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Structural change in the Mozambique economy between 2007 and 2019

A social accounting matrix approach

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Abstract: This study makes use of Mozambican social accounting matrices (SAMs) for the years 2007 and 2019, which we compare to uncover structural changes. Our findings reflect the significant short- and long-term challenges that Mozambican policy makers face. Broad-based dynamic change and structural transformation is lacking. Using structural decomposition analysis, the study finds that at the economy-wide level, final demand is the overwhelming determinant of the change in value added. The change in the final demand expenditure patterns and the shift between domestic and foreign final demand had little impact over the period of observation. The change in adding value per unit of gross output made a negative contribution to the overall change in value added. On average, industries became less adept at adding value to their intermediate inputs. On the other hand, a positive impact of the technology effect was found in that sectors shifted backward linkages such that this added to change in value added, although the effect is relatively small. This is confirmed in that the value added multipliers declined over the period whereas those of gross value of production remained more or less the same.

Key words: social accounting matrix, national accounts, structural change, economic shocks, income distribution, Mozambique

JEL classification: D31, D33, D57, E16, J21

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1 Introduction

Structural change in the economy is at the core of development and transformation processes. Accordingly, policy makers and researchers alike are keen to understand such change to support the formulation of adequate policy measures for future progress. One analytical approach to generating useful evidence on the continuing process of structural change is to decompose sector level output changes into a range of components using structural decomposition analysis (SDA). The key question this method aims to answer is 'what are the drivers of change and which drivers dominate?'

More than three decades have passed since Mozambique emerged from independence in 1975 and the subsequent devastating war, which turned this former Portuguese colony into one of the most impoverished countries in the world. From 1992 onwards, the country experienced remarkable economic growth with annual gross domestic product (GDP) growth reaching over 7% for various consecutive years and nearly all development indicators registering substantial improvements until the early 2010s. Recovery during the 1990s and massive public investments in infrastructure and social sectors supported by international development partners and active promotion of foreign and domestic direct investment underpinned the impressive growth. The discovery of enormous natural gas reserves at the turn of the 2010s added not only potentials but also significant risks for the country's development process.

A series of external and internal crises from the mid-2010s severely affected socio-economic progress and put an end to the positive trends experienced previously. Shocks included an external debt crisis, armed conflicts in central and northern Mozambique, two major cyclones, the COVID-19 pandemic, the Ukrainian crisis and its effects on the global economy, and the pressures generated by demographic growth—all reflecting Mozambique's vulnerability to economic and climate-related factors.

This sequence of events and processes, combined with the lack of progress in the sectors of agriculture (basis for development) and industry (stimulating factor for the economy) have led to the recent vertiginous fall of the economy and its dependence on megaprojects and the trade of imported products. Accordingly, there is need for evidence-based policies that can help steer the country towards broad-based structural transformation of the economy as a growth engine for sustainable inclusive development.

The analysis in this study makes use of Mozambican social accounting matrices (SAMs) for the year 2007 and 2019. Thus, the period of observation is 12 years. We selected these two years due to the availability of SAMs in a suitable format (Arndt and Thurlow 2014; Cruz, et al. 2022), and we lined up the SAMs so they are comparable. Common classifications for activities and commodities are found in Appendix Table A1. The 2007 SAM only shows marketed household expenditure whereas the 2019 SAM makes a distinction between household consumption of own production and household expenditure purchased through the market. The 2019 SAM has been adapted by reallocating the consumption of own production to marketed expenditure while adjusting the domestic supply by the matching amount to keep supply and demand of commodities balanced.

A key insight that emerges from our analysis is that while household expenditure has become less prominent relative to GDP, government expenditure and investment demand went the opposite direction. Moreover, the economy became significantly more dependent on imports. Investment demand is likely to remain the main expenditure GDP component, driving higher imports.

Furthermore, the current account deficit on the balance of payment has widened as a share of GDP and in the Mozambique economy is now borrowing more heavily from the rest of the world and is using this additional source of savings to raise its investment compared with the 2007 SAM. Whether running such high deficits in the longer run is sustainable remains a critical challenge.

In terms of income distribution, it appears that rural household income shifted away from wage earnings towards capital. Capital seems to have replaced paid labour in the rural areas. This suggests that rural households now work more for themselves rather than for a salary, probably reflecting that rural households got fewer opportunities to find waged work. On the other hand, in urban areas wage earnings seem to increase and 'own account' work to decrease, reflecting a shift towards more formal employment options. While the balance between labour and capital in GDP has remained relatively stable at the economy-wide level, less income from capital flows through to households at the end of the period. The reason is that the government taxes income before it reaches households and that over time other beneficiaries of capital income have claimed a higher share, such as the rest of the world.

Section 2 provides an overview of a range of economic measures of structural change in Mozambique. The SDA follows in Section 3, including both methodology and results. We conclude in Section 4 by discussing our results.

2 Background and measures

Before getting into the SDA, we set the scene by providing an overview of standard features of structural change for the case of Mozambique between 2007 and 2019 as they emerge from the SAMs.

2.1 National accounts

Table 1 shows national accounts aggregates for expenditure, income, and production measures derived from the two SAMs. In the first section of the table, national accounts aggregates are available based on the expenditure measure. It is clear that by 2019, the share of total household expenditures (i.e. personal consumption expenditure) in GDP (row 3) had dropped significantly from 80.1% in 2007 to 64.6% of GDP. In the first two rows, we show the disaggregation into household expenditure for urban and rural households, respectively.[1] The shares of household expenditure by urban and rural areas relative to GDP dropped more or less to the same extent. Consequently, in terms of total household expenditures, the relative shares of urban and rural households remained relatively stable when comparing 2007 with 2019 (see columns 3 and 6). Importantly, the share of government expenditure in GDP almost doubled while that of investment increased four-fold from 15% to 60%.[2] Turning to the share of exports in total GDP it increased slightly from 31% to 32%, but the import share of GDP doubled from 40% to 80%. As a result, summing the cells in rows 6 and 7 and columns 2 and 5, it can be seen that total trade as a share of GDP ballooned from less than 69% to 112%. In sum, very significant changes in the

[1] The disaggregation of household expenditure is based on the household budget surveys for the years 2008/09 and 2019/20, respectively.

[2] Investment consists of gross domestic fixed investment as well as changes in stocks. From the underlying data, the latter appears to include a very large residual entry, which makes up about 75% of total changes in stocks and about 20% of total investment.

composition of GDP—as reflected in expenditure levels and shares—took place during the period under study.

Table 1: National accounts aggregates (levels in millions of meticais, at market prices)

		1	2	3	4	5	6
	Expenditure measure	Level	Share in GDP (%)	Share in PCE (%)	Level	Share in GDP (%)	Share in PCE (%)
1	PCE rural	72,917	35.1	43.9	274,212	28.5	44.1
2	PCE urban	93,183	44.9	56.1	348,109	36.2	55.9
3	PCE	166,101	80.1	100.0	622,321	64.6	100.0
4	Government expenditure	24,598	11.9		219,047	22.8	
5	Investment	31,754	15.3		578,135	60.1	
6	Exports	63,959	30.8		310,622	32.3	
7	Imports	−78,951	−38.1		−767,503	−79.7	
8	GDP at market prices	207,461	100.0		962,621	100.0	
	Income measure	Level	Share in GDP (%)	Other share (%)	Level	Share in GDP (%)	Other share (%)
1	Wages and salaries for low-skilled workers	86,484	41.7	79.7	211,346	22.0	43.7
2	Wages and salaries for high-skilled workers	22,031	10.6	20.3	271,839	28.2	56.3
3	Total wages and salaries			100.0			100.0
4	Wages and salaries	108,515	52.3	57.0	483,185	50.2	56.5
5	Gross operating surplus	81,949	39.5	43.0	372,096	38.7	43.5
6	GDP at factor costs	190,464	91.8	100.0	855,281	88.8	100.0
7	GDP at basic prices	190,464	91.8		855,281	88.8	
8	Sales tax (domestic)	13,198	6.4		90,186	9.4	
9	Import duty	3,798	1.8		17,155	1.8	
10	GDP at market prices	207,461	100.0		962,621	100.0	
	Production measure	Level	Share in GDP (%)	Share in GVP (%)	Level	Share in GDP (%)	Share in GVP (%)
1	GVP	311,851	150.3	100.0	1,761,315	183.0	100.0
2	Intermediate demand	121,387	58.5	38.9	906,034	94.1	51.4
3	GDP at basic prices/factor costs	190,464	91.8	61.1	855,281	88.8	48.6
4	Sales tax + Import duty	16,996	8.2		107,340	11.2	
5	GDP at market prices	207,461	100.0		962,621	100.0	

Note: GDP, gross domestic product; PCE, personal consumption expenditure; GVP, gross value of production. Low-skilled workers are those with no or primary education only; high-skilled workers are those with secondary or tertiary education.

