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Transforming Southern Africa?

A comparison of structural change experiences in the region[1]

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Abstract

This paper examines the process of structural change and export diversification that took place in five selected Southern African economies since the early 1970s. Making use of several complementary data sources, the paper highlights the important differences that characterized the experiences of different countries and discusses the main challenges and opportunities that these countries, and the region as a whole, will face in the years to come.

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1. Introduction

What determines economic disparities among countries and how can we move forward to reduce these income gaps? The development economics literature has studied how countries get rich since the seminal work of Arthur Lewis (1954). This literature primarily attributes economic development to the process of structural transformation – economies grow as resources shift towards progressively more productive sectors. The speed at which this transformation occurs, in turn, determines why some countries get rich faster than others.

The forces of structural transformation operate at two levels. At the aggregate level, the transformation occurs as resources are reallocated from low-productivity agriculture to high-productivity industry, and eventually from industry to services after a certain income threshold is achieved (Kuznets, 1973).[2] In the early phase of development, manufacturing plays a particularly important role in fostering those linkages through which the nexus between growth and structural transformation is sustained (UNCTAD, 2016a). At the microeconomic level, significant productivity differences exist within each of the three broad sectors. Whether the economy transitions to producing more dynamic activities within a sector is conditional on the institutional environment and the know-how that is accumulated through comparative advantage in the production of similar goods.

This suggests that development is a path-dependent process that requires deliberate policy choices to usher in economic transformation. And it is this inherent path-dependence, along with unfortunate policy decisions, that explains (at least in part) why many developing countries either have failed to diversify and deepen their production structure or experienced

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[2] Following UNCTAD (2016a), industry is defined as a composite of manufacturing, mining and quarrying, construction and utilities

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premature deindustrialization, as has been the case of Latin American countries (UNCTAD, 2016a).

This paper analyses the structural transformation and export structures of five Southern African economies – Mauritius, Mozambique, South Africa, the United Republic of Tanzania and Zambia. Economic transformation is assessed in terms of both domestic output and international export composition. The focus on export structures is motivated by three factors. First, recent literature on structural transformation has shown export structure to be a good predictor of economic growth and therefore one of the possible explanations of cross-country income disparities (Hausmann et al., 2007; Hausmann et al., 2011). Second, countries generally export those goods where they have a comparative advantage, hence examining the export structure can help to understand the underlying knowledge or institutional advantages that make a country competitive (Hausmann and Klinger, 2007; Hidalgo et al., 2007). Finally, in the absence of disaggregated, cross-country production data, export data provide a useful approximation of the productive structures in an economy.

The rest of the paper is structured as follows: Section 2 summarizes the structural transformation literature. Section 3 gives an overview of the economic and export trends of the five economies under scrutiny. Section 4 analyses in detail the structural change and export dynamics experienced by each of them since the early 1970s. In section 5, we propose an experiment of regional integration, which aims at understanding how export diversification opportunities would change if the five countries would act as a single economy. Section 6 concludes.

2. Related literature

The first generation of growth models used two distinct approaches to explain the growth phenomena (McMillan and Rodrik, 2016). The first approach has its roots in development economics and focused on the dual characteristic of the economy (Lewis, 1954; Ranis and Fei, 1961). According to these models, the economy comprises traditional (agriculture) and modern (industry) sectors. The traditional sector employs primitive technology and remains backward. The modern sector, on the other hand, is characterized by capital accumulation, innovation and productivity growth. Economic growth therefore depends on the rate at which labour and other productive resources are shifted from the traditional and low-productivity sector to the modern one – a process of "structural transformation". Structural transformation is particularly beneficial for developing countries because their structural heterogeneity – that is, the combination of significant intersectoral productivity gaps in which high-productivity activities are few and isolated from the rest of the economy – slows their development. Economic activities also differ in terms of the strength of their linkages with the rest of the economy. In developing economies, the weak linkages between high- and low-productivity activities that make up the bulk of the economy reduce the chances of structural transformation and technological change.

In this framework, structural transformation can generate both static and dynamic gains. The static gain is the rise in economy-wide labour productivity, as workers are employed in more productive sectors. Dynamic gains, which follow over time, are due to skill upgrading and positive externalities that result from workers having access to better technologies and accumulating capabilities.

The second approach to economic growth is founded in the neoclassical growth models of Solow and its later variants (Solow, 1956; Grossman and Helpman, 1991). According to these models, various economic activities are structurally similar and can be aggregated into a single representative sector. In their set-up, growth depends on the incentives to save, capital accumulation (both physical and human) and innovation by developing new products or processes and economic growth is seen as essentially a process of "within-sector transformation".

Empirical literature focused mainly on the long-term growth trends in the developed countries. Herrendorf et al. (2013), for example, use data on 5 non-European Union and 15 European Union countries from 1970 to 2007, and establishes the typical pattern of structural transformation. The share of the agricultural sector decreases with the level of development, while the share of the services sector increases at all levels of development. The share of the manufacturing sector, on the other hand, follows a hump-shaped pattern. The manufacturing share increases until a certain level of development is achieved and decreases thereafter. In the same period, Total Factor Productivity growth is observed in all three broad sectors of the economy, suggesting a contemporaneous transformation that occurs within each sector. In particular, it is the agriculture sector that experiences the largest productivity growth, which frees up resources for the manufacturing and services sectors.

More recently, the structural transformation literature has abstracted from the broad sectoral dichotomies, concentrating on the complexity of productive structures that are embedded in an economy (Hausmann and Klinger, 2007; Hausmann et al., 2007; Hidalgo et al., 2007). The intuition is that countries cannot produce goods for which they do not possess the underlying knowledge or capabilities. This puts learning, capabilities and technological change at the centre of the structural transformation processes. This literature sees

production possibilities as a space in which economies move. More specifically, the "product space" is an illustration of all goods exported in the world, where the distance between two goods is defined by the probability of producing one of the goods if an economy already produces the other. In this framework, structural transformation entails moving from a good that countries already produce to another one that is close enough to it, where "close enough" is defined based on the knowledge and capabilities needed to produce a certain good. Hence, in the product space, goods are close if the knowledge used to produce them is similar, and goods are far away if producing them requires completely new sets of skills. This ultimately configures a network of goods, a sort of map in which economies move from one point to another, leading to diversification and production of increasingly complex goods.

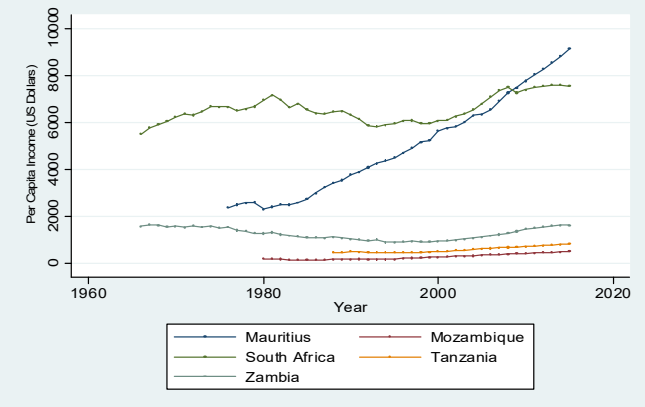
In the remainder of this paper we will examine structural transformation in the five economies under exam employing both traditional data on productivity changes and value added distribution and more recent product space analysis.

