Quantitative Measurement of Agricultural Support in Ghana using PSE (Producer Support Estimate) Indicator

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ABSTRACT

Averagely, agriculture accounted for 19.3% of the total GDP accrued to Ghana's economy, and provided employment for 32.49% of the total population within the period 2015 – 2019. Agricultural land in general occupies the greater percentage of entire land area in Ghana (65.14%). Almost half of the total population (44.61%) in Ghana lives in the rural areas and majority of which are engaged in agriculture. The aim of this paper is to measure the level of government support to farmers' income in Ghana, using the Producer Support Estimate (PSE) approach. Specifically, Single Commodity Transfers (SCT) and expression of % SCT for individual commodities, which account for about 70% of the total value of agricultural production in Ghana was used. Inasmuch as important data on market price and budgetary support to Ghana's agriculture in the period 2015 – 2019 were still not inserted in the OECD database, data on market price were sourced from World Bank and FAOSTAT for the analysis. On the other hand, data on budgetary support to Ghana's agriculture for 2015 – 2019 were not in existence. Inadequate literature on policy support to Ghana's agriculture and lack of data on budgetary support to Ghana's agriculture was a limitation and therefore limits the scope of this research. The study revealed that producers of agricultural commodities such as cocoa, maize and coffee received positive market price support, only with the exception of rice which received negative market price support in the period 2015 – 2019. The %SCT for cocoa, maize, rice and coffee were 57.83%, 37.73, -72.28 and 29.79 respectively. It is recommended that the government of Ghana would intensify production to secure enough food for its population and provide jobs initiative as a policy support to provide sustainable incentives for producers of agricultural commodities in the country. This refers especially to rice, since it was the most deprived with significant market price support during the period of the study.

Keywords: Agricultural policy, PSE approach, Single Commodity Transfers, Agricultural commodities, Ghana

INTRODUCTION

Agricultural sector accounts for one-fifth of Gross Domestic Product (GDP) of Ghana and employs nearly half of the workforce. It is the main source of livelihood for the majority of the country's poorest households. About two-thirds of non-oil manufacturing companies depend on agriculture for raw materials. Likewise, agriculture and agribusiness account for a major share of all economic activities and livelihoods of smallholder farmers. The major export crop of Ghana, cocoa, accounts for 20-25 percent of total foreign exchange earnings for the country. Ghana provides about 20 percent of global cocoa exports and has a

recognition for high quality cocoa beans, which accounts for 3-5 percent market premium. An important part of agricultural public expenditure is for input subsidies, meanwhile evidence shows that these subsidies are inefficient and generate low returns. The government provides fertilizer subsidies to farmers through MoFA and also to cocoa farmers through COCOBOD. Also, there are issues related to agricultural services which have been delegated to the District Assemblies.

Although, Ghana has initiated its decentralization policy, but much more need to be done to give full meaning to administrative and fiscal decentralization, specifically for key sectors such as agriculture whose functions and services are needed most at the local level. The delivery of agricultural extension services and other services at the local level remains rather poor, as a result of low capacity, limited and untimely provision of public funding (World Bank, 2017).

Meanwhile, according to the Organization for Economic Co-operation and Development (OECD, 1999), over-supply in response to recent high prices in combination with depressed economic conditions in the main emerging markets resulted in falling commodity prices. Also, agricultural situation in Sub-Saharan Africa is often described as bad in quality, which needs immediate policy action if food production is to keep up with a growing population, famine averted and poverty reduced (Dewbre and Borot de Battisti, 2008).

The challenge is to use a range of well-targeted policy measures and approaches which can ensure that the rising concerns regarding food safety, food security, environmental protection and the viability of rural areas are met in ways that maximize benefits and avoid distortion of production and trade (OECD, 1999).

The purpose of the research is to measure the level of government support to the farmers' income in Ghana. This government support is based on market measures and budgetary transfers directed towards producers. Budgetary transfers are provided in agricultural policy by applying the producer support estimate (PSE) methodology. It is used to assess whether agricultural policies have a positive or negative impact on farmers' income and also used to assess the economic status and the economic sustainability of farms.