Source: derived by the authors from the 2007 and 2019 SAMs.

In the second section of Table 1, we report the income measures of GDP and rows 4–5 show the main components of income GDP (i.e. Wages and salaries and Gross operating surplus). The shares of labour and capital income both declined slightly in terms of GDP at market prices (columns 2 and 5). In terms of GDP at factor costs, the shares did not move much over the period of observation as can be seen in columns 3 and 6. However, this relative stability hides some very large changes in the shares of wage income for low-skilled and high-skilled workers.[3] Row 2 in this second section suggests that wages and salaries of high-skilled workers (with secondary and tertiary education) account for 28.2% of GDP in 2019 and 56.3% of total wages and salaries compared with 10.6% and 20.3%, respectively, in 2007. Accordingly, the shares of low-skilled wages and salary earners fell from 41.7% of GDP to 22.0% of GDP and from 79.7% to 43.7% of total wages and salaries. The other remarkable feature of income GDP is the higher share of domestic sales tax in 2019 (9.4% versus 6.4%) whereas import duties, collected as a share of GDP at market prices, remained constant.

In the last section of Table 1, we report the production measures of GDP, starting with the gross value of production (GVP) in row 1. In the second row, we see that the share of intermediate demand by productive activities increased in terms of GDP at market prices from 58.5% to 94.1% (row 2, columns 2 and 5). Put differently, as a share of total production costs, intermediate demand increased from 38.9% to 51.4% (row 2, columns 3 and 6). Consequently, the share of primary input costs (i.e. the rewards for the factors of production or value added, GDP at basic prices/factor costs) as a share of total production costs declined from 61.1% to 48.6%. Thus, from an economy-wide perspective, Mozambique's ability to add value declined relatively to total production costs, but the use of more intermediates suggests that the economy achieved a higher level of connectivity. However, from the first section of Table 1, it appears that imports as a share of GDP also increased significantly, which could be interpreted as weakening this connectivity. To take a closer look at this, we consider industry composition and multipliers next.

2.2 Detailed value added

GDP, being the sum of value added (VA) at industry levels, is regularly seen as a key measure in policy analysis. In Table 2, we show value-added shares for 11 broad industries. While Agriculture's share in GDP has remained relatively constant over the period 2007–19, that of Mining has increased significantly from less than 2% to more than 12%. The increase in the Mining share obviously has a negative impact on the other shares since the sum must remain 100%. From that perspective, Agriculture maintaining its share suggests a better performance than for the next five industries reported in rows 3–7. The Food and beverage share in GDP dropped along with the shares of Other manufacturing, Utilities, Construction, and Trade. While Other manufacturing still reported a positive real annual average rate of change, it is negative for the other industries. Other private services, Public services, and Accommodation increased their shares and indeed reported average annual growth rates that are higher than for GDP.

In the last two columns of Table 2, we show the VA/GVP ratios for the 11 broad industries. For Agriculture, the payments to labour and capital (including land) as a share of GVP (industry-wide production costs) declined from 86.7% to 76.2%. The corollary is that in 2019, a higher share of the costs of production was devoted to intermediate inputs compared with that in 2007. For Mining, the VA/GVP ratio increased over the period of observation while at the same time the industry increased significantly in size.

[3] The disaggregation of wage earnings is based on household budget surveys for the years 2008/09 and 2019/20, respectively.

Table 2: Value added for broad industries (shares in current prices and average annual change in constant prices)

		1	2	3	4	5
		2007 (%)	2019 (%)	Average annual change in constant price (%)	VA/GVP ratio 2007 (%)	VA/GVP ratio 2019 (%)
1	Agriculture	27.7	27.3	3.2	86.7	76.2
2	Mining	1.6	12.1	13.9	52.9	66.7
3	Food and beverage	2.6	1.5	−0.5	40.7	20.4
4	Other manufacturing	12.8	8.5	1.5	46.2	36.3
5	Utilities	5.9	3.1	−2.9	68.9	58.8
6	Construction	3.1	1.4	−4.0	37.5	30.6
7	Trade	15.1	11.1	2.5	84.3	35.6
8	Accommodation	1.6	1.8	7.9	54.7	49.8
9	Transport	7.5	6.6	6.7	42.0	45.2
10	Other private services	12.5	13.3	10.4	52.4	43.0
11	Public services	9.6	13.3	9.6	62.7	42.9
12	Total	100.0	100.0	5.3	61.1	48.6

Note: we use the average manufacturing deflator for Food and beverage and Other manufacturing, and derive the weighted average GDP deflator for Utilities, Other private services, and Public services using more detailed deflators from INE (2022). The latter includes Public administration, health, and education.

Source: authors' calculations using the 2007 and 2019 SAMs and deflators derived from INE (2022).

The other large industry worth discussing here is Trade (row 7). In 2007, this industry was the largest in this configuration but most of the production/operating costs were for labour and capital. Hence, the VA/GVP ratio was as high as 84%. While the industry dropped a few places in the ranking of this broad industry configuration, the primary inputs share of production/operating costs declined dramatically. This suggests that margins must have come under pressure over the period of observation with a larger share now required as running costs.

More detailed industry level value-added shares appear for both 2007 and 2019 in Table 3. We rank shares in total GDP according to those for 2019 (column 2), showing only the top 25 activities. Column 1 then shows the 2007 shares.

The production activities that have seen a decline in their share of GDP include Wholesale and retail trade (row 1), Transportation and storage (row 5), Metals and metal products (row 10), Electricity, gas, and steam (row 11), Vegetables (row 18), Construction (row 23), Other foods (row 24), and Forestry (row 25). Of those that are included in Other activities (row 26), but not shown here, Wood and paper, Textiles, and, in particular, Cassava have lost significant shares of GDP over the period of observation. Industries that have seen an increase in their share of GDP include Other mining (row 2), Public administration (row 3), Maize (row 4), Finance and insurance (row 6), Information and communication (row 8), Pulses (row 9), Other cereals (row 12), and Natural gas (row 14). The gain of Natural gas is rather modest compared with the gain of Other mining. The latter includes among others mainly coal mining.

The decline in the share of GDP for construction is also remarkable as one might expect a stable share over time. INE (2022) data confirm this and suggest that the underlying SAM data have been revised subsequent to the 2007 SAM construction. In fact, INE's construction GDP (in current prices) is now reported as being about 40% lower than in the 2007 SAM whereas INE's total GDP (in current prices) is about 30% higher than that in the 2007 SAM. Put differently, GDP in the 2007 SAM is about 23% lower than in the INE (2022) current price series.

Table 3: Value added for detailed SAM industries (shares in current prices)

		1	2	3	4
		2007 VA shares (%)	2019 VA shares (%)	2007 VA/GVP ratio (%)	2019 VA/GVP ratio (%)
1	Wholesale and retail trade	15.1	11.1	84.3	35.6
2	Other mining	0.4	9.8	58.7	69.2
3	Public administration	3.9	7.6	37.5	30.6
4	Maize	6.0	7.0	37.4	21.6
5	Transportation and storage	7.5	6.6	96.7	53.7
6	Finance and insurance	2.1	4.7	84.3	35.6
7	Education	4.1	4.1	58.7	69.2
8	Information and communication	2.3	3.6	37.5	30.6
9	Pulses	1.2	3.3	37.4	21.6
10	Metals and metal products	7.4	3.2	96.7	53.7
11	Electricity, gas, and steam	5.4	2.9	84.3	35.6
12	Other cereals	0.7	2.9	58.7	69.2
13	Real estate activities	4.5	2.3	37.5	30.6
14	Natural gas	1.1	2.3	37.4	21.6
15	Business services	1.8	1.9	96.7	53.7
16	Tobacco	0.3	1.8	84.3	35.6
17	Accommodation and food services	1.6	1.8	58.7	69.2
18	Vegetables	2.3	1.8	37.5	30.6
19	Fruits and nuts	1.1	1.7	37.4	21.6
20	Health and social work	1.6	1.6	96.7	53.7
21	Beverages and tobacco	1.6	1.5	84.3	35.6
22	Fishing	1.8	1.5	58.7	69.2
23	Construction	3.1	1.4	37.5	30.6
24	Other foods	2.1	1.3	37.4	21.6
25	Forestry	3.3	1.3	96.7	53.7
26	Other	20.8	12.0		

Source: authors' calculations using the 2007 and 2019 SAMs.