3. Trends of economic and export growth in the region

The economies under assessment have some common attributes. Except for Mauritius, they are rich in natural resources, particularly in extractive resources. Their workforces are predominantly employed in agriculture, although they have been evolving into service-led economies. Their export basket is dependent on few commodities and, generally, manufacturing growth has been difficult to achieve. Mauritius and South Africa are the two exceptions, having developed a stronger manufacturing sector and more diversified export basket. Mauritius in particular is an anomaly. Scarce in natural resources, it has followed the trajectory of East Asian economies in industrializing rapidly. Its manufacturing sector has generated considerable employment, while industrial policies have created new exporting opportunities (see box).

Significant per capita income variation exists among these five economies (figure 1). Due to rapid economic growth, Mauritius overtook South Africa in the late 2000s and became the richest economy of the group. South Africa has witnessed periods of economic growth, but did not experience the same catch-up industrialization process that has been observed in Mauritius. In contrast, Zambia, the United Republic of Tanzania and Mozambique have achieved limited economic growth, with per capita income stagnating at low levels.

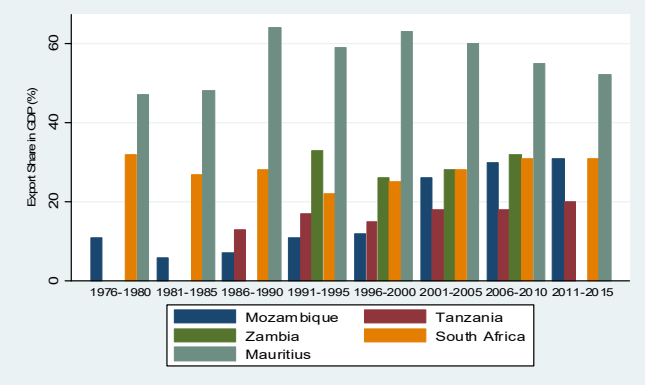
Figure 1: Incomes per capita, 1966–2015



Source: Authors' elaboration based on World Development Indicators.
Note: Gross domestic product (GDP) per capita at constant 2010 United States dollars.

The Mauritian structural transformation process has been accompanied by export growth, with exports having reached 65 per cent of the country's GDP in 1990. The role of exports in the other four economies has been more limited (figure 2). In South Africa and Zambia, export share has hovered around 30 per cent of GDP, while in the United Republic of Tanzania it reached a peak of only around 20 per cent in 2012. Mozambique has experienced a rapid increase in its export share since the 1990s, perhaps driven by the surge in the international demand for commodities.

Figure 2. Exports, as a share of GDP, 1976–2015

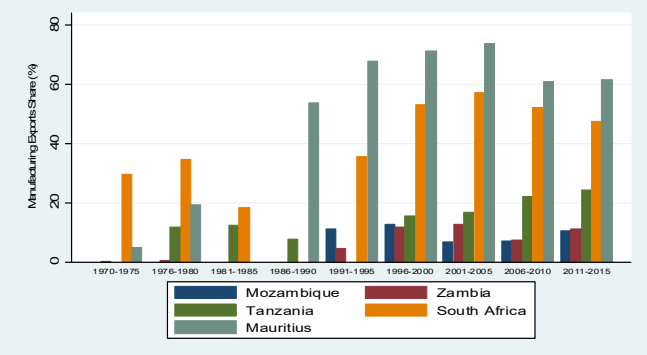


Source: Authors' elaboration based on World Development Indicators.

To better understand how structural transformation has affected export growth in these economies, figure 3 depicts manufacturing exports as a share of total merchandise exports. Mauritius and South Africa stand out from the rest of the group. In Mauritius, the share of manufactured goods in total exports increased from 5 per cent in the 1970s to 74 per cent in the early 2000s. In contrast, South Africa has maintained a high share of manufacturing exports since the 1970s. The remaining three economies started off from low

manufacturing exports bases and have not been able to achieve significant growth.

Figure 3. Manufacturing exports, as a share of merchandise exports, 1970–2015



Source: Authors' elaboration based on World Development Indicators.

4. Structural transformation and export diversification opportunities

This section analyses the structural change and export diversification opportunities of Mauritius (section 4.1), Mozambique (section 4.2), South Africa (section 4.3), the United Republic of Tanzania (section 4.4) and Zambia (section 3.5).

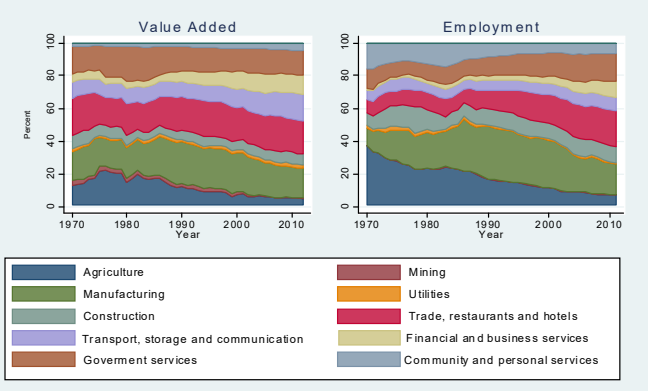
4.1 Mauritius

Mauritius has undergone a successful process of structural transformation over the last five decades; the productive resources were first reallocated from agriculture to manufacturing, and then from manufacturing to services after reaching a relatively high per capita income level (UNCTAD, 2016a).

Figure 4 illustrates the structural transformation process in Mauritius for the period from 1970 to 2012. The decline in agricultural value added from 20 per cent in the mid-1970s to 5 per cent in 2012 benefited manufacturing first, and later services (especially financial services). A similar trend is observed in the labour dynamics. The employment share in agriculture contracted from 37 per cent of the workforce in 1970 to 7 per cent in 2011. Labour moved to manufacturing, whose employment peaked at 32 per cent in 1990. Manufacturing output grew at an average of 3 per cent per annum from the late 1970s until the early 1990s.

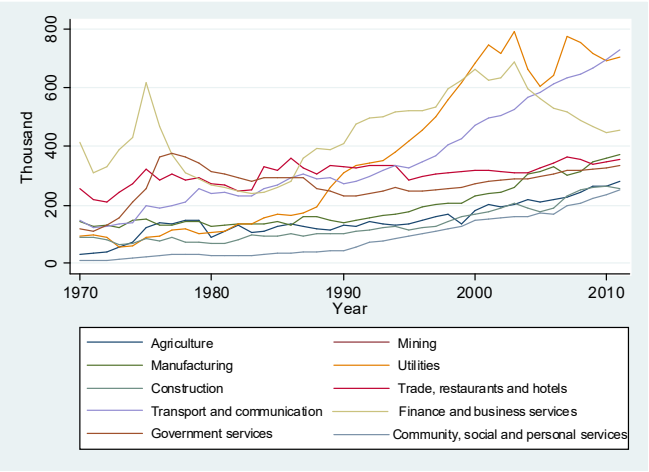
This rapid industrialization was accompanied by fast productivity growth. Figure 5 presents the disaggregated sectoral productivity trend for the 1970–2011 period. Two stylized facts are noteworthy: the structural transformation was accompanied by labour productivity growth in all sectors of the economy, and the initial spurt in agricultural productivity growth was key for freeing up resources for the manufacturing sector.