Also, the research seeks to measure government support to agriculture in Ghana and to quantify the impact of market price support and budgetary transfers to farmers' income, thereby identifying the need to improve incentives in order to achieve economic sustainability of agricultural households.

LITERATURE REVIEW

Performance of Agricultural Sector in Ghana

Ghana's agriculture contributes 19.7% to current GDP and accounts for over 30% of export earnings and serves as a major source of inputs to the manufacturing sector. In the year 2019, 33.5% of labor force in Ghana was absorbed by the agriculture sector. Agriculture is the second largest employer in the economy of Ghana but the smallest sector as compared to services and industry. The agriculture sector grew from 2.9% in the year 2016 to 6.1% in the year 2017, recorded a growth of 4.8 in the year 2018 and it is projected to grow at 6.9% in the year 2019. Agriculture is known by many as a key factor in Ghana's economic growth and development process.

Ghana has a total land area of 238,539 km^2 of which 57% of it representing 136,000 km^2 is identified as agricultural land, of which 58,000 km^2 (24.4 %) is under cultivation and 11,000 hectares are under irrigation. The agriculture sector in Ghana is characterized as very informal and hence lacks high quality official data. Ghana's agriculture is predominately smallholder farmers (about 80%), traditional and rain fed.

Agriculture sector is most often divided into four subsectors, and these are crops, livestock, forestry and

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logging and fishing. Ghana's major agricultural commodities include Cocoa beans, yam, cassava, plantain, maize, groundnuts, cocoyam, rice, oil palm, tomatoes, pepper, oranges, onions, sorghum and pineapples (Ministry of Economy and Industry, 2020). Ghana is a net importer of basic foods (raw and processed) including rice, poultry, sugar, and vegetable oils.

Meanwhile, there are both challenges and opportunities towards achieving transformation and modernization of the agriculture sector in Ghana. These issues underline the special challenges confronting Ghana to sustain and accelerate agriculture growth towards economic transformation (World Bank, 2017).

Government Agencies Responsible for Agricultural Policies in Ghana

The responsibility for agricultural policy development and implementation is widespread across a number of agencies. Ministry of Food and Agriculture (MoFA) is the lead ministry for the agricultural sector, responsible for non-cocoa crops and livestock. The Ghana Cocoa Board (COCOBOD) is responsible for cocoa, coffee and shea nuts. The Agricultural Research Institutes of the Council for Scientific and Industrial Research (CSIR) under the Ministry of Environment, Science, and Technology and Innovation (MESTI) and other agencies in the National Agricultural Research System (NARS) are responsible for agricultural research (Ministry of Economy and Industry of Israel, 2020).

Government Agricultural Flagship Programs and Interventions

Planting for Food and Jobs – The Government of Ghana's agriculture modernization program is directed towards improving production efficiency, achieving food security and profitability for farmers, and more importantly increasing agricultural productivity as the basis for industrialization, job creation and export. Government has increased subsidies on retail prices of seeds, fertilizers and other agrochemicals, and it is focusing on developing irrigation schemes in order to facilitate the provision of community owned and managed small-scale irrigation facilities across the country, more importantly, in the northern Ghana, through the One Village, One Dam Policy. Extension officer to farmer ratio has also been improved (Ministry of Economy and Industry of Israel, 2020).

Planting for Food and Jobs is a flagship agricultural program of the Government of Ghana, with five (5) implementation modules. The five Modules are Food Crops (PFJ), Planting for Export and Rural Development (PERD), Greenhouse Technology Villages, Rearing for Food and Jobs (RFJ) and Agricultural Mechanization Services (AMSECs) (MoFA, 2021).

One District – One Factory Initiative – The One-District One-Factory Initiative was originally designated as the Rural Enterprises Development Program, and later rebranded as the District Industrialization Program (DIP). It was designed as a comprehensive program for rural industrialization, involving the setting up of at least one medium to large scale factory in each of the districts of Ghana. The Program seeks to address the challenge of severe poverty and underdevelopment among rural communities, through the establishment of an institutional framework that will attract private sector investments in rural development activities. It also seeks to promote local participation in economic development, and encourage new community-based public and private sector partnerships (1D1F, 2020).

