

Article

Economic Connectiveness and Pro-Poor Growth in Sub-Saharan Africa: The Role of Agriculture

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Abstract: In Sub-Saharan Africa, economic growth is essential for poverty reduction, and pro-poor growth is the renewed focus of today's political debate. The present paper adds to the literature on the growth–inequality relationship. It provides an in-depth analysis of the potential role of agriculture in promoting pro-poor growth in rural and urban areas compared with that of other activities. This aspect still lacks rigorous empirical support. Using the Nexus project SAMs by the International Food Policy Research Institute, this study identifies the level of ‘keyness’ of 36 activities (12 are agricultural) in nine Eastern, Western, and Central African countries using the inter-industry linkages analysis. Afterwards, it investigates the income distribution multipliers effects of activities growth across households classified in quantiles in rural and urban areas. Therefore, the paper adds to the literature, mainly focused on rural poverty and information on the growth effect on urban poverty, which is important in the context of rapid urbanization and the growing number of poor people in African cities. Apart from country-specific factors, the results confirm the strong integration of agriculture with the economy. The growth of key agricultural activities presents the most pronounced multiplicative effect on the income of rural households in the lowest quantiles. Poor urban households also benefit from their growth, but not to the same extent as rural households with an increase in the rural–urban income gap.

Keywords: pro-poor growth; rural–urban poverty; agricultural development; multiplier analysis; Sub-Saharan Africa



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1. Introduction

COVID-19, conflict and climate change are recent global shocks that have had a tremendous human cost to developing countries as hundreds of millions of people are falling into poverty [1]. Under this scenario, sub-Saharan Africa is the area of greatest concern. Many countries in Africa have the highest poverty rates in the world. Furthermore, recent projections point to poverty, particularly extreme poverty, becoming a predominant African phenomenon [2].

The literature provides clear evidence that economic growth is an essential requirement and often the primary contributor to poverty reduction [3,4]. Given the current economic recession and rising poverty rates across the African continent, there is renewed interest in the pro-poor growth process. Consequently, today's political debate concerns accelerating the growth and participation of the poor in this process.

In this debate, there is also a renewed focus on the potential role of pro-poor growth agricultural development, especially in rural areas where the majority of poor households are located [5–8]. This role has been long neglected [6]. However, the recent literature acknowledges the positive relationship between poverty reduction and increasing agricultural growth rates in Sub-Saharan Africa [1,9]. This relationship is ascribed to the extensive participation of the poor in agriculture, a sector that still provides a relatively significant contribution to the economy, particularly if its indirect impact on the growth of other sectors is accounted for [10].

This paper contributes to this debate and adds to the literature on the growth–inequality relationship an in-depth analysis of the role of the agricultural sector [11]. Most empirical literature uses cross-sectional data to verify this relationship [12,13]. The current study complements this perspective using a different approach. Focusing on nine East, Western and Central African countries, it first identified the key economic sectors with strong potential to drive their domestic economic growth. Afterwards, it studied the magnitude of effects produced by an exogenous demand injection of one unit in the individual 36 activities in the dataset on households classified according to income quantiles both in rural and urban areas. The literature argues that raising agricultural production and productivity in developing countries reduces poverty more than comparable growth in other sectors, specifically focusing on rural areas. However, this assertion has rarely been based on evidence from rigorous empirical investigations [14]. In this respect, the research question of this paper is to understand if a stimulus to the demand in the key economic sectors promotes a distributional effect that benefits more low-income households in rural and urban areas than the better-off distinguishing among economic activities. The current analysis is, therefore, grounded in a relative approach to pro-poor growth [15].

The research question of the current study is of specific importance when related to the potential role of the agricultural sector in pro-poor growth. In fact, despite the recognition of the relevance of the sector for growth and poverty reduction, public, private, and foreign investment in agriculture remains weak and inadequate in Africa [16]. More precisely, policymakers were discouraged by the uncertainties about the effectiveness of these investments. This study can assist them at least in two ways: correctly identifying key economic sectors with the important potential to stimulate economic growth domestically and revealing whether a clear pattern emerges between the key sectors and pro-poor growth.

The distinction between rural and urban households made by the present study is crucial when analyzing the potential pro-poor growth of economic and agricultural activities. As previously highlighted, the available studies on this aspect mainly focus on poverty in rural areas. However, in the current context of rapid urbanization, Africa is experimenting with a growing number of poor people in cities because of the recent global downturn and lack of employment and income [17,18]. Therefore, pro-poor growth strategies should account for the different geographic locations of poverty. Moreover, many people living in poverty in urban areas have strong links to rural areas through the agricultural sector. These connections and their effects on urban poverty reduction still deserve a clear understanding.

Since Hirshman's findings [19], sectoral interdependency has been considered a crucial source of economic development for a country [20]. The literature underlines the positive relationship between the extent of intra-industry linkages and the level of production of an economy, which is a measure of economic growth [21]. For this reason, input–output-based linkage analysis techniques have been used extensively to identify the leading sectors in an economy and to formulate development strategies [22–32].

The analysis of key links is a rigorous economic approach which makes it possible to identify quantitatively the interdependencies between the various economic sectors and to estimate the wider systemic impacts.

This research followed this approach to compare the 'keyness' of a sector with other sectors of the economy. However, instead of using input–output matrices widely adopted in the literature, Social Accounting Matrices (SAM) were employed to account for both production and consumption linkages. Sectors with above-average linkages promote economic development and structural change. They act to speed up and amplify initial minor changes and eventually affect the entire economy [33].

Following Cohen [34], the paper adopted the Relative Distributive Measure (RDM) using the income multipliers from the SAM to analyze the distribution multiplier effect across households and the underlying structural bias. As income by household groups is a more relevant indicator of social welfare than gross output, it should complement the

information on the role of sectors in development based on the analysis of inter-industry linkages. This consideration is strengthened by the fact that household income is also closer to the efficiency notion of value added than gross output [35].

The current paper applied the above-described methodology in the Democratic Republic of Congo (DRC), Ethiopia, Kenya, Mali, Niger, Nigeria, Senegal, Tanzania, and Zambia using the most recent comparable SAMs produced by the International Food Policy Research Institute (IFPRI) and referred to 2018 and 2019.

The comparison between countries has allowed us to understand better the most crucial aspects of the pro-poor growth process in Africa. In addition, the literature provides only three studies using a similar approach, but none focused on African countries. In fact, they refer to the Netherlands [34], Russia and China [35], and Nepal [36]. However, these papers propose an analysis of the distribution of the multiplier effects of injection in sectors on the sectors themselves and households' income to investigate the respective structural bias. As a result, the identification of key sectors is based only on a demand-driven model. The current paper adds the supply side dimension to this identification process considering both backward and forward linkages.

The remainder of the paper is structured as follows. Section 2 describes the method and data and methods used in the employed in the econometric analysis, Section 3 presents and discusses results, and Section 4 concludes.

2. Data and Methods

The paper referred to the latest SAMs published by IFPRI for Sub-Saharan African countries as part of the Nexus Project. This project has established common data standards, procedures, and classification systems used to construct and update the national SAMs, allowing for a more robust comparison of the economic structure across countries (<https://www.ifpri.org/project/nexus-project> accessed on 4 January 2023). In fact, the size of multipliers differs to a certain extent according to the level of account aggregation [35]. The current study used the freely available online SAMs of Ethiopia (2018), Kenya (2019), Tanzania (2018), and Zambia (2019) in Eastern Africa, the DRC (2018) in Middle Africa, and Mali (2018), Niger (2018), Nigeria (2018), and Senegal (2018) in Western Africa [37–45].

A SAM is a square matrix based on the double accounting principle, whereby each account represents the revenues and payments recorded in rows and columns, respectively. The SAMs produced by the Nexus Project include Activities, Commodities, Factors, Enterprises, Households, Government, Taxes, Investment, and Rest of the World accounts.