Figure 4. Mauritius: Value added and employment shares by sector, 1970–2012



Source: Authors' elaboration based on the Groningen Growth and Development Centre (GGDC) 10-sector database.
Note: Value added in constant 2005 national prices.

Figure 5. Mauritius: Labour productivity by sector, 1970–2011

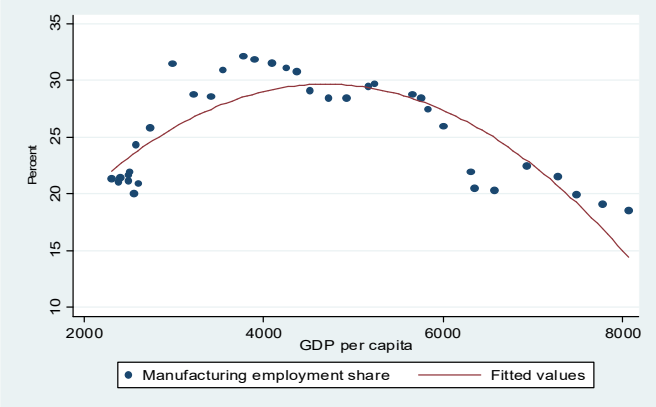


Source: Authors' elaboration based on the GGDC 10-sector database and World Development Indicators.
Note: GDP per capita in constant 2010 United States dollars.

Figure 6 depicts the hump-shaped pattern of manufacturing growth in Mauritius, which mirrors the long-term structural transformation of the early industrializing countries (Herrendorf et al., 2013). During the first phase of development, from 1970 to 1990, labour-augmenting technical progress in the agricultural sector freed excess labour to act as a catalyst for the manufacturing industry. Manufacturing employment peaked at roughly 30 per cent of GDP at a per capita income of $4,500 in the early 1990s. The expansion of the manufacturing sector was accompanied by rapid productivity growth, which freed up the resources for expansion of other high-productivity sectors. For example, the

employment in financial and business services registered a five-fold growth from 1990 to 2011. This transition from manufacturing to other high-productivity services from the 1990s onwards explains the deindustrialization trend in figure 6.

Figure 6. Mauritius: The deindustrialization process, 1976-2011

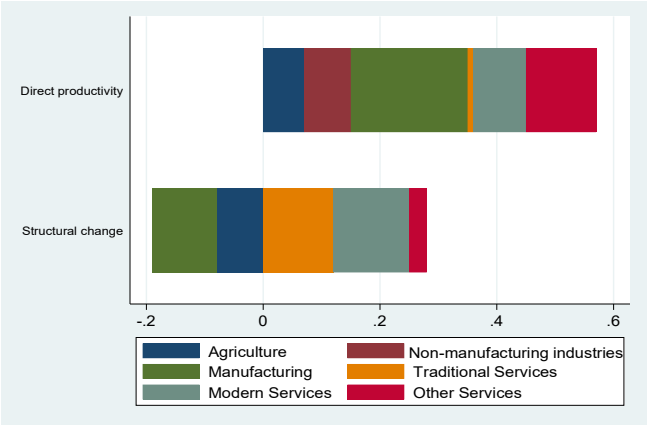


Source: Authors' elaboration based on the GGDC 10-sector database and World Development Indicators.
Note: GDP per capita in constant 2010 United States dollars.

Next, we decompose aggregate labour productivity growth from 1991 to 2010 into its underlying "direct productivity" and "structural change" effect components. Direct productivity effect measures the change in labour productivity that is determined by productivity gains within a sector, due, for example, to technological advancement. The structural change effect captures the impact of labour movements across sectors on the overall labour productivity (see annex I for a detailed explanation of these two effects). Results show that 37 per cent of labour productivity growth from 1991 to 2010 was due to the structural transformation in the economy.

Figure 7 shows how individual sectors contributed to these two effects. First, direct productivity effects are positive for all industries, with manufacturing being the largest contributor. At the same time, the reallocation effect for manufacturing was negative, suggesting that, due to its sustained productivity growth, the sector shrank in terms of employment share. This is in line with the deindustrialization trend described above. Despite structural change away from manufacturing, the aggregate reallocation effect on productivity was still positive, as the structural shift occurred towards other productive industries such as modern services.

Figure 7. Mauritius: Direct productivity and structural change effects by sector, 1991–2010

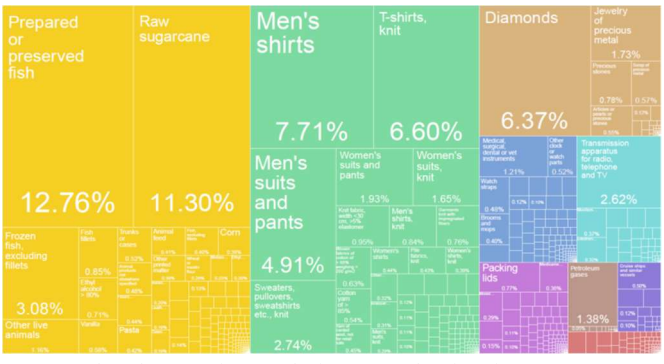


Source: Authors' computations based on the GGDC 10-sector database.

Notes: For brevity, we aggregate the 10 sectors into 6 broadly defined sectors: agriculture, non-manufacturing industries, manufacturing, and traditional, modern and other services. "Non-manufacturing industries" include mining, utilities and construction. "Traditional services" refer to retail trade, restaurants and hotels. "Modern services" refer to finance, insurance, real estate and business services and transport, storage and communication. "Other services" include government services and community, social and personal services.

We now turn our attention to Mauritian export structure to understand the underlying knowledge or capabilities that are embedded in the economy. This also allows us to scope the future production possibilities. We first present the current export basket in figure 8. The country's total exports were worth $2.14 billion in 2016, and its main exports included primary products and textiles. The export structure can be summed up in two stylized facts: the export basket is quite diverse and is dominated by goods that can be produced with simple know-how.

Figure 8. Mauritius: Export basket in 2016



Source: Atlas of Economic Complexity, Harvard University.

Next, we map the Mauritian exports for the products where the country has a revealed comparative advantage (RCA), as a subset of all the products that are exported in the world (figure 9). The coloured circles in figure 9 denote products for

which Mauritius's RCA is greater than or equal to 1.[3] These are the products where Mauritius enjoys a relative advantage in the global economy, as measured by the trade flows.

The network representation of globally exported goods that is shown in figure 9 suggests that product space is highly heterogeneous. Products at the periphery of the network tend to be weakly connected with the rest of the products in terms of the common capability requirements. The periphery products typically include products such as petroleum, seafood and raw materials (Abdon and Jesus, 2011).

On the other hand, products at the core of the network are closely related to each other. These mainly include machinery, chemicals and metal products (Abdon and Jesus, 2011). There are also some clusters where the products are closely related to each other within the cluster, but not to the rest of the product space. These clusters typically include garments and electronic products (Abdon and Jesus, 2011).

Figure 9 depicts the evolution of Mauritius' product space from 1970 to 2014. The country had a more diversified product space in 2014, compared with 1970. The number of products with RCA increased from about 20 products in 1970 to almost 150 in 2014. The diversification of the product space has mainly taken place in the peripheral products, particularly in the closely knitted garments sector(depicted by green circles). The country has not been able to make significant leaps in the more sophisticated and intricately linked core products. This suggests that Mauritius' transformation in the future will not be seamless, as the set of acquired productive capacities cannot be easily redeployed into producing other goods.