One District One Factory Program is addressing the challenge of slow economic growth at the district level through a massive nationwide industrialization drive, which is equipping and empowering communities to utilize their local resources in manufacturing products that are in high demand both locally and internationally. The program is expected to facilitate the creation of about 7,000 to 15,000 jobs per district and between 1.5 million and 3.2 million jobs nationwide by end of 2021. Currently, 45 factories are operating under this initiative and 136 are in various phases of constructions (Ministry of Economy and Industry of Israel, 2020). The program was also initiated to absorb the locally produced agricultural products

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as means of raw materials to feed the local industries and to help provide ready market for local farmers in Ghana.

The PSE/CSE Concept of OECD Methodology

The measurement of agricultural assistance using the concept of PSE/CSE was developed and has evolved as a response to the needs of policymakers. As a result, the process needed to be precise, easily understood and possible, if it was to indicate to policy makers the levels of transfers arising from the implementation of agricultural policies. The PSE/CSE concept provides a rational framework to examine all of the policies affecting agricultural production, consumption and trade. With the calculation of the monetary transfers that result from agricultural policies, it has enabled a more effective and disciplined assessment of those policies than would be provided by a purely qualitative assessment. Meanwhile, the simplicity of the PSE/CSE measure defines the limits of the concept. Specifically, it is not a measure which can provide answers to every question that is being asked of it. It is valuable as a measure of the transfers between consumers, taxpayers and producers, but it does not cast emphasize on the effects on net incomes of particular groups in the economy, because it is not a welfare measure.

The preference of the PSE/CSE method was determined by a number of considerations. The principal among these was the priority to capture in a single, all-inclusive measure of the transfers to farmers from agricultural policies, implemented with a wide range of mostly complex and inter-related instruments. Specifically, the PSE incorporates clearly all domestic agricultural policy measures directly or indirectly affecting trade which would not be captured by measuring trade barriers alone. The calculation of PSE was perceived as being practically possible given the availability of data and resources. The method has the potential to produce comparable results across countries, commodities and through time, which are easily understood by policy makers. Despite the complex nature and different types of policy instruments designed to achieve agricultural policy, they ultimately provide assistance to the owners of factors of production engaged in the agricultural sector. Different types of measurement concepts have been developed to estimate assistance, the choice of which depends on the purpose of the measurement, the level of refinement, the detail desired and the availability of data.

There are **five categories** of agricultural policy measures that are included in the OECD calculations of PSEs:

- All measures which simultaneously affect producer and consumer prices (Market Price Support).
- All measures which transfer money directly to producers (Direct Payments) without raising prices to consumers.
- All measures which lower input costs (Reduction in Input Costs) with no distinction being made between subsidies to capital and those to other inputs.
- Measures which in the long term reduce costs but which are not directly received by producers (General Services).
- Other indirect support (Other), the main elements of which are sub-national subsidies (i.e. measures funded nationally by Member states in the case of the EC or regionally in the case of other countries) and taxation concessions.

Producer Support Estimates (PSEs) can be expressed in three ways: I) as the total value of transfers to the commodity produced; II) as the total value of transfers per unit of the commodity produced; and III) as the total value of transfers as a percentage of the total value of production including transfers. The value of production can be measured at domestic prices, as in the OECD calculations or at world prices. The expression of the transfers as total, per unit or percentage amounts depends on the type of comparisons being made. The total PSE for a commodity and country will reflect not only the rate of assistance but also the quantity of agricultural production. It is an important measure to monitor changes in quantities produced

emanating from supply control measures because an effective supply control policy will reduce or stabilize output which will be reflected in the total PSE measure. The per unit PSE, when expressed in a common currency, allows comparisons between countries and the rate of assistance to a particular commodity. Percentage PSE measurements allow comparisons between countries, commodities and the levels of assistance relative to the value of production (Cahill and Legg, 1990).

The PSE has as major practical advantage as a statistical measure. To be able to obtain it as a common framework, countries only have to settle on its definition. This leads to agreeing on (I) the items to be considered; (II) the producer and the reference prices to be used to calculate a margin; (III) the associated quantities; and (IV) the transfers to be considered. Building a model of such nature involves, a compilation of time-series data on quantities, prices and transfers of the PSE, stating a set of functional forms with estimated coefficients. In simple term, the PSE measure offers as major advantage that reduces the number of statistics and arithmetic operations the OECD-members have to agree upon in the context of negotiations.