The current study focuses specifically on activities and households. The standard Nexus SAMs disaggregate activities in the 42 sectors shown in Table 1 with the codes used in the paper. Each refers to a set of industries classified according to the 4-digit International Standard Industrial Classification system (ISIC Revision 4), with the agricultural activities further disaggregated according to the FAO's categorization system [46].

Not all activities are represented in all the countries under study. They refer to the agrifood system and reflect the specific country's production capacity. The absent sectors are in the category of agricultural commodities and livestock and fisheries. For a cross-country comparison, the current study merged sugarcane, tobacco, cotton and fibers, and coffee, tea and cocoa in one sector (suco) and cattle and raw milk, poultry and eggs, other livestock, and fisheries in another sector (lifi). The paper maintained the detailed original classification for the other accounts.

For households, a Nexus SAM separates national populations in rural (RU) and urban (UR) using the official definition of these areas adopted at the country level. A SAM includes five representative household groups for the population in each of these two areas. These categories represent the income quintiles defined at the national level. Therefore, rural and urban quintiles are comparable at the country level. Moreover, each of them represents one-fifth of the national population.

Table 1. Standard Nexus SAM activities and codes.

Code	Description	Code	Description
maiz	Maize	text	Textiles, clothing and footwear
rice	Rice	wood	Wood and paper products
ocer	Other cereals	chem	Chemicals and petroleum
puls	Pulses	nmet	Non-metal minerals
oils	Oilseeds	metl	Metals and metal products
root	Roots	mach	Machinery, equipment and vehicles
vege	Vegetables	oman	Other manufacturing
sucu	Sugarcane (sugr)	elec	Electricity, gas and steam
	Tobacco (toba)	watr	Water supply and sewage
	Cotton and fibers (cott)	cons	Construction
	Coffee, tea and cocoa (coff)	trad	Wholesale and retail trade
frui	Fruits and nuts	tran	Transportation and storage
ocrp	Other crops	hotl	Accommodation and food services
lifi	Cattle and raw milk (catt)	comm	Information and communication
	Poultry and eggs (poul)	fsrv	Finance and insurance
	Other livestock (oliv)	real	Real estate activities
	Fisheries (fish)	bsrv	Business services
fore	Forestry	padm	Public administration
mine	Mining	educ	Education
food	Processed foods	heal	Health and social work
beve	Beverage and tobacco	osrv	Other services

(...) code in the original SAM. Source: author's elaboration from [37–45].

In all the countries analyzed, the majority of the population lives in rural areas where the poor are concentrated (Table 2).

Table 2. Percentage of population by area, wealth category, and country.

	DRC	Ethiopia	Kenya	Tanzania	Zambia	Mali	Niger	Nigeria	Senegal
RU_1	16.2	19.4	17.6	17.8	18.2	18.9	19.9	17.6	17.7
RU_2	13.7	19.1	16.1	17.0	16.8	18.1	19.6	15.6	16.4
RU_3	12.6	18.5	14.3	15.8	13.0	16.7	18.1	12.9	12.7
RU_4	10.5	17.0	11.0	13.1	7.4	13.6	15.9	9.9	7.1
RU_5	8.2	11.6	5.2	7.3	2.9	7.1	10.4	7.3	2.2
RURAL	61.2	85.7	64.2	71.2	58.3	74.3	83.8	63.4	56.2
UR_1	3.8	0.6	2.4	2.2	1.8	1.2	0.1	2.4	2.3
UR_2	6.3	0.9	3.9	3.0	3.2	1.9	0.5	4.4	3.6
UR_3	7.4	1.4	5.7	4.1	7.0	3.3	1.9	7.0	7.3
UR_4	9.5	3.0	9.0	6.9	12.6	6.4	4.1	10.1	12.9
UR_5	11.8	8.4	2.4	12.7	17.1	12.9	9.6	12.6	17.8
URBAN	38.8	14.3	35.8	28.8	41.7	25.7	16.2	36.6	43.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: [37–45].

2.1. Economic Linkages

The paper applied a demand- and supply-side model to the SAM multipliers to compute the backward and forward linkages in the analyzed countries.

Backward linkages capture the relationship of a particular sector with those upstream from which it purchases inputs [47]. A coefficient matrix (A) was constructed to obtain them by dividing each column's account in the SAM by its total. The Government, Taxes, Investment, and Rest of the World accounts were excluded from this computation. Following the standard convention, the current study treated these accounts as exogenous by assuming that their expenditures are independent of income [48]. The literature supports this choice in competitive economies because it reflects the fact that government expenditures are usually policy-determined, the Rest of the World is not controlled by the domestic economy, and investment is exogenously determined due to the static nature of the SAM [49]. The analysis treats the remaining accounts as endogenous. Interpretation of the results should consider that the size of the multipliers depends, in part, on the selected exogenous variables [35].

According to the principle of double-entry accounting underlining the SAMs, a whole economy can be represented in a linear form. Denoting the endogenous variables by y and the exogenous variables by x , total demand is given by the following equation:

$$y = Ay + x = (I - A)^{-1}x = Mx \quad (1)$$

where A is the matrix of the average propensities obtained by dividing each flow in the SAM by the respective column total, and M is the aggregate multiplier matrix or input inverse matrix given by the identity matrix (I) minus A .

The paper used the industry-by-industry multipliers of the M matrix, corresponding to the Leontief inverse matrix, to compute the backward linkages.

If sector j increases by one unit, its output, backward linkages (B) measure the increase in demand for inputs from sector j to upstream sectors i . The backward linkages of each activity were computed as the column sum of the elements m_{ij} of the Leontief inverse matrix as follows:

$$B_j = \sum_{i=1}^n m_{ij} \quad i = 1, \dots, n \quad (2)$$

The concept of sector "keyness" is a relative notion that depends on other sectors. Therefore, following the work of Rasmussen [50] and Hirschman [19], Equation (2) was normalized to obtain an indicator of backward linkages (BL) by dividing the backward linkage of sector j by the simple average of all backward linkages. This indicator is called "power of dispersion" and is formulated as below:

$$BL_j = \frac{B_j}{\frac{1}{n} \sum_{j=1}^n B_j} \quad j = 1, \dots, n \quad (3)$$

If BL_j is greater (lower) than 1, a unit change in final demand in sector j will generate an increase in the activity of the economy above (below) the average. Hence, the sector draws heavily (slightly) from the rest of the economy.

Forward linkages account for the interconnections of a sector with those downstream to which it sells its output [47]. Following Beyers [26] and Jones [51], the current study used the Ghosh [52] model for their computation instead of the Leontief inverse matrix. The literature shows that the calculation of forward linkages as a row total of the Leontief inverse matrix has a hypothetical and no general economic interpretation [33]. At the increase in output of sector j , forward linkages à la Leontief assume a simultaneous increase in the final demand of every supplied activity. Ghosh [52] argues that a similar model is only appropriate when different sectors of a country's economy are under monopolistic control, and all but one resource is scarce. The countries of the sample do not exhibit these characteristics.

Therefore, to compute forward linkages, each SAM's row account was divided by the row sum, obtaining a matrix of allocation coefficients (C) from which we constructed the Ghosh output inverse matrix (G) as follows:

$$G = (I - C)^{-1} \quad (4)$$

In other words, the value of the total intermediate sales of sector i was calculated as a proportion of the value of the sector i 's total output [47].

The row sums of the elements of the Ghosh-inverse matrix (g_{ij}), called allocation coefficients, provide the total forward linkages (F). These are computed as:

$$F_i = \sum_{j=1}^n g_{ij} \quad j = 1, \dots, n \quad (5)$$

Following Oosterhaven [53–56], the impact of a one-unit change in input from sector i on the price of total inputs of all sectors was measured.

The paper used the normalization method introduced above to compute an indicator of forward linkages (FL), also called the “sensitivity of dispersion”, as:

$$FL_i = \frac{F_i}{\frac{1}{n} \sum_{i=1}^n F_i} \quad i, j = 1, \dots, n \quad (6)$$

A value of FL_i larger (lower) than 1 indicates that a unit change in the final demand of all sectors would create an above- (below-) average production increase in sector i . The sector is a key (minor) supplier for the rest of the economy.