Figure 9. Mauritius: Product space in 1970 and 2014

Panel a: Product space 1970 Panel b: Product space 2014

Source: Atlas of Economic Complexity, Harvard University.

How is Mauritius's export structure likely to evolve in the future? The feasibility chart depicted in figure 10 displays the complexity of the products that the country is most likely to produce in future. The vertical axis shows the product complexity and is calculated as the function of how many countries export the given product and how diversified those exporters are (Hausmann et al., 2011).[4] In other words, a product is likely to score high on complexity on the vertical axis if it is exported by very few countries, and each of those countries exports large number of other products.

The horizontal axis shows the likelihood of a country producing a given product and is determined by how far that product is from the country's existing productive capabilities (Hausmann et al., 2011)[5]. The distance measure on the horizontal axis is the weighted proportion of products connected to a given product that are currently not produced by the country.[6] If Mauritius exports most of the products that are connected to a given product, then it would be located closer to 0 on the horizontal axis. However, if Mauritius only exports a small share of goods that are related to a given product, it would be located closer to 1 on the horizontal axis.

The upward slope of the product distribution on the complexity-distance axis suggests that Mauritius' existing productive capabilities are less likely to support the production of more complex products.[7] Focusing on the products that lie above the horizontal line, i.e. products that are more complex than the average complexity of the goods currently produced in Mauritius, suggests that the country can feasibly develop capacities to export more complex agro-based manufacturing products, textiles and furniture and chemicals and plastics.

[3] Country i having an RCA ≥ 1 in product k means that product k's share in country i's exports is larger than the share of product i in rest of the world's exports (Balassa, 1965).

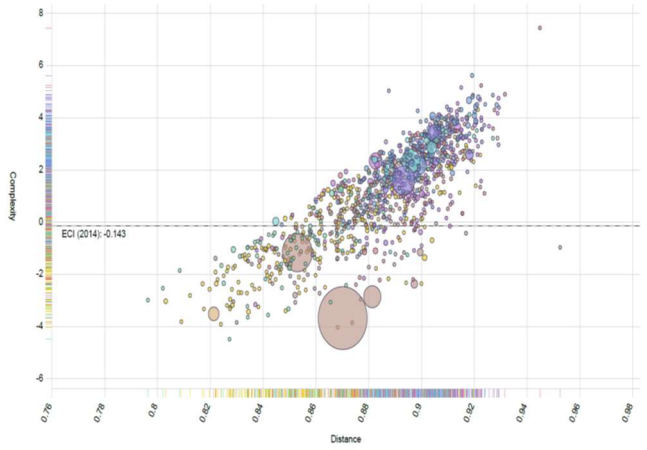
[4] Diversification measures the number of products that are produced by a given country.

[5] A country is less likely to produce a given product the further that product is placed on the horizontal axis.

[6] The weights are the proximity of each product that the country is not exporting to the given product. Proximity is defined as the minimum of the share of countries that specialize in both products

[7] The size of the bubble is proportional to the share of global trade accounted by each product.

Figure 10. Mauritius: Feasible products in 2014



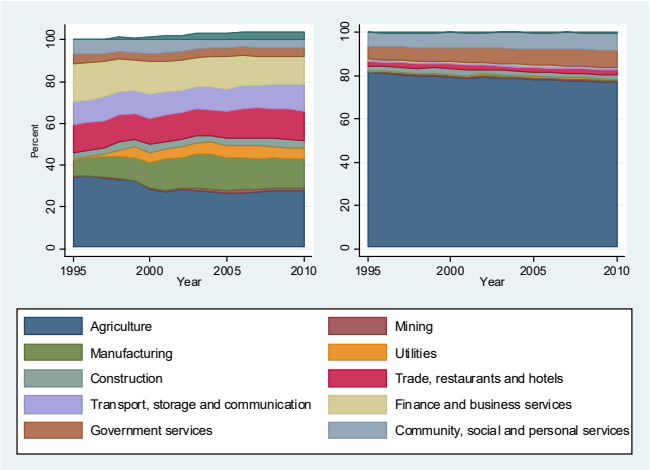
Source: Atlas of Economic Complexity, Harvard University.

In conclusion, Mauritius underwent a successful structural transformation, accompanied by fast productivity growth, particularly in agriculture. Today, the economy is internationally competitive in several products, although most of them are primary products, agro-based manufactures and textiles. Going forward, the economy is likely to specialize in some other industries, particularly chemicals and plastics. Diversifying towards a more complex economy will not be without its challenges, as most complex not-exported products seem far from the current export basket of Mauritius.

4.2 Mozambique

Subject to significant political turmoil, Mozambique has encountered considerable difficulty in kicking off a structural transformation[8]. Agriculture continues to be the mainstay of the economy, employing 77 per cent of the workforce in 2012 (figure 11). The small decline in the agricultural value added and labour share has been compensated by the gains in the transport, storage and communication sector. The share of manufacturing sector has remained low, both in terms of value added and employment. The sectoral output peaked at 17 per cent in 2004 and has been on a decline since, reverting to its 1990s values.

Figure 11. Mozambique: Value added and employment shares by sector, 1991–2012

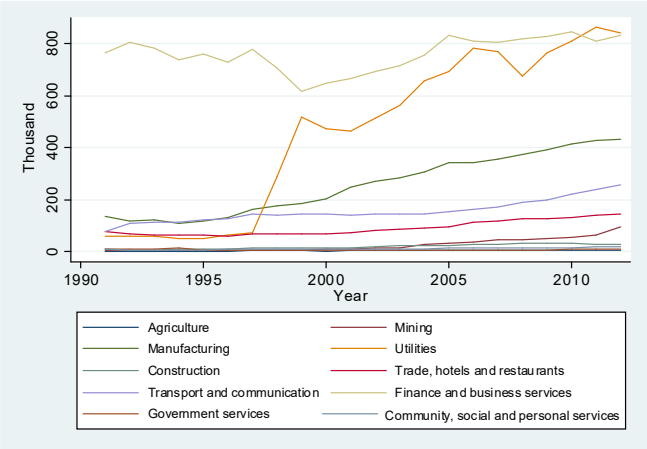


Source: Authors' elaboration based on United Nations Statistics Division (UNSD) National Accounts and the International Labour Organization's (ILO's) World Employment and Social Outlook.
Note: Value added in constant (2003) national prices (metical).

Limited productivity growth has been responsible for the weak structural transformation (figure 12). Finance and business services and utilities industries have been the most productive sectors, the latter experiencing rapid productivity growth since 1995. However, these industries only employ a small share of the workforce and tend to be isolated from the rest of the economy, therefore reducing spillover possibilities from productivity enhancements and technological change. Manufacturing has experienced some productivity growth, although the gains are not as significant as in the utilities sector. The rest of the sectors have experienced limited or no labour productivity growth, contributing to the stalled industrialization described above.

[8] "Mozambique country profile", BBC News (2 November 2017).