However, there is substantial evidence showing that the PSE and related measures were used massively in the recent past, in spite of the fact that they are not indicative of the effect of trade liberalization. It still stands questionable that the PSE would have enjoyed such a privileged position, had the OECD director been conceding 30 years ago that it provides no measure of the severity of distortions in terms of effects, since it can hardly be contested that politicians worldwide have for a very long time been given the impression that the measure was indicative of the welfare loss from agricultural protection. Moreover, it has been argued that the PSE is primarily based on imputed value calculations that cannot be justified without a theoretical framework, which needs refinement to monitor situations in large countries and country groups such as the EU, the US, Canada, and non-OECD members such as China and India (Keyzer, 2006).

Different authors have used PSE and other related indicators of support measures to quantify (measure) support to agriculture. Research conducted by Đurić, Cvijanović, Prodanović, Čavlin, Kuzman and Bulatović (2019), to identify the level of government support to farmers' income in the Republic of Serbia by applying the producer support estimate (PSE) methodology revealed that producers of more significant agricultural commodities covered by the analysis in the period 2012 – 2016 did not get any significant support from the state. Most of the analyzed commodities had negative values of single commodity transfer (SCT) indicators which gave a conclusion that agricultural producers received more taxes than incentives in the Republic of Serbia. Likewise, Lema and Gallacher (2015) analyzed agricultural policy in Argentina and calculated the degree of support received by producers and consumers. The results indicated that domestic agricultural output prices had been lower than international prices. Also, total transfers from producers had averaged US$ 11.000 million annually which indicated 25-30% of total gross farm receipts, and export taxes had resulted in lower food prices for consumers and tax revenue for the government.

Calculation of producer support estimate (PSE) for South African agriculture for 1996, 1997 and1998 confirmed the continuous declination in government and market support to South African agriculture, high duty payable on sugar and 9 out of the 16 commodities analyzed had negative market price support, which was an indication that domestic market prices were lower than border prices (Kirsten, Tregurtha, Gouse and Tswai, 2000).

Shik, Stratan, Ignat and Lucasenco (2016), evaluated agricultural support in the Republic of Moldova and revealed that the level of support to agricultural producers measured by PSE was low and volatile, fluctuating between +6% and -21% in the period of study (2006-2014). They further indicated that both market price support and budget transfers components of PSE were volatile, however, the share of MPS in PSE was much higher, and in some years the level of budget transfers was not high enough to compensate for negative MPS, resulting in negative PSE. Also, Đurović and Bulatović (2014), estimated product support (PSE) for the beef meat production in Montenegro and the study suggests that % PSE for beef sector was at 15.63, owing to higher subsidies and broader funding from other budgetary and credits. Some of the

discussions above are summarized below (table 1):

Table 1: Works done by some Authors using PSE and other related Indicators

Topic (title) of the paper	Research Objective	Investigated problem	Study Area	Data sources	Research Results	Authors and Year
Serbian Agriculture Policy: Economic Analysis Using the **PSE** Approach	To identify the level of Government support to farmers' income in the Republic of Serbia by applying the producer support estimate **(PSE)** methodology.	Effect of low level of support to agriculture on farmers' income and on the economic and social sustainability of agricultural households.	Republic of Serbia	The national database, that is, the Official Gazette of the Republic of Serbia.	1) Producers of more significant agricultural commodities covered by the analysis in the period between 2012 and 2016 did not get any significant support from the state. 2) Most of the analyzed commodities hadnegative values of single commodity transfer (SCT) indicators. 3) Agricultural producers received more taxes than incentives. 4) The support to farmers' income through higher prices on the domestic market is paid by consumers.	Đurić, Cvijanović, Prodanović, Čavlin, Kuzman and Bulatović (2019)