In the last two columns, value added (i.e. primary input payments) is shown in terms of GVP. Starting at the top, we already discussed Trade and Mining in the context of the broad industries referred to earlier (see Table 2). Other detailed industries of interest are Transportation and storage (row 5), Finance and insurance (row 6), Metals and metal products (row 10), and Electricity, gas and steam (row 11). For all these industries, except Finance and insurance, their share in total GDP declined. All, without exception, have also seen a dramatic decline in adding value to their production costs. Consequently, for these industries intermediate inputs as a share of production costs has increased significantly and their ability to add value has declined, reflecting a key development challenge from the perspective of economic transformation and generating domestic capacity to increase incomes.

2.3 Trade with the rest of the world

Trade with the rest of the world is another important indicator of the structural change over the period of observation. Table 4 shows shares of export and import for broad commodity groups that match the same broad industries of Table 2. The last four columns of Table 4 add the share of exports in total demand (export orientation) and the share of imports in total supply (import penetration).

In terms of share of exports (columns 1–2), it can be noticed that Mining's share in exports has increased 2.5-fold. The share of Other manufacturing, which includes aluminium and other metal products manufacturing, has dropped. Together, the share of the 'industrial complex' of Mozambique has actually declined slightly. Transport (row 9), perhaps linked to the overall increase in the share of trade in total GDP (see row 8 in the first section of Table 1), through port handling services, has also increased its share of exports as well as export penetration (see columns 5–6) significantly.

As a matter of interest, further to the right in the same row (9) it can be seen that imports of Transport as a share of total imports has declined whereas total imports as a share of GDP has doubled over the period (see row 7 in the first section of Table 1). This suggests that while overseas customers now pay a higher share of port handling services, the share of imported transport services of the total supply of these services (i.e. the import penetration) has increased.

Table 4: Foreign trade for broad commodities (shares in current prices)

		1	2	3	4	5	6	7	8
	Commodity group	Export shares (%)		Import shares (%)		Export orientation (%)		Import penetration (%)	
		2007	2019	2007	2019	2007	2019	2007	2019
1	Agriculture	9.2	8.6	7.5	2.8	7.2	6.8	7.3	5.5
2	Mining	9.1	25.6	1.4	9.8	76.0	33.9	14.2	31.9
3	Food and beverage	2.3	3.8	5.2	5.0	7.4	8.1	20.6	26.3
4	Other manufacturing	56.4	33.9	59.8	49.6	27.8	13.1	36.4	47.4
5	Utilities	9.4	6.0	4.3	2.3	30.1	28.9	17.2	27.5
6	Construction	0.6	0.0	1.6	0.6	2.3	0.0	7.4	10.2
7	Trade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Accommodation	5.6	4.6	0.0	0.0	56.0	45.3	0.0	0.3
9	Transport	4.3	11.8	8.2	5.0	6.8	22.1	16.0	23.3
10	Other private services	3.2	5.6	12.0	24.8	3.7	3.7	17.2	40.4
11	Public services	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2
12	Total	100.0	100.0	100.0	100.0	14.5	10.8	17.9	26.6

Source: authors' calculations using the 2007 and 2019 SAMs.

Other observations on the changing structure of import suggest that the share of Food and beverages (row 3) has not changed much whereas that of Agriculture (row 1) and of Other manufacturing (row 4) have declined. The big increase in imports is that of Other private services (row 10). Jones et. al. (2022) noted the importance of Other private services in terms of total imports and the last entry of that row reinforces this. The supply of Other private services (finance, business, etc.) is heavily dependent on imports, almost as much as manufacturing (rows 3 and 4). The increased penetration of Mining and Utilities (last entries of rows 2 and 5) likely links to the expansion of aluminium and other metals manufacturing industry. The tourism industry remains an important contributor to exports, although its shares in total exports and total demand (export orientation) have dropped slightly.

2.4 Demand shares

Another angle to changes in the structure of the Mozambique economy is to consider how the patterns of sales of products have changed. This can be achieved by making a distinction between sales to industries as downstream intermediate inputs and sales to domestic demand and foreign final demand. Table 5 presents shares of total sales to each of these categories for broad industries. Columns 1–4 show demand shares for 2007 and columns 5–8 report demand shares for 2019. The difference in shares between the two years is presented in columns 9–11.

From the last three entries of the first row of Table 5, it is clear that agricultural products were used slightly more for intermediate use (column 9) and slightly less for domestic final demand (column 10) and exports (column 11). More of agricultural product supply went for further processing when comparing the beginning and end of the period of observation. From the third row, it is clear that Food and beverages moved in the opposite direction, although to a limited extent. This may be evidence that some small steps towards development of local value chains took place over the period of observation.

The mining picture is puzzling with its large negative sales to domestic final demand in 2007. The reason is that this includes a net drawing down of inventories of mining products (mainly, but not shown, of natural gas), which amounted to almost a quarter of its total production. This is reported in the SAM as a negative entry.

The share of sales by Other manufacturing (row 3) seems to have shifted away from exports to intermediate use, perhaps indicating further local value chain development in this group of industries.

The use of Transport (row 9) seems to have shifted from domestic final use to exports as well as intermediate use whereas Other private services (financial, business, etc.) (row 10) became more domestic demand focused away from intermediate use.

Table 5: Demand shares (% in current prices)

	Commodity group	1	2	3	4	5	6	7	8	9	10	11
		2007				2019				2019−2007 difference		
		Intermediate	Domestic final demand	Exports	Total	Intermediate	Domestic final demand	Exports	Total	Intermediate	Domestic final demand	Exports
1	Agriculture	11.2	81.6	7.2	100	15.2	78.0	6.8	100	4.0	−3.6	−0.4
2	Mining	36.0	−12.0	76.0	100	25.6	40.5	33.9	100	−10.4	52.5	−42.1
3	Food and beverage	29.6	63.1	7.4	100	22.2	69.7	8.1	100	−7.4	6.6	0.8
4	Other manufacturing	32.0	40.2	27.8	100	47.1	39.7	13.1	100	15.1	−0.5	−14.7
5	Utilities	52.6	17.3	30.1	100	64.2	6.9	28.9	100	11.6	−10.3	−1.2
6	Construction	5.1	92.6	2.3	100	21.6	78.4	0.0	100	16.5	−14.2	−2.3
7	Trade	98.3	1.7	0.0	100	92.2	7.8	0.0	100	−6.1	6.1	0.0
8	Accommodation	14.7	29.3	56.0	100	45.1	9.6	45.3	100	30.4	−19.7	−10.7
9	Transport	46.5	46.7	6.8	100	59.3	18.7	22.1	100	12.8	−28.0	15.2
10	Other private services	53.4	42.9	3.7	100	42.8	53.5	3.7	100	−10.6	10.6	0.0
11	Public services	3.4	96.6	0.0	100	5.2	94.8	0.0	100	1.8	−1.8	0.0
12	Total	35.1	50.4	14.5	100	40.1	49.2	10.8	100	5.0	−1.3	−3.7

Source: authors' calculations using the 2007 and 2019 SAMs.

2.5 Income distribution

The SAMs allow us to explore broad changes in socio-economic structure, and in Table 6 we show shifts in the distribution of income at a high level of aggregation. Columns 1–4 explore how each type of household (hhd) income—rural (hhd-r) and urban (hhd-u) in this case—is derived from three broad sources of income: labour (flab), capital (fcap+enterprises), and transfers.[4] For convenience, we group income from capital and enterprises together and treat them as income from capital broadly defined. Households also receive transfers from government and from the rest of the world.[5] The sources of income are expressed in terms of shares. The first section of Table 1 (rows 1–3 and columns 1–3) does this for the year 2007, the second section (rows 4–6 and columns 1–3) for 2019, and the third section (rows 7–9 and columns 1–3) presents the difference in these shares (i.e. change). For example, in 2007, rural households derived 60% of their income from labour, 39% from capital, and 1% from transfers. In 2019, this was 54%, 44%, and 2%, respectively. Thus, it would appear that in the rural areas there has been a shift away from paid labour towards capital. The likely reason is that more rural households opted to work for 'own account' instead of working for a wage, as the latter became less available in rural areas.