Figure 12. Mozambique: Labour productivity by sector, 1991–2012



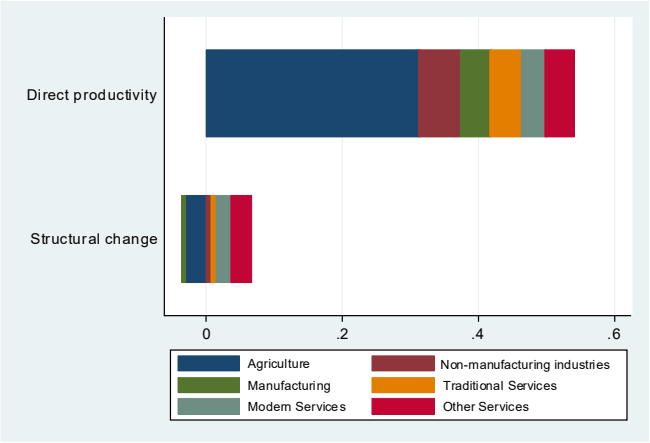
Source: Authors' elaboration based on UNSD National Accounts and ILO's World Employment and Social Outlook.
Note: Productivity in constant (2003) national prices (metical).

The decomposition of the overall productivity growth in its underlying components, direct productivity and structural change, is shown in figure 13. Expectedly, within sector productivity growth has contributed considerably more than employment shifts from less to more productive industries. Specifically, the direct productivity effect accounted for 63 per cent of aggregate labour productivity growth, while structural change accounted for the remaining 37 per cent increase from 1991 to 2010.

Given the disparity in productivity growth across sectors, we also expect heterogeneous sectoral contributions to these two effects. Figure 13 depicts this phenomenon. All industries contributed positively to direct productivity growth, the gains within the agricultural sector being the most significant. In principal, this should be a good sign, as fast agricultural productivity growth is a powerful catalyst of the industrialization process. This is also evident in the negative structural change effect, which suggests a shift in labour from agriculture to other industries.

However, as highlighted in figure 11, the movement in labour away from agriculture has been modest. Moreover, figure 13 depicts a negative structural change component for the manufacturing sector, indicating an employment shift away from manufacturing. Indeed, modern and other services have expanded the most, contributing positively to aggregate productivity growth. Furthermore, this effect is big enough to offset the negative structural change effect for the manufacturing sector.

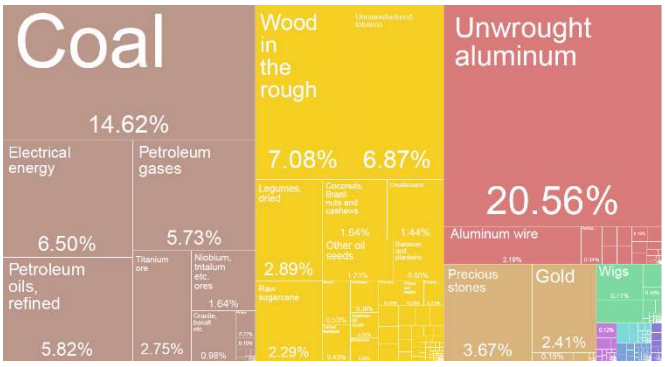
Figure 13. Mozambique: Direct productivity and structural change effects by sector, 1991–2010



Source: Authors' computations based on UNSD National Accounts and ILO's World Employment and Social Outlook.
Note: For the sake of simplicity, we aggregated the 10 sectors into 6 broadly defined sectors: agriculture, non-manufacturing industries, manufacturing, and traditional, modern and other services. "Non-manufacturing industries" include mining, utilities and construction. "Traditional services" refer to retail trade, restaurants and hotels. "Modern services" refer to finance, insurance, real estate and business services and transport, storage and communication. "Other services" include government services and community, social and personal services.

Finally, we assess the export structure and diversification opportunities for Mozambique. The product tree map shows the export structure in 2016 (figure 14). The total exports were worth $3.91 billion in 2016. The export basket is based on both agricultural and extractive products. In addition, electrical energy constitutes a key component of the export structure.

Figure 14. Mozambique: Export basket in 2016

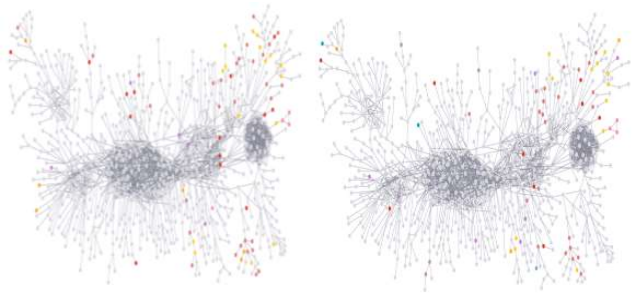


Source: Atlas of Economic Complexity, Harvard University.

Comparing the product space in 1970 and 2014 shows barely any diversification in Mozambique's export structure (figure 15). This further attests to the limited structural transformation Mozambique has achieved in the past decades.

Figure 15. Mozambique: Product space in 1970 and 2014

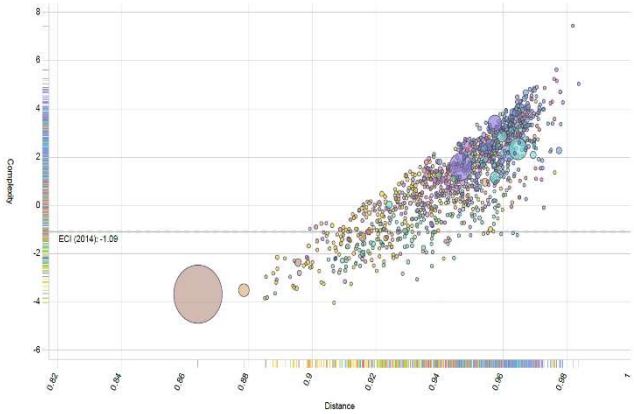
Panel a: Product space 1970 Panel b: Product space 2014



Source: Atlas of Economic Complexity, Harvard University.

Next, we assess the feasibility of productive transformation in Mozambique. The feasibility chart (figure 16) suggests that the capacities required for most of the complex products that are not yet produced are not available in the economy. Focusing on the distribution of the yet-exported goods that are above the average economic complexity indicate that the country is likely to develop capacities for producing mainly in more complex agro-based manufacturing. Furthermore, opportunities for developing transport and vehicles related products can also be leveraged in the future.

Figure 16. Mozambique: Feasibility chart in 2014



Source: Atlas of Economic Complexity, Harvard University.

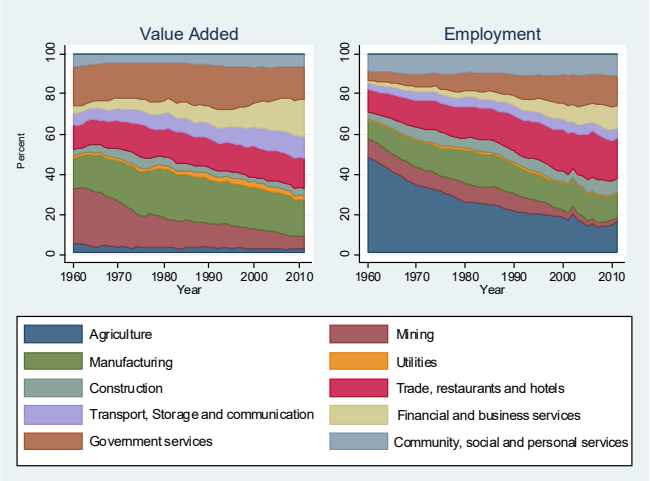
Stalled industrialization with limited manufacturing productivity growth is transforming Mozambique from an agrarian to a service-led economy. Apart from services, the mining sector continues to play a big role, especially in exports; as a matter of fact, the Mozambican export basket continues to be dominated by primary products and resource-based manufactures. The country is therefore currently facing the challenge to diversify towards simple manufacturing goods such as textiles or other low-tech manufactures.