Producer Support Estimate **(PSE)** for SouthAfrican agriculture for 1996, 1997, 1998	To update the series of PSE calculations based on the 1998 OECD methodology (OECD 1998) which is a slightly revised methodology from the earlier calculations.	Classification of policy measures under a slightly different set of categories.	South African	SouthAfrican Grain Information Service (SAGIS), SouthAfrican Sugar Association (SASA)	1) PSE calculations confirm the continuous decline in government and market supportto South African agriculture. 2) High duty payable on sugar is reflected in the high positive PSE results. Same applied to some meat commodities, where an import tariff of 40 percent resulted in positive PSEs. 3) 9 out of the16 commodities have negative market price support, which indicates that domestic market prices are lower than border prices.	Kirsten, Tregurtha, Gouse and Tswai (2000)

Continuation of Table 1:

Topic (title) of the paper	Research Objective	Investigated problem	Study Area	Data sources	Research Results	Authors and Year
Evaluationof Agricultural Support in the Republic of Moldova	To assesses the level and structure of government support to agriculture in Moldova by the application of the PSE methodology of OECD.	Comparison based on producers' output prices(farm gate prices)with pricesexpected withoutpolicy interventions.	Republic of Moldova	National Bureau of Statistics, Moldova.	1) The level of support to agricultural producers measured byPSE is low and volatile, fluctuating between +6%and -21% in the period of study (2006-2014).	Shik, Stratan, Ignat and Lucasenco (2016)

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					2) Both market price support and budget transfers components of PSE were volatile, however, the share of MPS in PSE was much higher, and in some years the level of budget transfers was not high enough to compensate for negative MPS, resulting in negative PSE.	
					3) In 2009 and 2012 the level of budget transfers was higher than MPS.	
					4) Average percentage PSE in 2012-2014 equaled -10%, which means that implicit taxation of the producers arising from agricultural policy was equal to ten percent of total farm receipts.	

Product support estimate (PSE) forthe beefmeat productionin Montenegro	To present quantification of indicator for the agricultural primary production sector, beef in particular, given the significant share of livestock in generation of GDP in agriculture.	Comparative analysis of agricultural policies and more targeted agriculturalbudget spendingfor meat sector inorder to raise competitiveness.	Montenegro	MONSTAT – Statistical office of Montenegro	1) The study suggests that % PSE for beef sector is at15.63, owing tohigher subsidiesand broaderfunding fromother budgetaryand credits.	Đurović and Bulatović (2014)
					2) Comparative analysis shows that % PSE value is higher than in China or Canada but also significantly smaller compared to the EU average (28.3), Switzerland (33.6) or Turkey (42.2).	

Continuation of Table 1:

Topic (title) of the paper	Research Objective	Investigated problem	Study Area	Data sources	Research Results	Authors and Year
Argentine Agricultural Policy: Economic Analysis and Impact Assessment Using the Producer Support Estimate (PSE) Approach.	To analyzes agricultural policy in Argentina and calculates the degree of support received by producers and consumers.	1) Understanding the impact of policy on prices paid by consumers and received by farmers.	Argentina	Not Applicable	1) As a result of export taxes, domestic agricultural output prices have been lower than international prices.	Lema and Gallacher (2015)

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		2) Discrimination against Argentina's agriculture through export taxes.			2) Total transfers from producers have averaged US$ 11.000 million annuallyor 25-30% of total gross farmreceipts.	
					3) Grains and beef have the highest (negative) support relative to milk, poultry and pork meat production.	
					4) Soybean crop accounts for a major portion of transfers from agriculture	
					5) The fact that on average 90% of the soybeans are exported implies that these transfers go mostly from farmers to tax collection.	
					6) Where exports are smaller portion of total production (e.g. beef or wheat) lower domestic prices mainly benefit consumers, and only secondarily tax collection.	
					7) Export taxes, however, result in lower food prices for consumers and tax revenue for government.	

Source: Systematization of author based on reviewed literature.

The PSE Indicators

The OECD indicators were developed to monitor and evaluate developments in agricultural policy, in order to establish a common base for policy dialogue among countries, and to provide economic data to assess the

effectiveness and efficiency of policies. The indicators were mandated by OECD Ministers in 1987 and have since been calculated for OECD and an increasing number of non-OECD countries. The indicators reflect the provision of support, or the level of effort made by governments, as implied by their agricultural policies. As such, they are not intended to and do not measure policy impacts on production, farm incomes, consumption, trade or environment.