Table 6: Income distribution shares (%) for 2007 and 2019

		1	2	3	4		5	6	7	8
	2007	flab	fcap+enterprises	Transfers	Total	2007	flab	fcap+enterprises	Transfers	Total
1	hhd-r	59.6	39.1	1.3	100.0	hhd-r	41.0	48.0	22.2	42.9
2	hhd-u	64.7	31.9	3.4	100.0	hhd-u	59.0	52.0	77.8	57.1
3	total	62.5	35.0	2.5	100.0	total	100.0	100.0	100.0	100.0
	2019	flab	fcap+enterprises	Transfers	Total	2019	flab	fcap+enterprises	Transfers	Total
4	hhd-r	53.7	44.1	2.2	100.0	hhd-r	32.0	54.9	23.2	38.8
5	hhd-u	72.4	22.9	4.7	100.0	hhd-u	68.0	45.1	76.8	61.2
6	total	65.1	31.1	3.8	100.0	total	100.0	100.0	100.0	100.0
	Change	flab	fcap+enterprises	Transfers	Total	Change	flab	fcap+enterprises	Transfers	Total
7	hhd-r	**−5.9**	4.9	0.9	0.0	hhd-r	**−9.0**	7.0	1.0	**−4.1**
8	hhd-u	7.7	**−9.0**	1.3	0.0	hhd-u	9.0	**−7.0**	**−1.0**	4.1
9	total	2.7	**−3.9**	1.2	0.0	total	0.0		0.0	0.0

Note: hhd, household; hhd-r, household rural; hhd-u, household urban; flab, labour income; fcap+enterprises, capital income. Negative values are shown in bold.

Source: authors' calculations using the 2007 and 2019 SAMs.

In urban areas there appears to be a shift the other way around, that is, more towards wage earnings and less for 'own account'. This may suggest a change in the direction of more formal employment opportunities. The change in the distribution of income sources for urban household income is distinct compared with rural areas, as can be seen from the first two entries of rows 7 and 8 in Table 6. At the economy-wide level in row 9, there is a shift towards household income generated from labour. Interestingly, Table 1 had revealed that the shares of labour and capital in GDP (at factor costs) did not change much. One reason could be that some of the income from capital flows to the rest of the world, and in the case of enterprise income, it flows to households after tax. On the other hand, wage income, as reported in Table 1, is measured pre-tax. Finally, while

[4] We extracted data from the household budget surveys for the years 2008/09 and 2019/20 and fitted to the SAMs for 2007 and 2019, respectively.

[5] The 2007 SAM does not report household transfers received (or paid) from (and to) the rest of the world.

transfers make a difference and became more prominent during the period under study, their shares remain small.

A similar story appears when considering the distribution of the various sources of income across the two types of households. We show results in columns 5–8 of Table 6, and column 5 reveals that in 2007, 41.0% of wage earnings went to rural households and 59.0% to urban households. By 2019, less than a third of wage earnings went to rural households and more than two-thirds to urban households. For capital, the shift is the other way around, for the reasons mentioned earlier. The likely underlying reason is that given rural–urban migration, those households that stay behind in the rural areas, by 2019 relied more on 'own account' income generation whereas those that make it to the urban areas are more likely to be employed and derive wage earnings.

2.6 Multipliers

To get a better understanding of changes in the degree to which the Mozambique economy is more or less integrated, we explore multipliers. They represent the impact of an exogenous one unit (or 1 million meticais) increase in final demand. The impact can capture by various measures. The standard measure is output or GVP. Other measures are those related to output such as value added, employment, energy, or carbon emissions. Here the focus is on output and value added. To present single economy-wide measures of multipliers, we rely on averages. Since the exogenous increase in final demand is for goods and services, we take an average using total demand weights and make a distinction between a Type 1 and Type 2 multiplier.

Type 1 multipliers account for direct and indirect impacts on the relevant measure and are limited to the interindustry relationships in the economy. The increase in demand for a particular good or service causes output in the industry that supplies the good or service to go up but to do so, they require intermediate inputs from other industries, which in turn require inputs from yet other industries. The combined impact on output or value added is summarized in the Type 1 multiplier. In the production process, industries not only require intermediate inputs but also require primary inputs from labour and capital. After accounting for leakages through transfers, taxes, and savings, the income of the factors of production flows towards households that—we assume—spend it on goods and services in fixed proportions, again after accounting for leakages. This Type 2 multiplier captures the additional rounds of household income and expenditure on goods and services. Economy-wide results are shown in Table 7.

Table 7: Economy-wide average multipliers for Mozambique in 2007 and 2019

	1	2	3	4	5	6
	Type 1 multiplier	Induced effect	Type 2 multiplier	Type 1 multiplier	Induced effect	Type 2 multiplier
	Output	Output	Output	Value added	Value added	Value added
2007	1.071	1.146	2.217	0.645	0.767	1.412
2019	1.055	0.606	1.661	0.487	0.308	0.794
Change	**−1.5%**	**−47.1%**	**−25.1%**	**−24.6%**	**−59.9%**	**−43.8%**

Note: negative values are shown in bold.

Source: authors' calculations using the 2007 and 2019 SAMs.

In the first three columns of Table 7, the impact on output (GVP) is summarized. In columns 4–6, we measure the impact in terms of value added (GDP) with each commodity's final demand being raised by one unit (or 1 million meticais). The impacts thereof are—as noted—averaged using total demand weights. In the first column, we see that the Type 1 multiplier is slightly lower in 2019 than in 2007. For all intent and purposes, the inter-industry connectivity in the Mozambique economy is more or less the same. However, if one also accounts for the household income–expenditure loop, the average impact on output is less in 2019 than in 2007.

As the economy grew over the period of observation, household incomes improved on average and tax and savings propensities increased whereas expenditure patterns may have shifted to goods and services with higher propensities to import. This brings about higher leakages from the demand-driven multiplier process. Table 1 showed that imports as a share of GDP did indeed increase significantly. This suggests that the increase in imports relate more directly and indirectly to household expenditure than to intermediate inputs of productive industries. In column 2 of Table 7, the induced effect, which is the difference between Type 1 and Type 2 multipliers and solely accounts directly and indirectly for the household income–expenditure loop, is almost 50% lower in 2019. A similar pattern can be observed in terms of value added (columns 4–6). The economy-wide impact on value added is more negative when comparing 2019 and 2007. This reflects that the value-adding ability of the Mozambique economy in general declined over the period of observation.

Detailed SAM level multiplier results are presented in Table 8 at the broad level of 11 commodities.[6] The first panel (rows 1–12) presents results for gross value of output whereas the second panel (rows 13–24) reports value added. In general, most multiplier effects have become weaker over the period of observation. Some exceptions exist for output. Agriculture shows more integration with the rest of the economy in terms of inter-industry interaction (first entry of column 7) in 2019 than in 2007. The same applies to Food and beverages (third entry of the same column). For both commodity groups, their 2019 multipliers are slightly above the economy-wide average compared with 2007.

When accounting for household income–expenditure flows, all multiplier impacts are lower in 2019 than in 2007. For the reasons already explained, household demand leakages in Mozambique are higher in 2019 than in 2007. Agriculture, Food and beverage, Construction, and Accommodation (related to tourism) are some of the commodity groups that report below average declines compared with most other commodity groups.

The second panel (rows 13–24) shows results for value added. The multipliers are in general lower in 2019 than in 2007. Again, the same reasons apply as discussed previously at the economy-wide level. The economy has become less able to generate value added to the use of intermediate inputs. Construction, Accommodation, and Agriculture, to some degree, show limited declines in value-added multipliers.

[6] The multiplier process is triggered by a one (or 1 million meticais) exogenous increase in final demand, so the shock is in terms of commodities. Impact is on economy-wide output (i.e. gross value of production) and value added (GDP at factor costs). The 11 broad commodities match the 11 broad industries of Table 4. Aggregation from detailed to 11 broad commodities is achieved by total commodity demand averaging.