The economic sectors were grouped into four categories by comparing the value of backward and forward linkages. The paper defined as key sectors (K) those with both BL and FL above one, forward linkage-oriented sectors, (F) those with only FL greater than one, backward linkages-oriented sectors, (B) those with only BL greater than one, independent or weak linkages-dependent sectors, and (N) those with both BL and FL lower than one.

BL s and FL s were computed using both inter-and intra-sectoral trade. In developing countries, transactions within a sector (i.e., intra-sectoral transactions) often constitute an essential element of value in a sector's value chain. By including this component in the current analysis, the importance of this portion of the trade is accounted for.

Following Hazari [22], the paper computed the coefficient of variation index (CV) of the BL s and FL s to detect the possible influence of a few sectors. For example, let us assume that sector j purchases an extremely large amount of inputs from one or two other sectors. In this case, the BL of sector j is greater than those of the other sectors, but its potential to spread growth impulses throughout the economy is limited to a low number of sectors. The CV_j and CV_i were computed using the sectoral elements of B_j and F_i , respectively, as the standard deviation divided by the mean value. A high (low) value of CV_j implies that sector j purchases inputs from a few sectors (most of the sectors equally). Similarly, a high (low) CV_i indicates that sector i sells its good or services to a few sectors (most sectors). The current study uses the average CV value across sectors to highlight those with the highest dispersion around the mean value.

The analysis also includes the Spearman [57] correlation coefficient that is adopted to verify the strength and direction of the association of FL , BL , and the level of “keynes” of the sectors between countries. The paper considers the association significant when the p -value of the two-tailed statistical significance was less than 0.05. Table 3 shows the guide followed to describe the strength of the correlation.

Table 3. Strength of correlation categories.

Absolute Value of Spearman Correlation Coefficient	Strength of the Correlation
0.00–0.19	Very weak
0.20–0.39	Weak
0.40–0.59	Moderate
0.60–0.79	Strong
0.80–1.0	Very strong

2.2. Relative Distributive Measure

The current study followed Cohen [34] by using the Relative Distributive Measure (*RDM*) to study the distribution of multiplier effects on households (*h*) of an exogenous demand injection in the activities *j* and assess the underlying structural bias in the country analyzed. This injection can be from investment, government spending or exports.

Following Cohen [35], the *RDM* was computed as follows:

$$RDM_{hj} = \frac{m_{hj} / \sum_{h=1}^m m_{hj}}{Y_{h0} / \sum_{j=1}^n Y_{h0}} \quad h = 1, \dots, m; j = 1, \dots, n \quad (7)$$

where m_{hj} is the income multiplier of household category *h* generated from a demand injection in activity *j*. It is part of the block of the *M* matrix defined by Equation (1). The denominator is the income share of household group *h* at year 0. It is from the values found in the SAMs for the base year. *RDM* takes values equal to one, greater than one and lower than one for neutral, positive, and negative distributive effects, respectively. In other words, a value of *RDM* equal to 1 means that the sectoral transfer would reproduce the same sectoral distribution pattern of the base year. A value above (below) unity for a household group would mean an increase (deterioration) in its income share relative to the base year and, therefore, a positive (negative) income growth bias towards that household group.

3. Results and Discussion

The comparison of the sectors ranked according to their “keyness” shows a relative dispersion across countries, with some exceptions. Focusing on the key sectors, maize, pulses, oilseeds, root, vegetables, and fruits and nuts are in this category in all the countries analyzed (Table 4). Moreover, agricultural activities make up the majority of the key sectors in all the countries considered. Their prevalence ranges from 50% in Niger to 69% in Nigeria. Another common feature of the key sectors category across countries is the presence of manufacturing and processing activities directly related to agriculture, among which the processed foods industry (food) is the most recurrent. This evidence confirms the potential role of agriculture in creating a value chain that can be strategic for growth.

The results also showed that many key agricultural activities populate the top ten sectors regarding the value of *BL* and especially *FL* indices (Tables 5 and 6). Therefore, they represent an important motor of economic development. In these sectors, the above-average *FL*s imply that promoting or disadvantaging the key agricultural activities will affect the factor costs of the downstream industries more than in other sectors. Consistent with the literature [4], also in the countries analyzed, the lower *BL* indices than *FL* indices are due, at least in part, to the fact that agriculture is still labor-intensive. A common feature across the analyzed countries is that the majority of farmers are smallholders practicing low productivity, low technology, and high labor-intensity agriculture [58–60]. For example, they contribute to 75 percent of the total agricultural output of Kenya, 90 percent of Ethiopia, and 99 percent of Nigeria.

Table 4. Key sectors and respective CVi, CVj.

DRC	Ethiopia	Kenya	Tanzania	Zambia	Mali	Niger	Nigeria	Senegal
[2.460; 6.319]	[6.222; 2.312]	[2.038; 2.032]	[2.204; 2.144]	[3.089; 2.839]	[2.513; 2.341]	[1.986; 2.220]	[1.864; 2.009]	[2.372; 2.423]
maiz (2.619; 6.108)	maiz (6.201; 1.799)	maiz (2.030; 1.587)	maiz (2.232; 1.684)	maiz (2.842; 2.062)	maiz (2.476; 1.749)	maiz (1.759; 1.422)	maiz (1.824; 1.489)	maiz (2.172; 1.751)
rice (2.817; 6.162)	rice (6.080; 1.722)	rice (1.839; 1.568)	rice (2.234; 1.726)	rice (2.978; 2.115)	rice (2.605; 1.953)	ocer (2.430; 1.973)	ocer (1.765; 1.387)	ocer (2.160; 1.757)
ocer (2.385; 6.115)	ocer (6.286; 2.007)	ocer (1.885; 1.425)	puls (2.305–1.810)	ocer (2.937; 2.215)	ocer (2.419; 1.760)	puls (1.984; 1.672)	puls (2.496; 2.139)	puls (2.480; 1.858)
puls (2.483; 6.068)	puls (6.152; 1.998)	puls (2.150; 1.559)	oils (2.246; 1.753)	puls (2.933; 2.194)	puls (2.713; 1.902)	oils (2.012; 1.615)	oils (2.059; 1.810)	oils (2.598; 2.231)
oils (2.498; 6.003)	oils (6.087; 1.690)	oils (1.867; 1.388)	root (2.302; 1.717)	oils (2.985; 2.232)	oils (2.627; 1.934)	root (2.048; 1.806)	root (2.029; 1.743)	root (2.366; 1.864)
root (2.575; 6.034)	root (6.131; 1.782)	root (2.074; 1.487)	vege (2.177; 1.613)	root (2.977; 2.150)	root (2.567; 1.888)	ege (2.146; 1.837)	vege (1.962; 1.663)	vege (2.522; 2.088)
vege (2.452; 5.992)	vege (6.109; 1.781)	vege (2.220; 1.620)	frui (2.228; 1.816)	vege (2.951; 2.066)	vege (2.810; 2.001)	suco (1.975; 1.709)	frui (1.719; 1.425)	frui (2.398; 2.017)
frui (2.434; 5.989)	frui (6.102; 1.732)	frui (1.997; 1.554)	food (2.174; 1.868)	frui (2.971; 2.103)	frui (2.524; 1.887)	frui (2.127; 1.832)	ocrp (1.580; 1.367)	text (2.459; 1.989)
ocrp (2.390; 5.978)	ocrp (6.095; 1.737)	food (2.203; 1.729)	oman (2.028; 1.647)	food (3.100; 2.470)	food (2.550; 2.065)	text (2.067; 1.941)	fore (1.917; 1.577)	oman (2.762; 2.197)
food (3.006; 6.217)	lifi (6.193; 2.112)	chem (1.855; 1.411)	elec (2.711; 2.035)	text (2.927; 2.164)	elec (3.323; 2.575)	chem (2.094; 1.632)	beve (1.615; 1.423)	watr (2.006; 1.732)
beve (2.338; 5.993)	fore (6.181; 1.839)	nmet (2.147; 1.948)	tran (2.393; 2.026)	wood (2.821; 2.442)	fsrv (2.202; 1.680)	oman (2.177; 2.201)	text (2.661; 2.195)	comm (2.613; 2.017)
chem (2.380; 6.035)	food (6.208; 1.949)	trad (2.134; 1.652)	fsrv (1.982; 1.919)	chem (3.041; 2.423)	real (2.291; 1.716)	elec (1.870; 1.565)	chem (1.658; 1.521)	fsrv (2.165; 1.743)
oman (2.217; 6.016)	comm (6.139; 1.942)		bsrv (2.309; 2.016)	oman (2.836; 2.130)		tran (1.970; 1.772)	fsrv (2.059; 1.782)	
osrv (2.309; 5.975)	real (6.200; 1.976)			elec (3.393; 2.289)		hotl (1.816; 1.788)		
	bsrv (6.099; 1.831)			watr (2.667; 2.580)		comm (1.960; 1.749)		
	osrv (6.168; 1.882)					osrv (1.808; 1.600)		