The support indicators introduced below are different ways to analyze agricultural policy transfers and measure their levels in relation to various key economic variables. No single indicator can capture all aspects of agricultural support. Indicators of support to producers are:

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.

Producer Nominal Assistance Coefficient (producer NAC): the ratio between the value of gross farm receipts (including support) and gross farm receipts valued at border prices (measured at farm gate).

Producer Nominal Protection Coefficient (producer NPC): the ratio between the average price received by producers at farm gate (including budget payments per ton of current output), and the border price (measured at farm gate).

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

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

Group Commodity Transfers (GCT): The annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policy measures whose payments are made on the basis that one or more of a designated list of commodities is produced, i.e. a producer may produce from a set of allowable commodities and receive a transfer that does not vary with respect to this decision.

All Commodity Transfers (ACT): 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 place no restrictions on the commodity produced but require the recipient to produce some commodity of their choice.

Other Transfers to Producers (OTP): 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 do not require any commodity production at all (OECD, 2016).

MATERIALS AND METHODS

Sources and Types of Data

The research employed the analysis of secondary data from the World Bank's database and Food and

Agriculture Organization statistical database (FAOSTAT). Inasmuch as important data on market price and budgetary support to Ghana's agriculture for the period between 2015 and 2019 were still not inserted in the OECD database, data on market price were sourced form World Bank and FAOSTAT for the analysis. On the other hand, data on budgetary support to Ghana's agriculture for the period between 2015 and 2019 were not in existence. Inadequate literature on policy support to Ghana's agriculture and lack of data on budgetary support to Ghana's agriculture was a limitation and therefore limits the scope of this research.

Data Analysis

In spite of the complicated nature and variety of policy instruments designed to achieve agricultural policy, they ultimately provide assistance to the owners of factors of production engaged in the agricultural sector. A variety of measurement concepts have been developed to estimate assistance to agriculture, of which the choice depends on the purpose of the measurement and the availability of data (Cahill and Legg, 1990).

Producer Support Estimate (PSE) is the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policies that support agriculture, regardless of their nature, objectives or impacts on farm production or income (OECD, 2016). The calculation of PSE admits the fact that policies which deliver assistance to producers occur by transferring income from either consumers or taxpayers and it is a measure of producer transfer, not incentives to production. The PSE is designed to measure transfers to primary agriculture and not to the processing and distribution sectors (Cahill and Legg, 1990).

When Producer Support Estimate (PSE) for a certain commodity is zero, it means that producers sell their commodities on the domestic market at world commodity prices and receive no support from government. When PSE is positive, it means that producers are subsidized either through prices support and or through budgetary transfers. Moreover, when PSE indicator is negative, it means that producers are taxed either based on lower prices of commodities as compared to the world commodity prices or based on taxes imposed by agricultural or trade policy measures.

The PSE can be sub-divide into four mutually exclusive indicators of support based on the degree to which policy measures deliver support on a commodity basis. The support can be calculated in four different levels, namely:

- **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. It is expressed as the sum of all single commodity transfers in PSE categories A, B, C and D.
- **Group Commodity Transfers (GCT) —** the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policies whose payments are made on the basis that one or more of a designated list of commodities is produced. It is expressed as the sum of transfers to groups of commodities in PSE categories B, C, and D.
- **All Commodity Transfers (ACT) —** the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policies that place no restrictions on the commodity produced but require the recipient to produce some commodity of their choice. It is expressed as sum of transfers to all commodities in PSE categories B, C, and D.
- **Other Transfers to Producers (OTP) —** the annual monetary value of gross transfers from

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consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policies that do not require any commodity production at all. It is expressed as the sum of transfers in PSE categories E, F and G.

The PSE categories **A, B, C, D, E, F** and **G** can be expressed as:

A — Support based on commodity outputs

B — Payments based on input use

C — Payments based on current A/An/R/I, production required

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

F — Payments based on non-commodity criteria

G — Miscellaneous payments

A/An/R/I means area, animal numbers, receipts or income (OECD, 2016)

For the purpose of this paper, producer Single Commodity Transfers (SCT) and expression of % SCT for individual commodities, which account for about 70% of the total value of agricultural production in Ghana was used. Đurić, Cvijanović, Prodanović, Čavlin, Kuzman and Bulatović (2019) used the same methodology to calculate the support of the total production of basic agricultural commodities of particular importance in the Republic of Serbia.