Table 8: Economy-wide average multipliers for Mozambique in 2007 and 2019

		1	2	3	4	5	6	7	8	9
		2007	2007	2007	2019	2019	2019	Change	Change	Change
		Type 1 multiplier	Induced effect	Type 2 multiplier	Type 1 multiplier	Induced effect	Type 2 multiplier	Type 1 multiplier	Induced effect	Type 2 multiplier
	Broad commodity group	Output	Output	Output	Output	Output	Output	Output	Output	Output
1	Agriculture	1.060	1.562	2.622	1.218	1.009	2.227	14.9%	−35.4%	−15.1%
2	Mining	1.136	1.029	2.166	0.870	0.667	1.536	−23.5%	−35.2%	−29.1%
3	Food and beverage	1.010	1.068	2.078	1.144	0.545	1.689	13.3%	−48.9%	−18.7%
4	Other manufacturing	0.772	0.739	1.511	0.693	0.324	1.017	−10.3%	−56.1%	−32.7%
5	Utilities	1.060	1.127	2.187	0.945	0.664	1.609	−10.8%	−41.1%	−26.4%
6	Construction	1.415	1.030	2.445	1.469	0.696	2.165	3.8%	−32.4%	−11.5%
7	Trade	1.181	1.755	2.936	1.613	0.712	2.325	36.6%	−59.5%	−20.8%
8	Accommodation	1.284	1.316	2.599	1.521	0.871	2.392	18.5%	−33.8%	−8.0%
9	Transport	1.195	0.944	2.139	1.018	0.583	1.601	−14.8%	−38.2%	−25.1%
10	Other private services	1.358	1.091	2.449	1.006	0.497	1.503	−25.9%	−54.4%	−38.6%
11	Public services	1.373	1.597	2.971	1.477	0.881	2.358	7.5%	−44.8%	−20.6%
12	Total	1.071	1.146	2.217	1.055	0.606	1.661	−1.5%	−47.1%	−25.1%
		Value added	Value added	Value added	Value added	Value added	Value added	Value added	Value added	Value added
13	Agriculture	0.862	1.046	1.908	0.775	0.511	1.287	−10.1%	−51.1%	−32.6%
14	Mining	0.627	0.690	1.317	0.523	0.338	0.861	−16.6%	−51.0%	−34.6%
15	Food and beverage	0.584	0.714	1.298	0.450	0.277	0.727	−22.9%	−61.2%	−44.0%
16	Other manufacturing	0.430	0.495	0.925	0.276	0.165	0.441	−35.8%	−66.6%	−52.3%
17	Utilities	0.698	0.756	1.454	0.560	0.338	0.899	−19.7%	−55.2%	−38.2%
18	Construction	0.579	0.690	1.269	0.532	0.353	0.885	−8.2%	−48.8%	−30.3%
19	Trade	0.931	1.174	2.105	0.619	0.363	0.982	−33.5%	−69.1%	−53.3%
20	Accommodation	0.729	0.881	1.609	0.734	0.444	1.177	0.6%	−49.6%	−26.8%
21	Transport	0.533	0.632	1.165	0.451	0.296	0.746	−15.4%	−53.2%	−35.9%
22	Other private services	0.664	0.732	1.396	0.424	0.253	0.677	−36.2%	−65.4%	−51.5%
23	Public services	0.817	1.068	1.885	0.632	0.445	1.077	−22.7%	−58.3%	−42.9%
24	Total	0.645	0.767	1.412	0.487	0.308	0.794	−24.6%	−59.9%	−43.8%

Source: authors' calculations using the 2007 and 2019 SAMs.

3 Structural decomposition analysis

After setting the scene looking at a range of standard measures, we now turn attention to the more complex SDA.

3.1 Methodology

We base our methodology on Miller and Blair (2009: 593–621). SDA attributes the difference in gross output between two comparable input–output tables (IOTs) to changes in two components: technology and final demand. A number of additional variations are possible. We conduct the SDA here using the supply–use components of two SAMs for the years 2007 and 2019.

Analysts typically apply SDA to changes over time and it is more precise if there are no influences of price changes. This would mean that one of the data sets would have to be deflated or reflated and rebalanced. Given a lack of detailed deflators, we made no attempt in this regard. The structural change reported here, therefore, is somewhat polluted by divergent price changes between 2007 and 2019.

The SDA uses supply–use tables (SUTs) instead of IOTs. This can have implications for the interpretation of the concept of technology change. In an IOT context, technology change refers to changes in the Leontief inverse. The latter captures the interactions among industries in the economy through the purchases and sales of intermediate inputs. In SUTs, such connections are broken down into two components. On the one hand, the use matrix of the SUT shows how industries use and purchase intermediate goods and services. On the other hand, the supply matrix of the SUT describes the supply of commodities. It could show that an industry produces multiple commodities and that multiple industries produce the same commodity. This is not the case for the Mozambique data. The underlying SAMs for both years treat industries as supplying homogeneous goods and services.

Change between 2007 and 2019 is measured in terms of gross output and value added and is limited to industries. In the rest of this section, we discuss the methodology in broad terms followed by results. We describe the methodology in terms of IOT modelling but apply it to the SUTs of the 2007 and 2019 Mozambique SAMs.

A vector of industry outputs can be expressed as the matrix multiplication of an (industry × industry) Leontief multiplier matrix (**L**) with a vector of final demands (**f**). We write the vector of industry outputs for 2007 and 2019 as

$$\mathbf{x}^{07} = \mathbf{L}^{07} \cdot \mathbf{f}^{07} \text{ and } \mathbf{x}^{19} = \mathbf{L}^{19} \cdot \mathbf{f}^{19} \quad (1)$$

The vector of change in industry output due to the revision, $\Delta\mathbf{x}$, is

$$\Delta\mathbf{x} = \mathbf{x}^{19} - \mathbf{x}^{07} = \mathbf{L}^{19} \cdot \mathbf{f}^{19} - \mathbf{L}^{07} \cdot \mathbf{f}^{07} \quad (2)$$

From this, decomposition of change in industry outputs can be thought of as the result of a change in $\Delta\mathbf{L}$ $(=\mathbf{L}^{19}-\mathbf{L}^{07})$, the change in the Leontief inverse, and $\Delta\mathbf{f}(=\mathbf{f}^{19}-\mathbf{f}^{07})$, the change in final demands. Therefore, the initial decomposition of output is in terms of these two components, that is, $\Delta\mathbf{L}$ and $\Delta\mathbf{f}$. Substituting them into Equation 2 while taking the start year measurement approach for the change in final demand and the end year measurement approach for changes in the Leontief inverse and some rearranging of terms results in

$$\Delta\mathbf{x} = \mathbf{L}^{19}(\mathbf{f}^{07} + \Delta\mathbf{f}) - (\mathbf{L}^{19} - \Delta\mathbf{L})f^{07} = \underbrace{\Delta\mathbf{L} \cdot \mathbf{f}^{07}}_{\text{Technology}} + \underbrace{\mathbf{L}^{19} \cdot \Delta\mathbf{f}}_{\text{Final demand}} \quad (3)$$

The first term on the far right side refers to the technology effect. It measures the impact on each industry's output due to changes in the IOT coefficients while final demand stays the same in 2007 values. In other words, over the period 2007–19 industry intermediate demands may have changed to some degree directly and indirectly among supplying industries, perhaps due to higher or lower economic self-sufficiency. The second term measures the impact of changes in final demand on industry outputs while the industry technology stays constant in 2019 terms. This impact—as will be seen later—is the larger of the two since we measure the change in current prices.