[...] Average CV computed in all 36 activities. (...) CV of the specific activity.

The average CV of the power of dispersion ranges between 1.864 in Nigeria and 6.222 in Ethiopia, while the CV for the sensitivity of dispersion is between 2.009 in Nigeria and 6.319 in the DRC. Focusing on the key sectors, the CV indicates their potential to spread growth impulses to a relatively higher number of upstream sectors than the overall sectors' average and their backstream activities (Table 4). In addition, the fact that, among the key sectors, there are industries directly related to the primary sector with a CV below average for the *FL* indices suggests the presence of a diversification process within the agrifood chain towards higher-value-added goods.

The CV computed on the *BL* indices highlights the relatively limited integration of the agricultural sectors with the downstream sectors. This result was expected. As highlighted by Sheahan and Barret [61], despite the signs of progress in the use of modern input in Sub-Saharan Africa and the specificities within countries, the adoption of inputs that include improved technologies, such as improved seed, fertilizers and other agro-chemicals, machinery, and irrigation is still low. In fact, in the countries analyzed, agriculture relies on extensive land use practices, and access to inputs and finance is still problematic. Because of this situation, agricultural productivity is lower than in other sectors, as shown in Table 7. In fact, the lower agriculture's employment share compared with the share of agricultural

value added over Gross Domestic Product (GDP) indicates that agricultural output per worker is lower than labor productivity in other sectors.

Table 5. Activities with *BL* above average and their respective *BL* value.

DRC	Ethiopia	Kenya	Tanzania	Zambia	Mali	Niger	Nigeria	Senegal
food 1.158	lifi 1.150	hotl 1.086	hotl 1.132	cons 1.124	elec 1.265	oman 1.178	puls 1.332	oman 1.125
root 1.154	Real 1.148	food 1.078	food 1.130	watr 1.121	bsrv 1.119	chem 1.123	text 1.173	fsrv 1.094
frui 1.096	root 1.108	maiz 1.077	root 1.079	wood 1.115	metl 1.116	root 1.116	oils 1.165	root 1.078
oils 1.095	ocer 1.108	root 1.077	bsrv 1.074	osrv 1.113	hotl 1.087	frui 1.107	maiz 1.113	hotl 1.076
maiz 1.088	puls 1.107	vege 1.070	elec 1.065	maiz 1.090	food 1.084	elec 1.092	vege 1.073	oils 1.074
ocrp 1.084	oils 1.096	puls 1.070	puls 1.062	padm 1.071	mach 1.081	hotl 1.079	root 1.069	wood 1.070
beve 1.083	rice 1.096	rice 1.067	nmet 1.054	oman 1.069	oman 1.070	comm 1.078	chem 1.066	puls 1.069
puls 1.066	food 1.096	frui 1.063	fsrv 1.050	puls 1.065	puls 1.061	text 1.060	fsrv 1.063	nmet 1.064
vege 1.066	maiz 1.093	oils 1.063	vege 1.049	root 1.056	nmet 1.060	cons 1.055	hotl 1.040	padm 1.064
rice 1.047	ocrp 1.092	ocer 1.047	maiz 1.047	suco 1.054	vege 1.049	tran 1.053	fore 1.025	watr 1.058
ocer 1.035	vege 1.083	ocrp 1.044	oman 1.047	hotl 1.054	ocer 1.037	vege 1.043	ocer 1.020	heal 1.047
scot 1.030	fore 1.066	trad 1.043	frui 1.039	food 1.038	oils 1.033	ocer 1.039	padm 1.012	vege 1.045
fsrv 1.029	frui 1.064	nmet 1.035	metl 1.035	oils 1.037	root 1.020	maiz 1.034	ocrp 1.011	ocer 1.041
oman 1.022	bsrv 1.052	cons 1.035	oils 1.032	ocer 1.036	mine 1.019	wood 1.022	frui 1.009	bsrv 1.034
padm 1.015	comm 1.049	padm 1.035	padm 1.022	metl 1.035	maiz 1.019	food 1.020	beve 1.006	frui 1.032
chem 1.014	hotl 1.030	educ 1.032	tran 1.021	vege 1.029	rice 1.018	osrv 1.017		maiz 1.025
osrv 1.013	osrv 1.027	wood 1.030	ocrp 1.019	nmet 1.022	frui 1.011	educ 1.015		text 1.022
	tran 1.016	bsrv 1.029	rice 1.016	mach 1.021	fsrv 1.005	real 1.013		cons 1.013
	padm 1.011	chem 1.013	cons 1.002	text 1.019	real 1.005	oils 1.013		mach 1.003
	educ 1.008	metl 1.007	wood 1.000	frui 1.018		suco 1.013		comm 1.001
		heal 1.001		chem 1.011		puls 1.007		
				educ 1.009				
				rice 1.003				

Table 6. Activities with *FL* above average and their respective *FL* value.