According to OECD (2016), Producer Single Commodity Transfers (producer SCT) is 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**.** Single Commodity Transfers can be derived for individual commodities and at the national level and usually expressed as a percentage value called percentage SCT. It is represented with the following mathematical equations:

$$\textbf{Producer SCT} = \textbf{MPS} + \Sigma\ \textbf{BOT}$$

where:

- **Producer SCT — producer single commodity transfers**
- **MPS — market price support** (MPS is calculated as a Price Gap, i.e., MPD —Market Price Differential. The MPD for a commodity is expressed as: **MPD = PP – RP**, where PP— producer price or domestic price and RP— reference price or border price at farm gate); **MPS = QP * MPD, where QP – Level of production.**
- **Σ BOT —** national aggregate budgetary and other transfers to producers from policies that have been labelled as based on a single commodity (SC). It occurs in different forms such as payments based on output, input use, current production required, and non-current production required. **It should be noted that for this analysis, data on budgetary and other transfers to producers (2015-2019) were not in existence (0.00) and therefore Producer SCT = MPS.**

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Percentage single commodity transfer (%SCT) presents the share of **gross producer receipts** arising from agricultural policy measures. This can also be expressed as:

% SCT = producer SCT/GR × 100

and:

GR = VP + producer SCT – MPS

or **GR = VP + (MPS + Σ BOT) – MPS**

or simplified **GR = VP + Σ BOT (based on a single commodity – SC).**

where:

- **% SCT — percentage single commodity transfer**
- **GR — gross receipts for the commodity**
- **VP — value of production**

RESEARCH RESULTS AND DISCUSSIONS

Features of Agriculture in the Economic Structure of Ghana

The features of agriculture in the economic structure of Ghana are presented in the table 2:

Table 2: Features of Agriculture in the Economic Structure of Ghana

Indicator	Average for the Period 2015–2019
Agriculture value added (% of GDP)	19.30
Employment in agriculture (% of total employment)	32.49
Agricultural land (% of land area)	65.14
Rural population (% of total population)	44.61

Source: Author's computation from World Development Indicators. World Bank (2021). Available: https://databank.worldbank.org/source/world-development-indicators

Averagely, agriculture accounted for 19.30% of the total GDP accrued to Ghana's economy between the periods of 2015 and 2019, and provided employment for 32.49% of the total population within the same period. Agricultural land in general occupies the greater percentage of entire land area in Ghana. Agricultural land put into cultivation accounted for 65.14% of the total land area in Ghana for the same period of the study. The percentage of rural population, of which majority are engaged in agriculture was revealed to be 44.61. This means that almost half of the total population in Ghana lived in the rural area during the period of the study (2015-2019).

Indicators of Support to Individual Agricultural Commodities

According to the OECD methodology, the calculation of support using the PSE methodology is by rule carried out only for agricultural commodities that account for 70% of the total value of agricultural output in a given country in the observed period (Đurić *et al*, 2019). In Ghana, the following accounted for the biggest share of the total value of agricultural commodities produced between the periods of 2015 and 2019,

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and these were Cocoa beans, Maize, paddy Rice and Coffee. These commodities represent about 70% of the total agricultural output produced in the country. Table 7 represents the Percentage Single Commodity Transfer (%SCT) of the above named commodities for the period between 2015 and 2019. It should be noted that all budgetary and other transfers (Σ BOT) are equal to zero (0.00) since data related to the budgetary and other transfers are not available.