4.3 South Africa

South Africa underwent a structural transformation that curtailed reliance on its natural resources, both agricultural and extractive output. Figure 17 illustrates the sectoral value added and employment share trends from 1960 to 2011. Most notably, over this period, the share of mining value added decreased from 28 to 6 per cent, while the share of agricultural employment declined from 50 to 17 per cent.

The shift away from the primary sector has mainly benefited the services industry. Financial and business services experienced an almost five-fold increase in their value added and employment shares during this period. Trade, restaurants and hotels doubled their employment share. In contrast, manufacturing employment increased initially from 15 per cent in 1960 to 25 per cent in 1981, but it has contracted since then, falling to 18 per cent in 2011. Similarly, manufacturing value added, which peaked at 25 per cent in 1981, has returned to its 1960s' values.

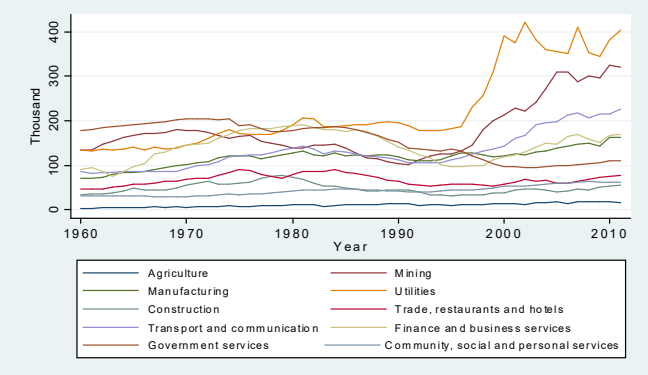
Figure 17. South Africa: Value added and employment shares by sector, 1960-2011



Source: Authors' elaboration based on the GGDC 10-sector database.
Note: Value added in constant 2005 national prices.

Rapid productivity growth is essential for sustained structural transformation, as the case of Mauritius has shown. Figure 18 shows the evolution of labour productivity across sectors from 1960 to 2011. Average productivity growth remained stagnant in the last five decades, except for the mining and utilities sectors, which enjoyed a productivity surge starting in the late 1990s. Since the 2000s, productivity in the modern services has been on the rise, outperforming that of the manufacturing sector. The manufacturing productivity level has typically been higher than average productivity levels, and in some periods higher than the modern service industry. However, for the largest sectors in the economy – agriculture, retail, restaurants and hotels – labour productivity has remained low over the entire period.

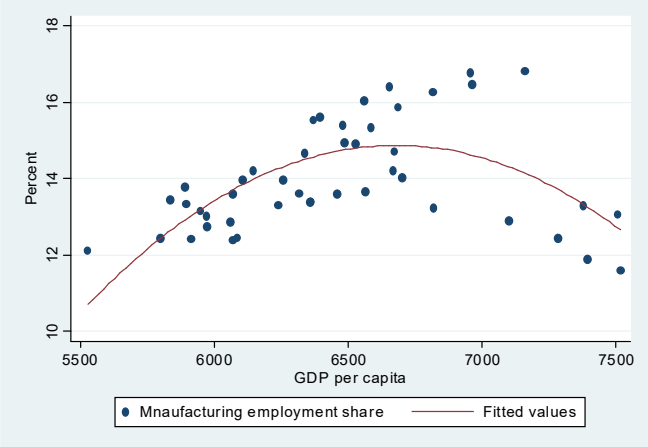
Figure 18. South Africa: Labour productivity by sector, 1960–2011



Source: Authors' elaboration based on the GGDC 10-sector database.
Note: Value added figures are in national currency (constant 2005 prices).

Figure 19 depicts the deindustrialization pattern in South Africa. Manufacturing employment peaked at only about 15 per cent of GDP at a per capita income of $6,500 in the early 1980s, and declined thereafter. In the case of South Africa, the manufacturing sector was unable to develop a large base, before ceding space to the services sector.

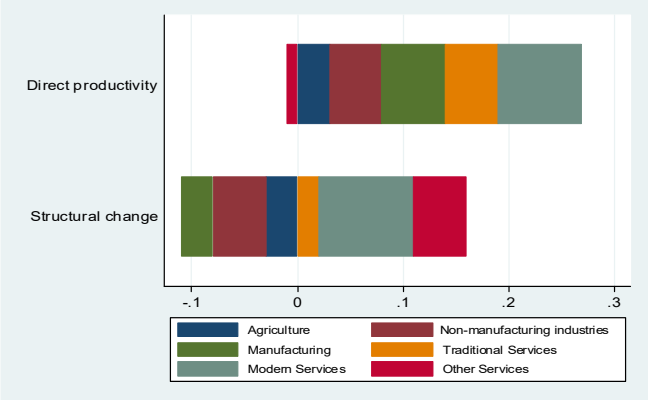
Figure 19. South Africa: The premature deindustrialization process, 1966–2011



Source: Authors' elaboration based on the GGDC 10-sector database and World Development Indicators.
Note: GDP per capita in constant 2010 United States dollars.

We now quantify the precise role of structural transformation in overall productivity growth in South Africa. Decomposition of labour productivity growth shows that the structural change effect was responsible for 45 per cent of the productivity gains between 1991 and 2010 (figure 20). Based on sectoral productivity trends presented in figure 18 that show sustained productivity gains in only some selected industries, it is reasonable to expect that productivity growth in certain sectors had a bigger contribution to the overall productivity growth. Figure 20 shows that within-sector productivity gains were the largest for modern services and manufacturing, although these industries could not expand enough to stimulate deeper structural transformation. Labour moved to modern services, while employment in the manufacturing sector shrank.

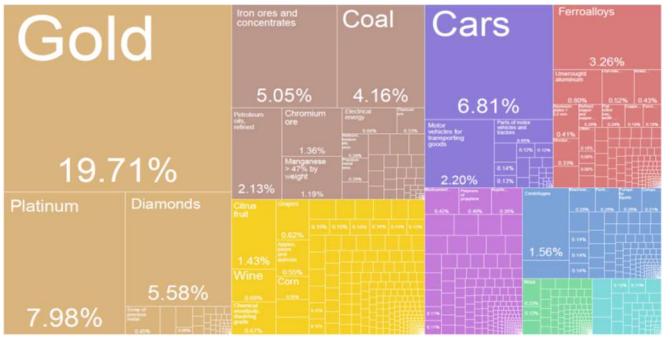
Figure 20. South Africa: Direct productivity and structural change effects by sector, 1991–2010



Source: Authors' computations based on the GGDC 10-sector database.
Notes: For brevity, we aggregate the 10 sectors into 6 broadly defined sectors: agriculture, non-manufacturing industries, manufacturing, and traditional, modern and other services. "Non-manufacturing industries" include mining, utilities and construction. "Traditional services" refer to retail trade, restaurants and hotels. "Modern services" refer to finance, insurance, real estate and business services and transport, storage and communication. "Other services" include government services and community, social and personal services.

