).

109. Ruf, F., O., and Tschannen, A. (2009). *Why and How to Re-Launch the Cocoa Sector in Jamaica?* CIRAD / USAID.

- **High vulnerability to climate change and natural disasters:** The subsector is highly vulnerable to both droughts and hurricanes. Between 2012 and 2013, for instance, cocoa production declined significantly due to the combined effects of Hurricane Sandy and droughts. The former led to a 49% decline in production in the affected areas. Additional policy efforts are needed to improve the subsector's resilience to natural disasters and other climate-related events.[110]

5. DAIRY VALUE CHAIN ANALYSIS

Background

As described above, between 2015 and 2018, fresh milk production increased by 19% to 14.2 million liters. In 2019, however, it fell back to 11.89 million liters, which is equivalent to the production level of 2015. These figures are far below the objective to increase local production of milk to 55 million liters by 2017, set out in the MICAF's 2008 Dairy Sector Revitalization Program (DSRP). Over the same period, dairy imports, expressed in fluid equivalent, increased by 49% to 116 million liters (approximately US$ 52 million).[111] In other words, as of 2019, Jamaica imports over 90% of the dairy products (including milk) it consumes. Imports mostly consist of milk powder, which is then processed into liquid milk, cheese, ice cream, and condensed milk, as well as finished products such as cheese.

Farmers

As of 2019, there are approximately 100 milk producers in Jamaica. Most of the milk is produced by Jamaica's 4,000 Jamaica Hope cows, with an average production of 5 to 7 liters of milk per day per cow, which is quite low.[112]

The JDDB sets the farm-gate price. In 2018, for instance, it was approximately 91 JMD per liter of milk. That same year, 30 dairy

110. Bedasse, J. (2017). *Assessment of the Vulnerability of Jamaica's Agricultural Sector to the Adverse Consequences of Severe Weather Events.* IICA.

111. http://jamaica-gleaner.com/article/lead-stories/20191203/get-moo-ving-govt-looks-revive-dairy-sector

112. http://jamaica-gleaner.com/article/news/20191204/milk-opportunity-massive-chance-local-dairy-farmers-increase-production

producers were surveyed by MICAF's Economic Planning division and reported the following production costs:[113]

- 45.09 JMD per liter for small non-irrigated farms, which is equivalent to 50% of the farm-gate price.
- 86.30 - 88.41 JMD per liter for large irrigated and non-irrigated farms, which is more or less equivalent to 100% of the farm-gate price.
- Above 100 JMD per liter for medium irrigated and non-irrigated farms, which is higher than the farm-gate price.

Despite the existence of policies that allow milk producers to receive higher farm-gate prices than international reference prices (as described above in the PSE analysis), the latter two groups of milk producers do not seem profitable due to a combination of factors which are explained in more details in the "Key Challenges" section below.

Processing, Markets and Consumers

As of 2019, there are only 4 major processors in Jamaica, which produce liquid milk, cheese, ice cream, and condensed milk, using either domestic fresh milk or imported milk powder. These products are then sold on the local market by retailers. The retail price of processed liquid milk can be disaggregated as follows:[114]

- 25% goes to dairy farmers.
- 40% goes to processing costs.
- 35-40% goes to retail margins.

According to the JDDB, the retail price of processed liquid milk in Jamaica is one of the highest in the world, which goes to explain why individual milk consumption in Jamaica is low relative to other countries in the LAC region and less than the World Health Organization's daily recommendations.[115] High retail prices are to a large extent the result of underutilized processing capacity (Jamaica went from producing 38.8 million liters of fresh milk in 1992 to 14.2 in 2019) and processors' dominant market position (dairy farmers are not well integrated into the market and thus often have no choice but to sell their milk to the 4 major processors).[116]

113. Data provided by the JDDB.

114. *Ministry Paper 54 / 2014*. Jamaica Dairy Development Board.

115. *Ministry Paper / 2015*. Jamaica Dairy Development Board.

116. Knips, V. (2006). *Developing Countries and the Global Dairy Sector Part II: Country Case Studies.* PPLPI Working Paper No. 31. FAO.

In order to meet domestic demand, retailers also import a significant volume of dairy products. Expressed in fluid equivalent, dairy imports in 2019 represented 116 million liters, which is more than 8 times the volume of domestic fresh milk production.

Key Challenges

- **Decreasing number of mature milking cows:** The subsector's profitability decline has led to a decrease in investments necessary to, at least, maintain cow herds at their current level and to an increasing number of cows entering the meat trade.