DRC	Ethiopia	Kenya	Tanzania	Zambia	Mali	Niger	Nigeria	Senegal
rice 1.545	rice 1.422	maiz 1.376	rice 1.344	ocer 1.426	rice 1.340	ocrp 1.286	puls 1.442	ocer 1.309
maiz 1.512	maiz 1.413	ocer 1.355	chem 1.338	maiz 1.413	elec 1.313	maiz 1.268	text 1.374	maiz 1.302
ocer 1.511	ocer 1.330	rice 1.349	ocer 1.293	rice 1.364	oils 1.266	ocer 1.266	maiz 1.279	oman 1.276
puls 1.457	watr 1.234	root 1.281	maiz 1.290	frui 1.294	puls 1.258	oils 1.251	ocer 1.256	puls 1.266
oils 1.272	fsrv 1.223	oils 1.280	lifi 1.259	vege 1.223	ocer 1.244	frui 1.249	oils 1.215	rice 1.234
root 1.265	elec 1.208	watr 1.256	root 1.257	oman 1.216	maiz 1.244	beve 1.230	suco 1.204	root 1.233
frui 1.262	root 1.187	puls 1.244	oils 1.221	root 1.197	tran 1.244	chem 1.227	vege 1.196	fsrv 1.220
vege 1.253	oils 1.178	vege 1.224	vege 1.209	real 1.193	suco 1.224	fsrv 1.221	rice 1.190	oils 1.201
text 1.243	chem 1.164	lifi 1.206	elec 1.198	fore 1.191	vege 1.223	comm 1.215	fore 1.189	elec 1.188
ocrp 1.236	beve 1.163	oman 1.184	fore 1.188	lifi 1.174	root 1.191	root 1.208	root 1.173	comm 1.181
food 1.213	osrv 1.148	food 1.183	osrv 1.143	text 1.159	chem 1.164	elec 1.193	food 1.163	real 1.163
beve 1.207	fore 1.145	real 1.171	comm 1.142	puls 1.157	watr 1.162	rice 1.189	fsrv 1.150	tran 1.158
bsrv 1.170	food 1.143	comm 1.164	puls 1.142	watr 1.151	fsrv 1.160	tran 1.188	osrv 1.147	osrv 1.147
watr 1.163	ocrp 1.134	beve 1.149	beve 1.139	oils 1.146	comm 1.147	vege 1.186	frui 1.144	text 1.140
trad 1.121	lifi 1.127	osrv 1.141	watr 1.137	comm 1.140	real 1.142	puls 1.173	comm 1.114	vege 1.130
comm 1.119	vege 1.127	frui 1.132	real 1.137	tran 1.119	food 1.130	suco 1.162	lifi 1.110	watr 1.130
real 1.115	frui 1.124	trad 1.130	food 1.116	elec 1.101	osrv 1.117	osrv 1.144	watr 1.110	suco 1.121
osrv 1.099	wood 1.114	text 1.128	text 1.113	food 1.075	beve 1.114	lifi 1.138	bsrv 1.104	lifi 1.120
tran 1.098	bsrv 1.108	chem 1.125	trad 1.094	wood 1.072	frui 1.114	oman 1.129	ocrp 1.097	fore 1.114
chem 1.086	real 1.085	elec 1.106	oman 1.084	fsrv 1.056	ocrp 1.095	watr 1.111	real 1.078	frui 1.084
elec 1.083	comm 1.072	nmet 1.010	frui 1.079	chem 1.056	wood 1.081	mine 1.108	chem 1.076	beve 1.080
oman 1.016	trad 1.054	fsrv 1.006	tran 1.074		fore 1.059	text 1.095	elec 1.062	ocrp 1.065
fore 1.006	puls 1.039	mine 1.005	bsrv 1.059			bsrv 1.085	beve 1.059	food 1.057
	text 1.009		fsrv 1.026			trad 1.035	oman 1.055	trad 1.032
						hotl 1.018	trad 1.042	chem 1.024

Table 7. Agricultural productivity and contribution to GDP.

	Share of Employment in Agriculture (%) *	Agricultural Value Added as a Share of GDP (%) **
DRC (2018)	64.8	20.1
Ethiopia (2018)	67.3	38.9
Kenya (2019)	54.3	37.0
Mali (2018)	63.0	40.7
Niger (2018)	72.9	38.9
Nigeria (2018)	35.5	21.4
Senegal (2018)	30.8	16.7
Tanzania (2018)	65.7	32.3
Zambia (2019)	49.6	3.5

Source: * <https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS> accessed on 4 January 2023; ** [37–45].

The Spearman correlation coefficient indicates strong and statistically significant relationships in sectors' *FLs* indices between pairs of countries (Table 8). These similarities might be explained by the fact that technological factors rather than country factors determine these linkages. On the contrary, *BL* indices seem to be country specific. The Spearman correlation coefficient is strongly statistically significant in very few cases. Moreover, within countries, there is no relevant correlation between *BL* and *FL*. The only relevant exceptions are Ethiopia and Niger.

Table 8. Spearman correlation coefficient of *BL* (below the diagonal) and *FL* (above the diagonal) between countries and spearman correlation coefficient between *BL* and *FL* within countries (on the diagonal—shaded in gray).

	DRC	ETH	KEN	MAL	NIG	NRA	SEN	TAN	ZAM
DRC	0.537 **	0.693 ***	0.770 ***	0.711 ***	0.686 ***	0.776 ***	0.697 ***	0.709 ***	0.746 ***
		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETH	0.393 *	0.455 **	0.715 ***	0.728 ***	0.711 ***	0.640 ***	0.674 ***	0.824 ****	0.657 ***
	0.018		0.000	0.000	0.000	0.000	0.000	0.000	0.000
KEN	0.596 **	0.424 **	0.260	0.680 ***	0.579 ***	0.690 ***	0.796 ***	0.845 ****	0.799 ***
	0.000	0.010		0.000	0.000	0.000	0.000	0.000	0.000
MAL	0.315	0.099	0.381 *	−0.022	0.751 ***	0.732 ***	0.809 ****	0.734 ***	0.679 ***
	0.062	0.564	0.022		0.000	0.000	0.000	0.000	0.000
NIG	0.174	0.099	0.293	−0.033	0.362 *	0.628 ***	0.708 ***	0.628 ***	0.580 **
	0.309	0.567	0.082	0.850		0.000	0.000	0.000	0.000
NRA	0.471 **	0.293	0.414 **	0.094	0.265	0.563 **	0.770 ***	0.702 ***	0.759 ***
	0.004	0.083	0.012	0.587	0.119		0.000	0.000	0.000
SEN	0.215	−0.002	0.401 **	0.241	0.216	0.342 *	0.093	0.731 ***	0.821 ****
	0.208	0.989	0.016	0.156	0.206	0.042		0.000	0.000
TAN	0.319	0.228	0.658 ***	0.687 ***	0.331 *	0.291	0.535 **	−0.014	0.763 ***
	0.058	0.181	0.000	0.000	0.049	0.085	0.001		0.000
ZAM	0.241	−0.067	0.336 *	0.088	0.224	0.113	0.453 **	0.201	0.010
	0.157	0.699	0.045	0.611	0.189	0.513	0.006	0.240	

Note: Strength of correlation: no star (0.00–0.19) very weak; * (0.20–0.39) weak; ** (0.40–0.59) moderate; *** (0.60–0.79) strong; **** (0.80–1.0) very strong. In italic the two-tailed statistical significance.

Table 9 shows that a sectoral injection of one unit in all activities determines an average positive distributive effect on rural household income that is more intense the poorer the household. The increase in the income of the poorest rural households (RU_1) compared with the base year is between 5.4% in the DRC and 66.3% in Zambia. Apart from Kenya, the poorest urban households (UR_1), on average, also benefit from a positive redistributive

effect. In Ethiopia, Tanzania, Zambia, Nigeria, and Senegal, this positive impact is also extended to poor urban households (UR_2) but with reduced levels of intensity.

Table 9. Average RDM by household category and country.

	DRC	Ethiopia	Kenya	Tanzania	Zambia	Mali	Niger	Nigeria	Senegal
RU_1	1.054	1.236	1.100	1.115	1.663	1.111	1.117	1.231	1.440
RU_2	1.067	1.187	1.098	1.100	1.718	1.115	1.117	1.191	1.345
RU_3	1.078	1.131	1.088	1.076	1.673	1.068	1.116	1.142	1.244
RU_4	1.056	1.060	1.051	1.060	1.411	0.989	1.110	1.080	1.209
RU_5	1.085	0.917	1.011	1.030	1.093	0.910	1.052	0.982	1.093
UR_1	1.008	1.148	0.945	1.084	1.026	1.061	1.173	1.094	1.072
UR_2	0.953	1.114	0.980	1.006	1.018	0.964	0.842	1.019	1.027
UR_3	0.936	1.027	1.000	0.986	0.944	1.015	0.926	0.988	0.990
UR_4	0.917	0.984	0.974	0.955	0.907	0.979	1.012	0.960	0.954
UR_5	0.895	0.825	0.934	0.918	0.886	0.932	0.818	0.888	0.855

Figure 1 (Panel 1–9) shows the effect of the exogenous demand injection in the single activities in the sample used by this paper on household income distribution. This impact is country-specific. However, the significant positive income multiplier effect of the key agricultural activities is noticeable in all the sample countries. A one-unit injection in these activities reveals the most favorable bias towards rural household income compared with the exogenous demand injection in other key activities. It is followed by the income multiplier effect produced by the agriculture-related sectors.