We can also turn the measurement approach around such that

$$\Delta\mathbf{x} = \mathbf{f}^{19}(\mathbf{L}^{07} + \Delta\mathbf{L}) - \mathbf{L}^{07}(\mathbf{f}^{19} - \Delta\mathbf{f}) = \underbrace{\Delta\mathbf{L} \cdot \mathbf{f}^{19}}_{\text{Technology}} + \underbrace{\mathbf{L}^{07} \cdot \Delta\mathbf{f}}_{\text{Final demand}} \quad (4)$$

Now, the technology change ($\Delta\mathbf{L}$) is expressed in terms of 2019 final demand and the change in final demand ($\Delta\mathbf{f}$) is framed in terms of the 2007 Leontief inverse. Although mathematically each of these approaches is correct, the results will be different. In what follows, the averaging approach is taken.

$$\Delta\mathbf{x} = \underbrace{\Delta\mathbf{L} \cdot (\mathbf{f}^{07} + \mathbf{f}^{19})/2}_{\text{Technology}} + \underbrace{(\mathbf{L}^{07} + \mathbf{L}^{19}) \cdot \Delta\mathbf{f}/2}_{\text{Final demand}} \quad (5)$$

The change in final demand ($\Delta\mathbf{f}$) can be decomposed further into three components: (i) the level of change in total final demand, (ii) the product mix of each type of final demand, and (iii) the distribution of total final demand across its different types. To keep the analysis manageable, final demand is broken down into a domestic and a foreign component, with the latter representing a vector of commodity exports. In doing so

$$\mathbf{f}^{07} = f^{07}\mathbf{B}^{07}\mathbf{d}^{07} \text{ and } \mathbf{f}^{19} = f^{19}\mathbf{B}^{19}\mathbf{d}^{19} \quad (6)$$

In which f is a scalar with the sum of total final demand, $\mathbf{B}$ a matrix with two columns of expenditure shares, which add to unity, and $\mathbf{d}$ a column vector with the shares of total demand for each component in total final demand. For example, in the first column of $\mathbf{B}$, the share of food in total domestic expenditure may be shown whereas the second column may show the share of mining in total exports. The second element of $\mathbf{d}$ represents the share of total exports in total final demand. It follows that we can write the decomposition as follows:

$$\Delta\mathbf{f} = \underbrace{\Delta f\,(\mathbf{B}^{07}\mathbf{d}^{07} + \mathbf{B}^{19}\mathbf{d}^{19})/2}_{\text{Final demand level}} + \underbrace{(f^{07}\Delta\mathbf{B}\mathbf{d}^{19} + f^{19}\Delta\mathbf{B}\mathbf{d}^{07})/2}_{\text{Final demand mix}} + \underbrace{(f^{07}\mathbf{B}^{07} + f^{19}\mathbf{B}^{19})\Delta\mathbf{d}/2}_{\text{Final demand distribution}} \quad (7)$$

and Equation 7 can now be substituted into Equation 3. The first component refers to the change in the level of final demand. The second component captures the change in the shares of final demand and exports. The third component accounts for the change in share of total domestic demand and exports in total final demand.

So far, the decomposition has focused on change in gross output. Policy makers may be more interested in variables such as value added, employment, or any other variable that could conceivably have a relationship with output at the industry level such as energy use or carbon

emissions. To do this for value added, define a vector of industry value added to gross output ratios and their change between 2007 and 2019. This allows the following three-way decomposition to be set up:

$$\Delta\boldsymbol{\beta} = \underbrace{\Delta\widehat{\mathbf{V}}\,(\mathbf{L}^{07}\mathbf{f}^{07} + \mathbf{L}^{19}\mathbf{f}^{19})/2}_{\text{Value-added coefficient}} + \underbrace{\left(\widehat{\mathbf{V}}^{07}\Delta\mathbf{L}\mathbf{f}^{19} + \widehat{\mathbf{V}}^{19}\Delta\mathbf{L}\mathbf{f}^{07}\right)/2}_{\text{Technology}} + \underbrace{\left(\widehat{\mathbf{V}}^{07}\mathbf{L}^{07} + \widehat{\mathbf{V}}^{19}\mathbf{L}^{19}\right)\Delta\mathbf{f}/2}_{\text{Final demand}} \quad (8)$$

in which $\boldsymbol{\beta}$ is a vector of industry value added and $\widehat{\mathbf{V}}$ is a square matrix with industry value-added output ratios on the main diagonal. Equation 7 can be substituted into the third element of Equation 8 such that a decomposition of the change in value added can be achieved in which the following components contribute to industry level change in value added:

- *Value-added coefficient*: the first element of Equation 8 captures the degree to which industries have added more or less to the value of their inputs. Put differently, have they become more or less 'value adding' over the period of observation?
- *Technology*: the second element of Equation 8 captures the degree to which all industries are switching their intermediate inputs such that it—directly and indirectly—makes a positive or negative contribution to the change in industry level value added. This suggests that it would, in principle, be possible for a switch to less locally produced intermediate inputs but with higher overall ability to generate value added.
- *Final demand level*: the first element of Equation 7 captures the extent to which a change in the level of total final demand (domestic plus exports) has contributed to the change in value added.
- *Final demand distribution*: the second element of Equation 7 captures shifts in patterns of domestic and foreign demand towards products that make—directly and indirectly—a positive or negative impact on the overall change in value added.
- *Final demand mix*: the third element of Equation 7 captures the impact of a switch in total final demand between domestic and foreign demand on the change in value added.

3.2 Results

We show economy-wide results in the first row of Table 9. The interpretation is as follows. Some 119% of the total change in GDP (in current prices), as measured by the two SAMs for 2007 and 2019, can be attributed to the change in final demand (in current prices, column 3).[7]

The degree to which value added relative to output changed made a negative contribution of 22.8% (column 1) whereas the change in intermediate inputs made a small positive contribution of 3.8% (column 2).

The final demand effect of 119% on the change in GDP consists of a level effect of 126.7% (column 5), whereas the degree to which expenditure patterns of domestic and foreign final

[7] This is no surprise since GDP at market prices is equal to C+G+I+E−M according to standard terminology. Therefore, the level effect of (exogenous) final demand (C+G+I+E) is less than GDP at market prices and even more so because the GDP at the industry level is measured in the SDA calculation at factor costs/basic prices (production taxes in both SAM are equal to zero),

demand changed was negative at −7.6%. The change in the distribution of total final demand between total domestic and total foreign final demand (column 7) is negligible.

In short, changes in the level of final demand (126.7%) dominate with a negative impact due to the economy producing 22.8% less value added whereas demand patterns also detracted from the overall change in value added (−7.6%). Finally, reflecting the degree to which the Mozambique economy became more integrated using more locally produced intermediate inputs, this fact made a small positive contribution to the economy-wide change in GDP (3.8%).

Table 2: Structural decomposition analysis for broad industries in Mozambique (2007–19) measured as shares in change of value added at factor costs

		1	2	3 (=5+6+7)	4 (=1+2+3)	5	6	7
		Value added to output effect (%)	Technical change effect (%)	Final demand effect (%)	Change in value added (%)	FD level effect (%)	FD mix effect (%)	FD distribution effect (%)
	Total	**–22.8**	3.8	119.0	100	126.7	**–7.6**	**–0.1**
1	Agriculture	**–11.6**	9.7	101.9	100	122.7	**–23.2**	2.4
2	Mining	7.7	19.2	73.1	100	48.8	28.4	**–4.0**
3	Food and beverages	**–104.3**	**–52.6**	256.8	100	238.4	14.6	3.9
4	Other manufacturing	**–29.2**	7.6	121.6	100	182.2	**–51.7**	**–8.9**
5	Utilities	**–35.3**	**–3.9**	139.2	100	228.2	**–75.8**	**–13.3**
6	Construction	**–31.0**	10.1	120.8	100	304.8	**–190.8**	6.8
7	Trade	**–110.8**	20.7	190.1	100	179.5	9.3	1.3
8	Accommodation	**–7.2**	30.0	77.3	100	115.2	**–30.2**	**–7.7**
9	Transport	5.8	**–15.0**	109.1	100	141.8	**–29.7**	**–3.0**
10	Other private services	**–8.7**	**–27.5**	136.2	100	133.8	0.3	2.1
11	Public services	**–30.2**	2.3	127.9	100	102.3	21.5	4.1

Note: negative values are shown in bold.

Source: authors' calculations using the 2007 and 2019 SAMs.

At the broad 11-industry level, we see that there is large variation in effects. Some general observations suggest that for most industries, the contribution of value added to gross output ratio to the change in their value added (column 1) has been negative. Only in the case of Mining and Transport did the change in generating value added per unit of output contribute to an increase in their value added. The technical change effect (column 2) is mostly positive except for Food and beverages (row 3), Utilities (row 5), Transport (row 9), and Other private services (row 10). The majority of industries derived a positive contribution to their change in value added from the overall change in the economy's industry structure.