- **Inefficiencies throughout the value chain:**

  – **At the production level**, as a result (among other factors) of:

    - **High and increasing inbreeding**.[117] Improving productivity in the subsector will require increasing the genetic potential for milk production and quality.[118] MICAF's R&D Division is already working on improving genetics and breeding, while there have been attempts by the private sector to import more productive animals into the country.[119]

    - **High production costs**, caused by (i) dependence on costly and imported feed and, conversely, inadequate domestic pastures and fodders[120]; and (ii) high electricity costs, among other factors. MICAF's R&D Division is also currently working on improving animal nutrition.[121] Similarly, the JDDB has been working on the promotion of high-yielding grass varieties and on the conservation of fodder and forages.[122]

117. http://jamaica-gleaner.com/article/news/20191204/milk-opportunity-massive-chance-local-dairy-farmers-increase-production

118. http://jamaica-gleaner.com/article/lead-stories/20191203/get-moo-ving-govt-looks-revive-dairy-sector

119. http://jamaica-gleaner.com/article/business/20190322/dairy-output-grows-critical-care-still-required

120. http://jamaica-gleaner.com/article/news/20191204/milk-opportunity-massive-chance-local-dairy-farmers-increase-production

121. http://jamaica-gleaner.com/article/news/20191204/milk-opportunity-massive-chance-local-dairy-farmers-increase-production

122. http://jamaica-gleaner.com/article/business/20190322/dairy-output-grows-critical-care-still-required

- **High production costs** are also the consequence of low technology use. Dairy equipment costs are high, and so are costs of financing.[123] But even in times of lower interest rates on agricultural loans, the credit uptake in the dairy subsector remained low, which could be explained either by a lack of interest in technological change or by persistent expectations of low returns on such investments.[124]

  Overall, it seems unclear whether the current industry structure dominated by small-scale traditional dairy farming can overcome these challenges and satisfy current domestic demand.[125] A growing consensus suggests that a move towards a more intensive and specialized dairy farming might be the solution.[126]

– **At the processing level:** As described above, high processed liquid milk retail prices are to a large extent the result of underutilized processing capacity and other inefficiencies at processing plants.[127]

123. http://jamaica-gleaner.com/article/news/20191204/milk-opportunity-massive-chance-local-dairy-farmers-increase-production

124. Knips, V. (2006). *Developing Countries and the Global Dairy Sector Part II: Country Case Studies*. PPLPI Working Paper No. 31. FAO.

125. http://jamaica-gleaner.com/article/business/20190322/dairy-output-grows-critical-care-still-required

126. Miller, R.C. et al. (2007). *Revitalization of the Jamaica Dairy Sector: Evaluation of the Feasibility of Business Models for Intensive Dairy Production*. Jamaican Society for Agricultural Sciences, September 2007.

127. Miller, R.C. et al. (2007). *Revitalization of the Jamaica Dairy Sector: Evaluation of the Feasibility of Business Models for Intensive Dairy Production*. Jamaican Society for Agricultural Sciences, September 2007.

ANNEXES

ANNEX 3: PSE METHODOLOGY DEFINITIONS*

Producer Support Estimate (PSE): The annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm-gate level, arising from policy measures that support agriculture, regardless of their nature, objectives, or impacts on farm production or income.

Percentage PSE (PSE%): PSE as a share of gross farm receipts.

General Services Support Estimate (GSSE): the annual monetary value of gross transfers to general services provided to agricultural producers collectively (such as research, development, training, inspection, marketing, and promotion), arising from policy measures that create enabling conditions for the primary agricultural sector through the development of private or public services, institutions, and infrastructure, regardless of their objectives and impacts on farm production and income, or consumption of farm products. The GSSE does not include transfers to individual producers.

Consumer Support Estimate (CSE): the annual monetary value of gross transfers from (to) consumers of agricultural commodities, measured at the farm gate level, arising from policy measures that support agriculture, regardless of their nature, objectives, or impacts on consumption of farm products.

Percentage CSE (CSE%): CSE as a share of consumption expenditure (measured at farm gate) net of taxpayer transfers to consumers.

Total Support Estimate (TSE): The annual monetary value of all gross transfers from taxpayers and consumers arising from policy measures that support agriculture, net of associated budgetary receipts, regardless of their objectives and impacts on farm production and income, or consumption of farm products.

Percentage TSE (TSE%): TSE as a share of GDP.

(*) *OECD's Producer Support Estimate and Related Indicators of Agricultural Support – Concepts, Calculations, Interpretation and Use (The PSE Manual)*. OECD (March 2016).

Single Commodity Transfers (SCT): The annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policies linked to the production of a single commodity such that the producer must produce the designated commodity in order to receive the transfer.

Percentage Single Commodity Transfers (SCT%): The commodity SCT as a share of gross farm receipts for the specific commodity.