We now turn our attention to the current export basket and product diversification opportunities for South Africa. The country exported goods worth a total of $96.6 billion in 2016. Four of the top five exports belonged to the mining industry (figure 21). Motor vehicle manufacturing was another important constituent in the export basket.

Figure 21. South Africa: Export basket in 2016



Source: Atlas of Economic Complexity, Harvard University.

Figure 22 shows how South Africa's product space evolved from 1970 to 2014. The country's product space in 2014 looks similar to that in 1970. The country, however, managed to develop new competencies in a few core products related to machinery and transport and manufactured goods.

Figure 22. South Africa: Product space in 1970 and 2014

Panel a: Product space 1970 Panel b: Product space 2014

Source: Atlas of Economic Complexity, Harvard University.

Figure 23 shows the future transformative capacity for South Africa. The distribution of the yet-exported goods, which are above the average economic complexity, suggest that it is likely to develop capacities for producing more complex agro-processing manufacturing, chemicals and plastics, and transport- and vehicles-related products in the years ahead.

Figure 23. South Africa: Feasible products in 2014

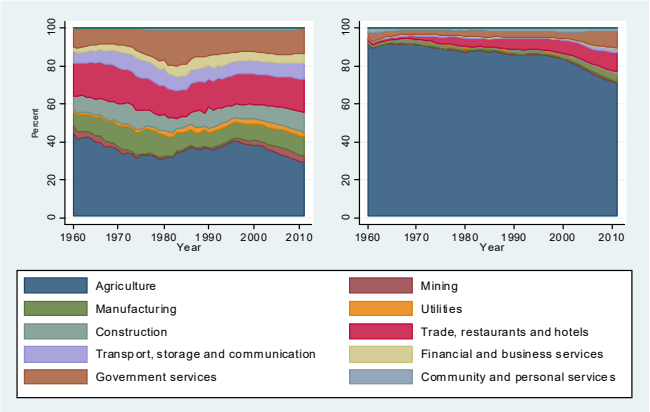
Source: Atlas of Economic Complexity, Harvard University.

To sum up, South Africa is an emblematic case of premature deindustrialization, where services grew in terms of value added and employment, spurred on by rapid productivity growth. Despite having been halted, industrialization has left some legacy. Today, the South African export basket is rather diversified. Raw materials and primary products coexist with manufactured products, including automotive, chemical and pharmaceutical products. Despite a relatively diversified export basket, South Africa faces a challenge to strengthen its international competitiveness in products where it does not have one already, as its knowledge and capabilities are not close enough to those required to master production in those areas.

4.3 United Republic of Tanzania

The United Republic of Tanzania has been a least developed economy since 1971. The country is predominantly an agrarian economy, with over 70 per cent of the workforce employed in agriculture (figure 24). Agricultural value added, which had been declining until the 1980s, had reverted to the 1960s values by the mid-1990s. On the other hand, the manufacturing value added grew in the 1960s and the 1970s, and peaked at 13 per cent in 1978. Since then, the sectoral value added began to decrease, and this trend was not reverted until the mid-1990s. Services – especially trade, restaurants and hotels – absorbed the small number of workers that left agriculture. Manufacturing employment remained very low throughout the period, employing only 3 per cent of the workforce in 2011.

Figure 24. The United Republic of Tanzania: Value added and employment shares by sector, 1960–2011

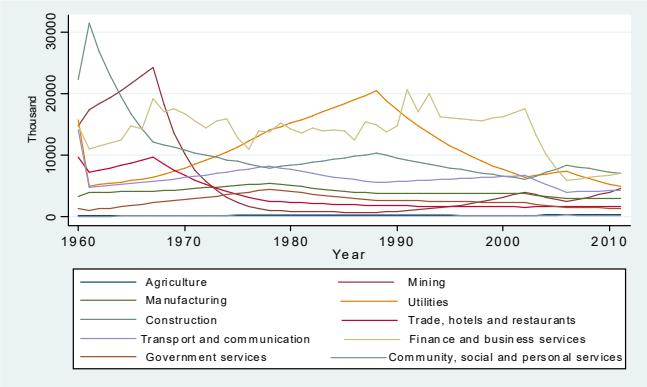


Source: Authors' elaboration based on the GGDC 10-sector database.
Note: Value added in constant 2005 national prices.

Structural transformation requires rapid productivity growth to be ignited and sustained. However, in the case of the United Republic of Tanzania, the only period with sustained employment and productivity growth was from 1960 to 1980. From 1980 to 1994, employment growth slowed down, with negative productivity growth rates. After the mid-1990s, productivity and employment growth recovered, but productivity continued to grow more slowly in comparison to employment.

Mirroring this hesitant structural transformation, aggregate labour productivity remained low over the entire period (figure 25). Most industries suffered from limited, or no, productivity growth, with utilities, financial and business services sectors being the only exceptions.

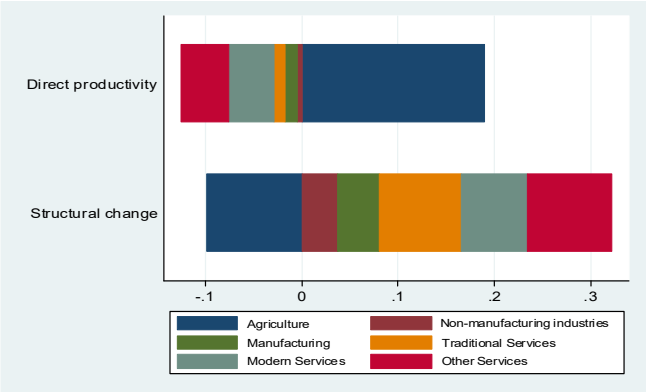
Figure 25. The United Republic of Tanzania: Labour productivity by sector, 1960-2011



Source: Authors' elaboration based on the GGDC 10-sector database.
Note: Productivity levels in constant 2005 national prices.

Decomposing aggregate labour productivity growth from 1991 to 2010 shows that structural change contributed as much as direct productivity gains to labour productivity growth. Figure 32 showcases how individual sectors contributed to these two effects. Due to productivity gains in agriculture (the large direct productivity effect of agriculture), the economy was able to shift away from agriculture (hence, the negative contribution of agriculture to the structural change effect). This is in accordance with the structural growth theory, which suggests that productivity growth in agriculture is the first trigger of industrialization, as mechanization frees labour, which can then move to more productive industries (Herrendorf et al., 2015). However, unlike the experience of early industrializing economies, the services industry benefited considerably more than manufacturing did from the productivity growth in agriculture. This is also evident in figure 26, where services expansion contributes predominantly to the structural change.