For all industries, the change in final demand (column 3) is the greatest source of them realizing the observed change in value added. The breakdown of the final demand effect in column 3 is shown in columns 5–7. The final demand level effect (column 5) dominates and the degree to which there is a change in the overall distribution of total final demand between domestic and foreign sources (column 7) is very small. Some large impacts are associated with changes in demand patterns (column 6). For Mining (row 2), this is positive and significant, as expected and discussed earlier. However, these impacts are very negative for Construction (row 6). In this case, the underlying data show a very large residual item in changes of stocks for the year 2019 (see footnote

2), which is three times larger than construction investment demand. In addition, the underlying data for 2019 also show large values of investment goods produced by Other private services (scientific, technical, and similar consulting) and Mining amounting to more than 50% of total gross domestic fixed investment. As a result, the share of Construction in domestic final demand has dropped dramatically in 2019 compared with that in 2007. This suggests that the reported result for construction is largely an artefact of the underlying 2019 SAM data linked to newly defined investment goods produced by Mining and Other private services and a large residual item for changes in stocks. The full industry level detail is in Appendix Table A2.

4 Discussion and conclusions

Although the Mozambican economy is one of the least complex economies in the world (Sørensen et al. 2020), it also experienced a series of inter-linked shocks and many changes over that last couple of decades (e.g., see Barletta et al. 2022). The present paper examined evidence of structural change over the period 2007–19 based on two comparable SAMs for these years. We explored lessons from number of standard measures and found a series of telling developments.

At the level of the national accounts, we uncovered that while household expenditure—for rural and urban in equal terms—became less prominent over the period relative to GDP, government expenditure and investment demand went in the opposite direction. Exports remained at the same relative level while the economy became significantly more dependent on imports. We also suggested that investment demand is most likely the main expenditure GDP component responsible for higher imports.

The current account deficit on the balance of payment widened as a share of GDP. In a sense, the Mozambique economy is now borrowing more heavily from the rest of the world and is using this additional source of savings to raise its investment compared with the 2007 SAM. Whether running such high deficits is sustainable in the long term remains to be seen, and will depend on the generation of significantly increased foreign debt service capacity.

On the income side of GDP, it appears that the shares of labour and capital in GDP at factor costs are remarkably stable. At market prices, their combined shares dropped somewhat whereas the share of import duties collected remained constant. This is so in spite of the referred increase in imports. It also appears that import tariffs have come down likely due to a combination of liberalization and lower tariffs on, for example, investment goods away from consumption goods. At the same time, the share of indirect domestic product taxes has increased. This relates to two factors. On the one hand, tax rates increased during the period. On the other hand, tax revenue collection became a higher policy priority. Within the labour component of GDP, there has been a marked shift towards higher-skilled earnings. This could be the result of an overall increase in education outcomes but also that higher-skilled labour managed to raise its share through higher wage rates. Lack of employment data for the starting year (2007) prevents deeper analysis of this possibility.

On the production side of Mozambique's macro-economic accounting, a picture emerges of productive activities becoming more reliant on intermediate inputs over the period of observation. In relative terms, this implies that the degree to which value is added and paid to labour and capital has declined. Moreover, intermediate inputs arise from local production and/or imports. With the relative surge in imports, it would indeed appear that intermediate inputs have played a role.

At a broad industry level, the industry distribution of GDP shows a pattern in which Agriculture is maintaining its relative position, Mining surges ahead, and most services make small gains apart from small declines in Trade and Transport. The productive core of a modern economy, in the form of Other manufacturing has declined its share in value added along with Utilities and Construction.

We noticed earlier that the share of exports in GDP remained steady but that of imports increased considerably. When looking at broad commodities there is no escaping the observation that Mining's exports share in total exports has increased significantly. This has dwarfed the importance of other commodities. Their importance in Mozambique's total trade has declined. Transport and Other private services are the only sectors that bucked this trend. Agriculture and processed food remain minor foreign trade players, even on the import side of trade. Imports of Mining products increased presumably with the expansion of metals manufacturing, although that did not improve the position of manufacturing in exports. Otherwise, the main shifts in trade over the period have been in Transport and Private services, in particular on the import side for the latter.

Shares in demand sales for broad product suggest that there is some evidence of value chain development for the local market by the wider agriculture and food-processing complex as well as by Other manufacturing industries. Elsewhere, it appears that the utilization of Transport has transitioned from primarily being for domestic consumption to increasingly being for exports and intermediate purposes. In contrast, Private services such as financial and business services have experienced a shift towards a greater focus on domestic demand, moving away from intermediate utilization.

In terms of income distribution, it appears that rural household income shifted away from wage earnings towards capital. Capital seems to have replaced paid labour in the rural areas. This suggests that relatively more rural households work for themselves rather than for a salary. Underlying reasons seem to be that rural households had fewer opportunities to find waged work and the effects of migration of younger people. On the other hand, in urban areas wage earnings seem to increase and 'own account' work to decrease. This could indicate a shift towards more formal employment options. Although we noted that the balance between labour and capital in GDP has remained relatively stable at the economy-wide level, less income from capital flows through to households at the end of the period. The reason is taxation of some of that income before it reaches households and/or that over time other beneficiaries of capital income have claimed a higher share such as government and the rest of the world.

The structure of the economy reflects inter-industry connectivity and that between other agents in the economy. We examined this by means of multipliers. At the economy-wide level, inter-industry interaction as such remained more or less the same. However, when considering the household income–expenditure loop, the average effect on output in 2019 is significantly smaller than that in 2007. As the economy expanded during the observed period, household incomes have generally increased, and spending patterns may have shifted towards goods and services that are more likely to be imported. As a result, there are greater leakages from the multiplier process, leading to a lower overall impact. Improved tax collection from household income may also increase leakages. Another observation is that when comparing net output with gross output multipliers over the period of observation, it would appear that the ability to add value by the Mozambique economy in general declined. Across broad industries, most GDP multiplier effects have become weaker. Those with the least decline are Agriculture and related food processing, Construction, and Accommodation. Main contributors to GDP such as Mining, Other manufacturing (other than processing food), and various services fared less favourably in this regard, reflecting some of the deeper challenges faced by Mozambican policy makers.

Taking the multiplier process one step further, our analysis aimed to decompose the change in value added over the period of study into various components. The question is to what extent the change in value addition (per unit of output), the change in inter-industry interaction (technology), and the change in final demand explain the change in value added at the industry level. Furthermore, we decomposed the change in final demand into a level effect, the degree to which expenditure patterns have changed, and an effect that considers whether the mix of total final demand between domestic and foreign sources changed.

Aggregated up to the economy-wide level, the level change in final demand is the overwhelming determinant of the change in value added. The change in the final demand expenditure patterns and the shift between domestic and foreign final demand had little impact over the period of observation. The change in adding value per unit of gross output made a negative contribution to the overall change in value added. On average, industries became less adept at adding value to their intermediate inputs. On the other hand, this suggests a positive impact of the technology effect in that industries shifted backward linkages such that this added to the change in value added, though the effect is relatively small. This confirms that the value-added multipliers declined whereas those of GVP remained more or less the same.

As observed at the economy-wide level, for most industries—broad or detailed—the level change in final demand is the greatest source of them realizing the observed change in value added. However, some large impacts also emerge from changes in demand patterns. For Mining, this change is positive and significant, as expected, but also for food processing. With regard to the latter, the results suggest that both the change in demand patterns as well as the change in the mix of domestic and foreign final demand have made a positive impact on growth in food processing.

Overall, our findings are a reflection of the significant short- and long-term challenges that Mozambican policy makers face. Broad-based dynamic change and structural transformation is lacking, and at the broad level, the SDA results suggest that for most industries, the contribution of value added to gross output ratio to the change in their value added was negative. Only in the case of Mining and Transport did the change in generating value added per unit of output contribute to an increase in their value added. Moreover, the majority of industries derived a positive contribution to their change in value added from the overall change in the economy's industry structure. Yet, this change was altogether small and did not happen for industries such as Transport, Private services, and food processing. This is certainly unfortunate for food processing as one would expect this industry could tap into the large Agriculture sector, which in and of itself does seem to have improved its ability in this regard, although modestly. Moreover, by 2019, less than a third of wage earnings went to rural households and more than two-thirds to urban households. This reflects deep-seated and stubborn transformation challenges related to the traditional kind of agricultural 'own account' activities that are the basis for current low-level livelihoods in large parts of the country. Changes in the Mining and extractives industries do not appear influential in this regard.