Reference price: It is the price that domestic producers could have received for their products in the absence of any domestic or trade policy affecting the commodity's market. Border prices of imports or exports are often used as reference prices. Another option is to use specific border prices in neighboring countries or in countries that play a major role in international trade in that commodity, or prices on securities exchanges.

Reference price and producer's price for MPS calculations: Must be measured at the same level of processing and at the same market. Therefore, reference prices (border prices) must be adjusted for marketing margins to make them comparable to farm- gate producer prices. The adjustment is made for the cost of processing, handling, and transportation to the market where domestically produced commodity encounters the commodity from the foreign market.

Price adjustment for imported commodity:

CIF price + costs of transporting the product from the border to the internal wholesale market (T1) = price of imports at domestic market level – cost of transporting the product from the wholesale market to the farm gate (T2) – costs of processing farm product into imported product (S) = price of imports in farm gate equivalent.

Price adjustment for exported product:

FOBprice – handling and transportation costs between border and domestic wholesale market (T1) – handling and transportation costs between wholesale market and the farm gate (T2) – costs of processing of farm product into exported product (S) = price of exports adjusted to the farm gate level.

Budget Transfers (BTs): For calculating coefficients of support estimation can exist in the form of transfers to producers, financing of general services, or transfers to consumers. Thus, all budget transfers need to distinguish between PSE, CSE, and GSSE.

PSE categories indicate the way the policy program is implemented by indicating the base on which the transfer or subsidy is calculated, such as the value of production, number of animals, input use, services provided, income, or non-commodity criteria **(Table 12)**.

Budget transfers to fund general services have been separated from PSE and have instead been calculated as a separate indicator since 1998: **General Services Support Estimate (GSSE) (Table 13)**. In 2014, the OECD changed its methodology for estimating GSSE.

TABLE A: CLASSIFICATION OF BUDGET TRANSFERS IN PSE, ACCORDING TO OECD METHODOLOGY

CATEGORIES
A. SUPPORT BASED ON COMMODITY OUTPUT
A.1. MARKET PRICE SUPPORT
A.2. PAYMENTS BASED ON OUTPUT
B. PAYMENTS BASED ON INPUT USE
B.1. VARIABLE INPUT USE
B.2. FIXED CAPITAL FORMATION
B.3. ON-FARM SERVICES
C. PAYMENTS BASED ON CURRENT A (AREA) /AN (ANIMAL NUMBER) /R (RECEIPTS) /I (INCOME), PRODUCTION REQUIRED
C.1. BASED ON CURRENT RECEIPTS/INCOME
C.2. BASED ON CURRENT AREA/ANIMAL NUMBER
D. PAYMENTS BASED ON NON-CURRENT A/AN/R/I, PRODUCTION REQUIRED
E. PAYMENTS BASED ON NON-CURRENT A/AN/R/I, PRODUCTION NOT REQUIRED
E.1. VARIABLE RATES (VARY WITH RESPECT TO LEVELS OF CURRENT OUTPUT OR INPUT PRICES, OR PRODUCTION/YIELDS AND/OR AREA)
E.2. FIXED RATES
F. PAYMENTS BASED ON NON-COMMODITY CRITERIA
F.1. LONG-TERM RESOURCE RETIREMENT
F.2. SPECIFIC NON-COMMODITY OUTPUT
F.3. OTHER NON-COMMODITY CRITERIA
G. MISCELLANEOUS PAYMENTS

Source: OECD, 2016.

TABLE B: CLASSIFICATION OF GSSE BUDGET TRANSFERS, ACCORDING TO OECD METHODOLOGY

GENERAL SERVICES SUPPORT ESTIMATE (GSSE)
H. AGRICULTURAL KNOWLEDGE AND INNOVATION SYSTEM
H.1. AGRICULTURAL KNOWLEDGE GENERATION
H.2. AGRICULTURAL KNOWLEDGE TRANSFER
I. INSPECTION AND CONTROL
I.1. AGRICULTURAL PRODUCT SAFETY AND INSPECTION
I.2. PEST AND DISEASE INSPECTION AND CONTROL
I.3. INPUT CONTROL
J. DEVELOPMENT AND MAINTENANCE OF INFRASTRUCTURE
J.1. HYDROLOGICAL INFRASTRUCTURE
J.2. STORAGE, MARKETING, AND OTHER PHYSICAL INFRASTRUCTURE
J.3. INSTITUTIONAL INFRASTRUCTURE
J.4. FARM RESTRUCTURING
K. MARKETING AND PROMOTION
K.1. COLLECTIVE SCHEMES FOR PROCESSING AND MARKETING
K.2. PROMOTION OF AGRICULTURAL PRODUCTS
L. COST OF PUBLIC STOCKHOLDING
M. MISCELLANEOUS

Source: OECD, 2016.

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