In all countries but DRC, the income of the rural households in the two lower quantiles benefits the most from this stimulus. In these countries, poor urban households also benefit from a one-unit demand injection in key agricultural activities. This impact is more significant than that on the urban households in the higher income categories. In fact, these latter are generally characterized by a degressive redistributive effect. However, poor urban households benefit less than poor rural households from the simulated exogenous shock. Therefore, the positive reallocation mechanisms from the key agricultural sectors can promote poverty reduction in rural and urban areas considered separately, but not between rural and urban poor households.

Niger is an exception. In fact, in these countries, the positive multiplier effect on the most deprived urban category of households dominates in the majority of key sectors with the potential to improve, in this way, the rural–urban divide in household poverty. The literature indicates that urban and rural economies are strongly interconnected in Niger. This interconnection is primarily due to the geographic proximity of the smaller towns to the rural areas and the stimulus provided by the agricultural growth to the manufacturing sector and demand for raw inputs for agricultural processing in the urban areas [62]. Moreover, economic development is expected to reinforce these linkages. Growth is intensely concentrated in the cities [63]. In contrast with the rest of Sub-Saharan Africa, Niger has a relatively low rate of rural–urban migration and urban population share. On the contrary, the rural population is continuously growing and dominated by subsistence farmers or pastoralists.

The DRC shows another different story. The households in the lower income quantile in rural and urban areas are not the most important beneficiaries of the effect of the simulated scenarios. This situation can be explained, at least partly, by the conflict situation in the country that mainly affects the rural population and smallholder farmers [64]. In addition, the ongoing violence and conflict are generating a large number of internally displaced persons, which has almost reached 6 million people [65]. They represent the

poorest segment of the population. As Cazabat and Yasukawa [66] have shown, people with this status have a limited capacity to contribute to the economy.

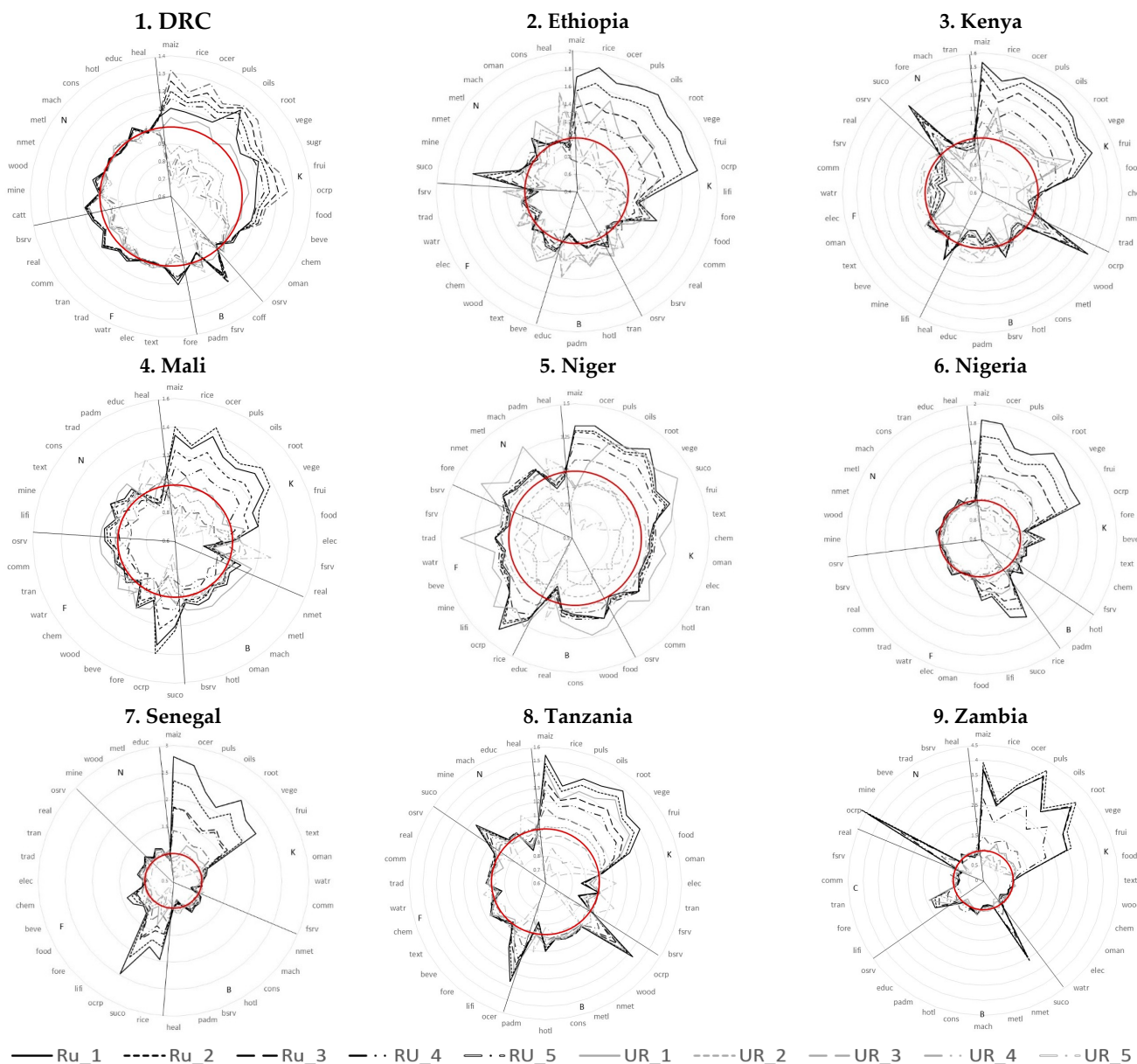


Figure 1. RDM by sector, household category and country (the red circle represents the base year).

Another notable piece of evidence from the present analysis concerns the positive redistributive effect, especially on poor rural households, from the injection in agricultural activities despite their level of “keyness”. This result confirms the strong relationship between agricultural development and poverty reduction in rural areas highlighted by the literature in Sub-Saharan Africa [9,67]. Furthermore, the paper adds to the literature showing that, in many cases, this positive effect extends to poor urban households, despite the lower levels of intensity.

4. Conclusions

As a first step, the paper has identified the critical sectors for economic growth in nine Eastern, Western, and Southern Sub-Saharan African countries by computing the *BL* and *FL* indices for 37 activities. Apart from the countries' specificities, the results confirm the strong integration of agriculture with the economy suggested by the literature and,

therefore, its pivotal role in economic growth in the analyzed countries. The paper adds to this evidence the growth potential of some downstream activities in the agricultural value chain, among which there is the processed food industry in several countries. The situation can be, at least in part, attributed to the gradual evolution of these chains in Africa from informal to more formalized exchanges [68]. This transformation is relevant in the analyzed region due to its potential impact on job creation, increase in agricultural produce value-added, and improvement in dietary diversity and nutritional outcomes [8]. Agrifood value chains can reinforce the positive impact of agriculture on economic growth. From a policy perspective, the conclusion of this paper supports the current focus on enhancing the competitiveness of the African agriculture and agribusiness sectors as an effective approach to creating growth and lessening the dominating poverty phenomena in rural areas [69].

On this last aspect, the *RDM* approach applied in the analysis has shown the strong multiplicative potential effect of a unit exogenous demand injection in the key agricultural sectors on the income of rural households in the lowest quantiles. Therefore, these activities contribute significantly to pro-poor growth in rural areas confirming the current literature on the topic. However, the paper adds to this literature that injection in the key agricultural sectors also impacts the poorest urban household income positively but with a lower intensity. Consequently, the agricultural sector growth contributes to increasing rural–urban income inequality, *ceteris paribus*. Although the results of the current study should be interpreted carefully in terms of policy implications [4], this latter evidence deserves specific attention. In fact, Sub-Saharan Africa shows the highest rate of urbanization [70], a process associated with growing poverty and inequalities in these areas [71,72]. Despite the beneficial multiplier effect of agriculture growth on rural and urban poverty, to promote pro-poor growth, the effort to boost the sector output and productivity needs to be complemented with policies targeted at the poor urban households, especially in countries where urban areas are not able to absorb the high rates of rural–urban migration. In other words, pro-poor policy priorities should have a component that varies spatially.