Table 7: Calculation of % SCT for individual commodities (Average for 2015–2019)

Indicator	**Units**	**Cocoa beans**	**Maize**	**Rice, daddy**	**Coffee, Robusta**
Value of production	Mil USD	756.88	570.00	180.00	0.47
Producer Single Commodity Transfers (producer SCT)	Mil USD	437.74	215.24	-130.10	0.14
A1. Market Price Support (MPS)	Mil USD	437.74	215.24	-130.10	0.14
A2. Payments based on output	Mil USD	0.00	0.00	0.00	0.00
B. Payments based on input use	Mil USD	0.00	0.00	0.00	0.00
C2. Payments based on current A/An, production required (single payment)	Mil USD	0.00	0.00	0.00	0.00
D. Payments based on non-current A/An/R/I, production required (single commodity)	Mil USD	0.00	0.00	0.00	0.00
Gross receipts for individual commodity	Mil USD	756.88	570.00	180.00	0.47
Percentage Producer Single Commodity Transfer (% SCT)	**%**	**57.83**	**37.73**	**-72.28**	**29.79**

Note: all budgetary and other transfers (Σ BOT) are not in existence and therefore = 0.00

Source: Author's computation from World Bank Commodities Price Forecast (constant US dollars) and FAOSTAT.

The level of support for cocoa producers' income as expressed by %SCT indicator value, according to available data for the period between 2015 and 2019 were good, as it accounted for 57.83%. The positive value of single commodity transfer (SCT) indicator means that cocoa farmers or producers received more incentives than taxes for the period between 2015 and 2019. Cocoa farmers in Ghana were mostly **given fixed and constant price** for their production by the government, irrespective of the fluctuation in the world market price.

For maize, the level of support for producers' income as expressed by %SCT indicator value, according to available data for the period between 2015 and 2019 were fairly good, as it accounted for 37.73%. The positive value of single commodity transfer (SCT) indicator means that maize farmers or producers received more incentives than taxes for the period between 2015 and 2019. This means that maize farmers or producers in Ghana **were given domestic price higher than the world commodity price** between the period of 2015 and 2019.

The level of support for paddy rice producers' income as expressed by %SCT indicator value, according to available data for the period between 2015 and 2019 resulted in a negative value, as it accounted for -72.28%. The negative value of single commodity transfer (SCT) indicator means that paddy rice farmers or producers received more taxes than incentives within the period of the research. This means that paddy rice farmers or producers in Ghana **were given domestic price lower than the world commodity price** within the said period. The negative value of SCT could be as a result of lack of budgetary support to producers of

paddy rice in Ghana within the period of the research. The lack of budgetary transfers to rice farmers in Ghana between the periods 2015 and 2019, leads to the conclusion that rice producers do not enjoy significant support (lower prices; lack of other forms of budget support) and therefore incurred higher production costs. Moreover, according to Lancon and Erenstein (2002), rice production in Ghana is fluctuating, with high production in some years and low in others and has further resulted in Ghana depending largely on imported rice to make up the deficit in rice supply.

On the part of coffee, the level of support for producers' income as expressed by %SCT indicator value, according to available data for the period between 2015 and 2019 were moderate, as it accounted for 29.79%. The positive value of single commodity transfer (SCT) indicator means that coffee farmers or producers received more incentives than taxes for the period between 2015 and 2019. Coffee farmers in Ghana were mostly **given fixed and constant price** for their production by the government, irrespective of the fluctuation in the world market price.

CONCLUSION

The study revealed that producers of agricultural commodities such as cocoa, maize and coffee received positive market price support, only with the exception of rice which had negative market price support between the period of 2015 and 2019. The negative value of SCT could be as a result of lack of budgetary support to producers of paddy rice in Ghana within the period of the research. The lack of budgetary transfers to rice farmers in Ghana between the periods 2015 and 2019, affirm that rice producers do not enjoy significant support (lower prices; lack of other forms of budget support) and therefore incurred higher production costs or generated lower incomes.

The OECD methodology, specifically the PSE approach, was applied in the research with the purpose of quantifying the impact of market price support and budgetary transfers to producers of certain agricultural commodities. This research should be aiming as a preliminary and as effort to increase knowledge about agricultural policy measures in Ghana.

It is recommended that the government of Ghana would intensify the planting for food and jobs initiative as a policy support to provide sustainable incentives for producers of agricultural commodities in the country, and more especially rice, since it is the most **deprived** with significant market price support during the period of the research.

This research is preliminary and an attempt to increase the knowledge about agricultural policy measures in Ghana. Inadequate literature on policy support to Ghana's agriculture and lack of data on budgetary support to Ghana's agriculture was a limitation and therefore limits the scope of this work. The author is fully aware that these results should be interpreted with caution.

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