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Appendix

Table A1: Common classifications for a 2007 and 2019 Mozambique SAM

	Activities	Description		Commodities	Description
1	amaiz	Maize	1	cmaiz	Maize
2	aocer	Other cereals	2	cocer	Other cereals
3	arice	Rice	3	crice	Rice
4	apuls	Pulses	4	cpuls	Pulses
5	agnut	Groundnuts	5	cgnut	Groundnuts
6	aoils	Other oilseeds	6	coils	Other oilseeds
7	acass	Cassava	7	ccass	Cassava
8	aroot	Other roots	8	croot	Other roots
9	avege	Vegetables	9	cvege	Vegetables
10	asugr	Sugar cane	10	csugr	Sugar cane
11	atoba	Tobacco	11	ctoba	Tobacco
12	acott	Cotton and fibres	12	ccott	Cotton and fibres
13	afrui	Fruits and nuts	13	cfrui	Fruits and nuts
14	acoff	Coffee and tea	14	ccoff	Coffee and tea
15	aocrp	Other crops	15	cocrp	Other crops
16	acatt	Cattle	16	ccatt	Cattle
17	apoul	Poultry	17	cpoul	Poultry
18	aoliv	Other livestock	18	coliv	Other livestock
19	afore	Forestry	19	cfore	Forestry
20	afish	Fishing	20	cfish	Fishing
21	aomin	Other mining	21	comin	Other mining
22	angas	Natural gas	22	cngas	Natural gas
23	ameat	Meat	23	cmeat	Meat
24	afood	Other foods	24	cfood	Other foods
25	abevt	Beverages and tobacco	25	cbevt	Beverages and tobacco
26	atext	Textiles	26	ctxcl	Textiles and clothing
27	aleat	Leather and footwear	27	cleat	Leather and footwear
28	awood	Wood and paper	28	cwood	Wood and paper

29	achem	Chemicals	29	cpetr	Petroleum
30	anmet	Non-metal minerals	30	cchem	Chemicals
31	ametl	Metals and metal products	31	cnmet	Non-metal minerals
32	amach	Machinery and equipment	32	cmetl	Metals and metal products
33	aoman	Other manufacturing	33	cmach	Machinery and equipment
34	aelec	Electricity, gas, and steam	34	coman	Other manufacturing
35	awatr	Water supply and sewage	35	celec	Electricity, gas, and steam
36	acons	Construction	36	cwatr	Water supply and sewage
37	atrad	Wholesale and retail trade	37	ccons	Construction
38	ahotl	Accommodation and food services	38	ctrad	Wholesale and retail trade
39	atran	Transportation and storage	39	chotl	Accommodation and food services
40	acomm	Information and communication	40	ctran	Transportation and storage
41	afsrv	Finance and insurance	41	ccomm	Information and communication
42	areal	Real estate activities	42	cfsrv	Finance and insurance
43	absrv	Business services	43	creal	Real estate activities
44	apadm	Public administration	44	cbsrv	Business services
45	aeduc	Education	45	cpadm	Public administration
46	aheal	Health and social work	46	ceduc	Education
47	aosrv	Other services	47	cheal	Health and social work
			48	cosrv	Other services

Source: authors' mappings.

Table A2: Structural decomposition analysis for detailed industries in Mozambique (2007–19) measured as shares in change of value added (at factor costs)

		1	2	3	4	5	6
		Value added coefficient effect	Technology effect	Final demand level effect	Final demand mix effect	Final demand distribution effect	Total
1	Maize	−4.1%	10.8%	111.3%	−21.6%	3.6%	100.0%
2	Other cereals	−2.9%	17.0%	52.6%	31.2%	2.1%	100.0%
3	Rice	−79.2%	153.8%	340.6%	−321.4%	6.2%	100.0%
4	Pulses	−5.0%	4.3%	69.2%	28.9%	2.7%	100.0%
5	Groundnuts	−18.0%	17.3%	167.3%	−69.7%	3.0%	100.0%
6	Other oilseeds	617.3%	563.4%	−3123.6%	2105.0%	−62.1%	100.0%
7	Cassava	37.4%	1.4%	−231.9%	296.2%	−3.0%	100.0%
8	Other roots	−9.1%	8.6%	75.2%	22.8%	2.6%	100.0%
9	Vegetables	−1.9%	−17.2%	158.0%	−43.7%	4.8%	100.0%
10	Sugar cane	5.2%	7.3%	60.8%	25.0%	1.6%	100.0%
11	Tobacco	4.4%	23.9%	46.8%	23.5%	1.5%	100.0%
12	Cotton and fibres	−22.8%	−61.4%	138.3%	52.7%	−6.9%	100.0%
13	Fruits and nuts	−5.9%	−1.7%	91.8%	19.4%	−3.6%	100.0%
14	Coffee and tea	326.7%	314.2%	−413.9%	−164.5%	37.4%	100.0%
15	Other crops	−11.7%	20.6%	96.5%	5.8%	−11.2%	100.0%
16	Cattle	6.3%	−9.6%	162.9%	−63.3%	3.7%	100.0%
17	Poultry	9.4%	−16.0%	161.7%	−59.8%	4.6%	100.0%
18	Other livestock	5.4%	5.3%	84.7%	2.0%	2.7%	100.0%
19	Forestry	−125.0%	−20.0%	408.2%	−170.0%	6.6%	100.0%
20	Fishing	−44.2%	20.1%	145.7%	−21.2%	−0.4%	100.0%
21	Other mining	7.8%	22.4%	42.9%	29.2%	−2.2%	100.0%
22	Natural gas	7.3%	4.0%	76.8%	24.6%	−12.8%	100.0%
23	Meat	−616.0%	24.7%	616.3%	52.7%	22.4%	100.0%
24	Other foods	−69.2%	−57.8%	212.5%	11.9%	2.6%	100.0%
25	Beverages and tobacco	−44.0%	9.6%	131.4%	2.3%	0.6%	100.0%
26	Textiles	−197.2%	−535.1%	1373.4%	−563.8%	22.7%	100.0%
27	Leather and footwear	251.6%	−652.9%	897.8%	−421.0%	24.5%	100.0%
28	Wood and paper	−170.6%	−75.6%	421.9%	−58.8%	−17.0%	100.0%
29	Chemicals	22.9%	17.8%	58.3%	0.3%	0.7%	100.0%
30	Non-metal minerals	41.3%	3.0%	85.1%	−28.9%	−0.5%	100.0%

31	Metals and metal products	−28.8%	−5.9%	316.1%	−151.7%	−29.7%	100.0%
32	Machinery and equipment	−140.1%	125.3%	103.9%	8.7%	2.2%	100.0%
33	Other manufacturing	−17.2%	33.4%	59.7%	23.7%	0.3%	100.0%
34	Electricity, gas, and steam	−43.4%	4.0%	225.2%	−71.3%	−14.5%	100.0%
35	Water supply and sewage	58.5%	−95.9%	263.3%	−126.8%	1.0%	100.0%
36	Construction	−31.0%	10.1%	304.8%	−190.8%	6.8%	100.0%
37	Wholesale and retail trade	−110.8%	20.7%	179.5%	9.3%	1.3%	100.0%
38	Accommodation and food services	−7.2%	30.0%	115.2%	−30.2%	−7.7%	100.0%
39	Transportation and storage	5.8%	−15.0%	141.8%	−29.7%	−3.0%	100.0%
40	Information and communication	−21.6%	33.1%	95.2%	−6.3%	−0.3%	100.0%
41	Finance and insurance	18.1%	11.8%	77.4%	−8.0%	0.7%	100.0%
42	Real estate activities	−42.4%	−37.3%	262.4%	−90.5%	7.9%	100.0%
43	Business services	−18.8%	−264.7%	205.0%	173.6%	4.9%	100.0%
44	Public administration	−1.7%	4.3%	80.3%	13.9%	3.1%	100.0%
45	Education	−56.4%	−0.6%	131.1%	20.6%	5.4%	100.0%
46	Health and social work	−113.7%	−0.6%	145.0%	62.6%	6.7%	100.0%
47	Other services	−52.3%	8.4%	361.3%	−223.2%	5.8%	100.0%

Source: authors' calculations using the 2007 and 2019 SAMs.