This paper used an unconstrained multiplier model based on several limiting assumptions. Among them, this model considers prices as fixed implying that resource factors in the analyzed countries are unlimited or unconstrained. Therefore, the multiplier analysis and *RDM* approach used in this paper allowed to verify the potential effects of exogenous policy shocks directed to key sectors on the income of different households grouped according to income categories, assuming a fixed price environment. For these implications to occur, sectoral bottlenecks should be clearly understood and addressed. Among them are the transformation and modernization of agriculture. Broadly speaking, this paper highlights that agriculture in the countries analyzed is less integrated with the upstream sectors than with the downstream sector and shows lower productivity compared with the other economic activities. The great abundance of labor and high rate of poverty in rural areas are important elements that hinder labor-saving technological changes and transitions from traditional farming into commercial and specialized systems for small farmers [73]. Therefore, developing a new agrarian system integrated with the agribusiness sectors seems to represent an important direction to make agriculture an effective contributor to pro-poor growth in Africa.

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References

- World Bank. Reversal of Future. In *Poverty and Shared Prosperity 2020*; World Bank: Washington, DC, USA, 2020.
- Beegle, K.; Christiaensen, L. *Accelerating Poverty Reduction in Africa*; World Bank: Washington, DC, USA, 2019. Available online: <https://openknowledge.worldbank.org/handle/10986/32354> (accessed on 20 November 2022).
- OECD. *Promoting Pro-Poor Growth: Policy Guidance for Donors, DAC Guidelines and Reference Series*; OECD Publishing: Paris, France, 2007. [CrossRef]
- Valdes, A.; Foster, W. Reflections on the Role of Agriculture in Pro-Poor Growth. *World Dev.* **2010**, *38*, 1362–1374. [CrossRef]
- Haggblade, S.; Hazell, P.B.; Reardon, T. *Transforming the Rural Nonfarm Economy: Opportunities and Threats in the Developing World*; Johns Hopkins University Press: Baltimore, MD, USA, 2007.
- Byerlee, D.; De Janvry, A.; Sadoulet, E. Agriculture for development: Toward a new paradigm. *Annu. Rev. Resour. Econ.* **2009**, *1*, 15–31. [CrossRef]
- Ligon, E.; Sadoulet, E. Estimating the relative benefits of agricultural growth on the distribution of expenditures. *World Dev.* **2018**, *109*, 417–428. [CrossRef]
- Calderon, C.; Kabundi, A.; Kubota, M.; Korman, V.; Goyal, A.; Eliste, P.; Forget, V.D. *Africa's Pulse*, No. 26 (October); World Bank: Washington, DC, USA, 2022. [CrossRef]
- Odusola, A.; Cornia, G.A.; Bhorat, H.; Conceicao, P. *Income Inequality Trends in Sub-Saharan Africa*; UNDP: New York, NY, USA, 2019.
- Christiaensen, L.; Demery, L.; Kuhl, J. The (evolving) role of agriculture in poverty reduction? An empirical perspective. *J. Dev. Econ.* **2011**, *96*, 239–254. [CrossRef]
- Lopez, J. *Pro-Poor Growth: A Review of What We Know (and of What We Don't)*; World Bank: Washington, DC, USA, 2005.
- Perotti, R. Growth, Income Distribution and Democracy. *J. Econ. Growth* **1996**, *1*, 149–187. [CrossRef]
- Barro, R. Inequality and Growth in a Panel of Countries. *J. Econ. Growth* **2000**, *5*, 5–32. [CrossRef]
- Warr, P.; Suphannachart, W. Agricultural Productivity Growth and Poverty Reduction: Evidence from Thailand. *J. Agric. Econ.* **2021**, *72*, 525–546. [CrossRef]
- Kakwani, N.; Pernia, E.M. What is pro-poor growth? *Asian Dev. Rev.* **2000**, *18*, 1–16.
- Mengoub, F.E. Agricultural Investment in Africa: A Low Level . . . Numerous Opportunities. Policy Brief, January, OCP Policy Center. 2018. Available online: <https://www.policycenter.ma/publications/agricultural-investment-africa-low-level%E2%80%A6numerous-opportunities> (accessed on 20 November 2022).
- Sridhar, K.S.; Mavrotas, G. *Urbanization in the Global South Perspectives and Challenges*, 1st ed.; Routledge India: London, UK, 2021.
- Zezza, A.; Tasciotti, L. Urban agriculture, poverty, and food security: Empirical evidence from a sample of developing countries. *Food Policy* **2010**, *35*, 265–273. [CrossRef]
- Hirschman, A. *The Strategy of Economic Development*; Yale University Press: New Haven, CT, USA, 1958.
- Karagiannis, G.; Tzouvelekas, V. Sectoral linkages and industrial efficiency: A dilemma or a requisition in identifying development priorities? *Ann. Reg. Sci.* **2010**, *45*, 207–233. [CrossRef]
- Ojaleye, D.; Narayanan, B. Identification of Key Sectors in Nigeria—Evidence of Backward and Forward Linkages from Input-Output Analysis. *Socio-Econ. Chall.* **2022**, *6*, 41–62. [CrossRef]
- Hazari, B.R. Empirical identification of key sectors in the Indian economy. *Rev. Econ. Stat.* **1970**, *52*, 301–305. [CrossRef]
- Acharya, S.N.; Hazari, B.R. Linkages and imports: A comparative study of India and Pakistan. *J. Dev. Stud.* **1971**, *8*, 107–115. [CrossRef]
- Diamond, J. The analysis of structural constraints in developing economies: A case study. *Oxford B Econ. Stat.* **1974**, *36*, 95–108. [CrossRef]
- Laumas, P.S. Key sectors in some underdeveloped countries. *Kyklos* **1975**, *28*, 62–79. [CrossRef]
- Beyers, W.B. Empirical Identification of Key Sectors: Some Further Evidence. *Environ. Plann. A* **1976**, *17*, 73–99. [CrossRef]
- Bulmer-Thomas, V. Trade, structure and linkages in Costa Rica: An input-output approach. *J. Dev. Econ.* **1978**, *5*, 73–86. [CrossRef]
- Meller, P.; Marfán, M. Small and large industry: Employment generation, linkages, and key sectors. *Econ. Dev. Cult. Chang.* **1981**, *29*, 263–274. [CrossRef]
- Baer, W.; da Fonseca, M.A.R.; Guilhoto, J.J.M. Structural changes in Brazil's industrial economy, 1960–1980. *World Dev.* **1987**, *15*, 275–286. [CrossRef]
- Clements, B.J.; Rossi, J.W. Interindustry linkages and economic development: The case of Brazil reconsidered. *J. Dev. Econ.* **1991**, *29*, 166–187. [CrossRef]
- Sonis, M.; Hewings, G.J.D. Hierarchies of regional sub-structures and their multipliers within input-output systems miyazawa revisited. *Hitotsubashi J. Econ.* **1993**, *34*, 33–44.
- Andreosso-O'Callaghan, B.; Yue, G. Intersectoral linkages and key sectors in China, 1987–1997. *Asian Econ. J.* **2004**, *18*, 165–183. [CrossRef]
- Kelly, S.; Tyler, P.; Crawford-Brown, D. Exploring Vulnerability and Interdependency of UK Infrastructure Using Key-Linkages Analysis. *Netw. Spat. Econ.* **2016**, *16*, 865–892. [CrossRef]
- Cohen, S.I. A social accounting matrix analysis for The Netherlands. *De Econ.* **1988**, *136*, 253–272. [CrossRef]
- Cohen, S.I. Growth and distribution in Russia and China: A Social Accounting Matrix analysis. *Int. Adv. Econ. Res.* **2002**, *8*, 296–304. [CrossRef]

36. Acharya, S. Flow Structure in Nepal and Benefit to the Poor. *Econ. Bull.* **2007**, *15*, 1–14.
37. Emerta, A.; Thurlow, J. *2018 Social Accounting Matrix for Ethiopia: A Nexus Project SAM. Data Paper*; International Food Policy Research Institute: Washington, DC, USA, 2021. [[CrossRef](#)]
38. Pauw, K.; Tembo, B.; Thurlow, J. *2019 Social Accounting Matrix for Zambia. A Nexus Project SAM*; International Food Policy Research Institute: Washington, DC, USA, 2021. [[CrossRef](#)]
39. Randriamamonjy, J. *2018 Social Accounting Matrix for the Democratic Republic of Congo (DRC). A Nexus Project SAM*; International Food Policy Research Institute: Washington, DC, USA, 2021. [[CrossRef](#)]
40. Randriamamonjy, J. *2018 Social Accounting Matrix for Mali (DRC). A Nexus Project SAM*; International Food Policy Research Institute: Washington, DC, USA, 2021. [[CrossRef](#)]
41. Randriamamonjy, J. *2018 Social Accounting Matrix for Senegal (DRC). A Nexus Project SAM*; International Food Policy Research Institute: Washington, DC, USA, 2021. [[CrossRef](#)]
42. Thurlow, J. *2019 Social Accounting Matrix for Kenya. A Nexus Project SAM*; International Food Policy Research Institute: Washington, DC, USA, 2021. [[CrossRef](#)]
43. Thurlow, J. *2018 Social Accounting Matrix for Nigeria. A Nexus Project SAM*; International Food Policy Research Institute: Washington, DC, USA, 2021. [[CrossRef](#)]
44. Thurlow, J. *2018 Social Accounting Matrix for Tanzania. A Nexus Project SAM*; International Food Policy Research Institute: Washington, DC, USA, 2021. [[CrossRef](#)]
45. Randriamamonjy, J.; Thurlow, J. *2018 Social Accounting Matrix for Niger. A Nexus Project SAM*; International Food Policy Research Institute: Washington, DC, USA, 2021. Available online: <http://orcid.org/0000-0002-5810-254X> (accessed on 20 November 2022).
46. FAO. *FAO Statistical Databases (FAOSTAT)*; FAO: Rome, Italy, 2021.
47. Miller, R.E.; Blair, P.D. *Input–Output Analysis Foundations and Extensions*, 2nd ed.; Cambridge University Press: Cambridge, UK, 2009. [[CrossRef](#)]
48. Sadoulet, E.; de Janvry, A. *Quantitative Development Policy Analysis*; Johns Hopkins University Press: Baltimore, MD, USA, 1995.
49. Pyatt, G.; Round, J. *Social Accounting Matrices: A Basis for Planning*; World Bank: Washington, DC, USA, 1985.
50. Rasmussen, P. *Studies in Inter-Sectorial Relations*; Einar Harks: København, Denmark; Amsterdam, The Netherlands, 1956.
51. Jones, L.P. The Measurement of Hirschmanian Linkages. *Q. J. Econ.* **1976**, *90*, 323–333. [[CrossRef](#)]
52. Ghosh, A. Input-Output Approach to an Allocation System. *Economica* **1958**, *25*, 58–64. [[CrossRef](#)]
53. Oosterhaven, J. On the plausibility of the supply-driven input-output model. *J. Reg. Sci.* **1988**, *28*, 203–217. [[CrossRef](#)]
54. Oosterhaven, J. The supply driven input-output model: A new interpretation but still implausible. *J. Reg. Sci.* **1989**, *29*, 459–465. [[CrossRef](#)]
55. Oosterhaven, J. Leontief versus Ghoshian price and quantity models. *South. Econ. J.* **1996**, *62*, 750–759. [[CrossRef](#)]
56. Oosterhaven, J. Adding supply-driven consumption makes the Ghosh model even more implausible. *Econ. Syst. Res.* **2012**, *24*, 101–111. [[CrossRef](#)]
57. Spearman, C.E. The proof and measurement of association between two things. *Am. J. Psychol.* **1904**, *15*, 72–101. [[CrossRef](#)]
58. FAO. *AQUASTAT Country Profile—Kenya*; FAO: Rome, Italy, 2015.
59. Haile, K.; Gebre, E.; Workye, A. Determinants of market participation among smallholder farmers in Southwest Ethiopia: Double-hurdle model approach. *Agric. Food Secur.* **2022**, *11*, 18. [[CrossRef](#)]
60. Anderson, J.; Marita, C.; Msiime, D.; Thiam, M. National Survey and Segmentation of Smallholder Households in Nigeria. Understanding Their Demand for Financial, Agricultural, and Digital Solutions. CIGAP Working Paper. 2017. Available online: <https://microdata.worldbank.org/index.php/catalog/2922/download/40974> (accessed on 20 November 2022).
61. Sheahan, M.; Barret, C.B. Ten striking facts about agricultural input use in Sub-Saharan Africa. *Food Policy* **2017**, *67*, 12–25. [[CrossRef](#)]
62. World Bank. *Niger Urbanization Review. Supporting Niger’s Modern Oases*; World Bank: Washington, DC, USA, 2021.
63. Dick, E.; Schraven, B. Rural-Urban Migration in West Africa: Contexts, Trends and Recommendations. KNOMAD Policy Brief 13. 2021. Available online: https://www.knomad.org/sites/default/files/2021-03/Policy%20Brief%20-%20Internal%20Migration%20West%20Africa%20Policy%20Brief%2013_%20Feb%202021.pdf (accessed on 20 November 2022).
64. FAO. Democratic Republic of the Congo and FAO. In *Building Resilience and Sustainable Food and Nutrition Security*; FAO: Rome, Italy, 2018.
65. ECHO. ECHO Daily Flash of 12 May 2022. 2022. Available online: <https://erccportal.jrc.ec.europa.eu/ECHO-Products/Echo-Flash#/daily-flash-archive/4491> (accessed on 20 November 2022).
66. Cazabat, C.; Yasukawa, L. *Unveiling the Cost of Internal Displacement. 2021 Report*; The Internal Displacement Monitoring Centre: Geneva, Switzerland, 2021. Available online: <https://www.internal-displacement.org/publications/unveiling-the-cost-of-internal-displacement-2021> (accessed on 20 November 2022).
67. Cleaver, K.M.; Donovan, W.G. *Agriculture, Poverty, and Policy Reform in Sub-Saharan Africa*; World Bank: Washington, DC, USA, 1995.
68. de Brauw, A.; Bulte, E. *African Farmers, Value Chains and Agricultural Development: An Economic and Institutional Perspective*; Palgrave Studies in Agricultural Economics and Food Policy; Palgrave Macmillan: London, UK, 2021. [[CrossRef](#)]
69. Webber, C.M.; Labaste, P. *Building Competitiveness in Africa’s Agriculture: A Guide to Value Chain Concepts and Applications*; World Bank: Washington, DC, USA, 2010.

70. UN-DESA. *World Urbanization Prospects: The 2018 Revision (ST/ESA/SER.A/420)*; Department of Economics and Social Affairs, Population Division: New York, NY, USA, 2019. Available online: <https://population.un.org/wup/publications/Files/WUP2018-Report.pdf> (accessed on 20 November 2022).
71. Glaeser, E.; Henderson, J.V. Urban economics for the developing World: An introduction. *J. Urban Econ.* **2017**, *98*, 1–5. [[CrossRef](#)]
72. Collier, P.; Venables, A.J. Urbanization in developing economies: The assessment. *Oxford Rev. Econ. Pol.* **2017**, *33*, 355–372. [[CrossRef](#)]
73. Sedik, D. The rural-urban gap and rural transformation in the Near East and North Africa. *New Medit* **2018**, *17*. Available online: <https://newmedit.iamb.it/2018/12/15/the-rural-urban-gap-and-rural-transformation-in-the-near-east-and-north-africa/> (accessed on 20 November 2022).

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