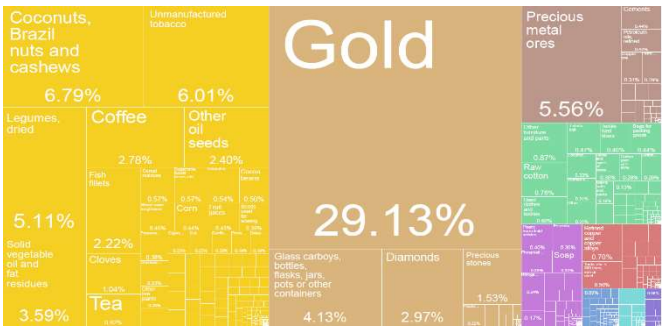
Figure 26. The United Republic of Tanzania: Direct productivity and structural change effects by sector, 1991–2010



Source: Authors' computations based on the GGDC 10-sector database.
Notes: For the sake of simplicity, we aggregated the 10 sectors into 6 broadly defined sectors: agriculture, non-manufacturing industries, manufacturing, and traditional, modern and other services. "Non-manufacturing industries" include mining, utilities and construction. "Traditional services" refer to retail trade, restaurants and hotels. "Modern services" refer to finance, insurance, real estate and business services and transport, storage and communication. "Other services" include government services and community, social and personal services.

Next, we assess the export structure and diversification opportunities for the United Republic of Tanzania. The product tree map in figure 27 shows the export basket in 2016. The country's total exports were worth $5.24 billion. The export structure can be summed up in two stylized facts: the export basket is relatively diverse and is dominated by primary products, both agricultural and extractives.

Figure 27. The United Republic of Tanzania: Export basket in 2016



Source: Atlas of Economic Complexity, Harvard University.

Figure 28 shows the evolution of the United Republic of Tanzania's productive structure from 1970 to 2014. The following stylized facts emerge. Enjoying RCA in a handful of products in 1970, the product structure had become more diversified in 2014. The diversification has mainly taken place in the peripheral products, particularly in agriculture-based products and precious metals.

Figure 28. The United Republic of Tanzania: Product space in 1970 and 2014

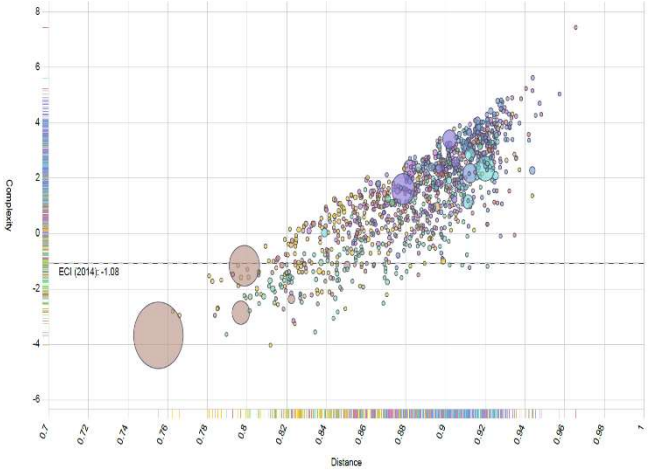
Panel a: Product space 1970 Panel b: Product space 2014

Source: Atlas of Economic Complexity, Harvard University.

What does the product space network for the United Republic of Tanzania suggest about its future transformation capacities? The feasibility chart (figure 29) shows the products that the country is likely to export based on its export structure in 2014. The upward slope of the product distribution suggests that Mauritius's existing productive structures are insufficiently capable of supporting the production of more complex products.

Focusing on the distribution of the yet-exported goods that are above the average economic complexity suggests that the country is likely to develop capacities in more complex agro-based manufacturing. Additionally, opportunities to develop transport and vehicles-related products may be leveraged in the years ahead.

Figure 29. The United Republic of Tanzania: Feasibility chart in 2014



Source: Atlas of Economic Complexity, Harvard University.

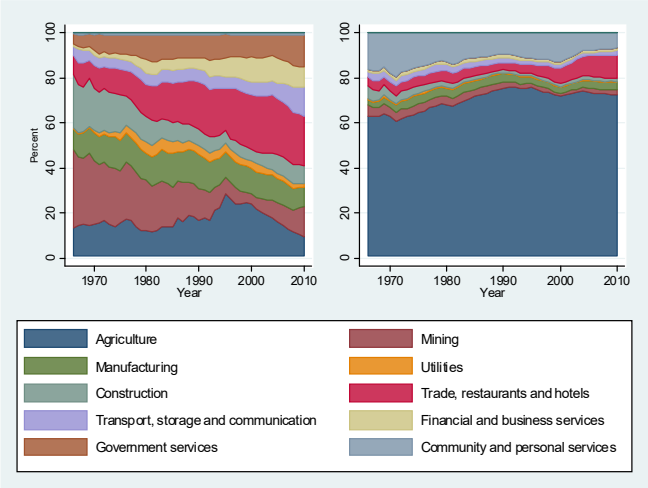
In summary, the United Republic of Tanzania experienced weak structural transformation; its industrialization stalled and left the economy as predominantly agrarian. This is reflected in the composition of its export basket, dominated by a handful of raw materials and primary products. While some advancement in textile-related products is expected, the manufacturing component of exports from the United Republic of Tanzania is still small, and more shall be done to diversify the economy.

4.3 Zambia

Zambia has achieved limited economic and export growth in the last five decades. Income per capita has stagnated at $1,500–1,600. The country's structural change dynamics look rather peculiar: the economy experienced some structural change away from mining, but not from agriculture (figure 30). Mining value added decreased from 40 to 14 per cent between 1965 and 2010. Meanwhile, employment in agriculture increased from 63 per cent to 72 per cent over the same period.

The trade, restaurants and hotels industry was the biggest beneficiary of the limited structural transformation, with its output growing from 8 to 22 per cent. Importantly, the manufacturing sectordid not grow substantially: its value added share increased from 7 per cent in 1965 to 15 per cent in 1990. Since then, its output share has been contracting, falling to 9 per cent in 2010. Meanwhile, the manufacturing employment share remained negligible, 2–4 per cent, during the entire period.

Figure 30. Zambia: Value added and employment shares by sector, 1965–2010

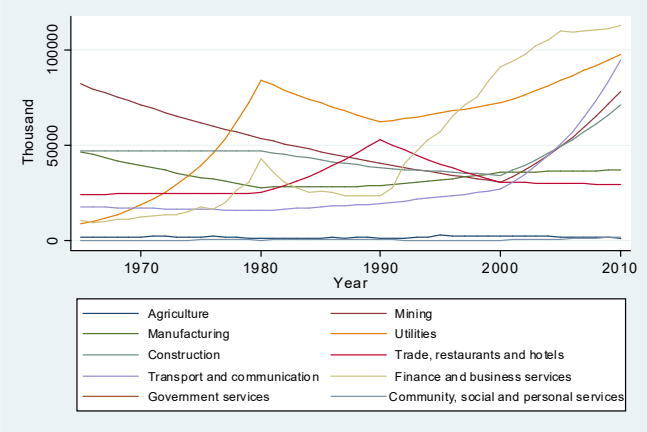


Source: Authors' elaboration based on the GGDC 10-sector database.
Note: Value added in constant 2005 national prices.

Insufficient structural transformation was accompanied by limited productivity growth. These two processes in tandem, however, are necessary to generate virtuous cycles that lead to economic development. Figure 31 shows the sector-wise labour productivity trends in the period between 1965 and 2010. Overall, labour productivity remained stagnant in most industries. Agriculture and traditional services, the largest sectors in the economy, experienced virtually no productivity

growth. The most productive industries – mining, construction and utilities – were negligible in terms of employment generation. Since the 1990s, productivity in the financial and business services sector has grown substantially, making it the most productive industry in the economy.

Figure 31. Zambia: Labour productivity by sector, 1965–2010

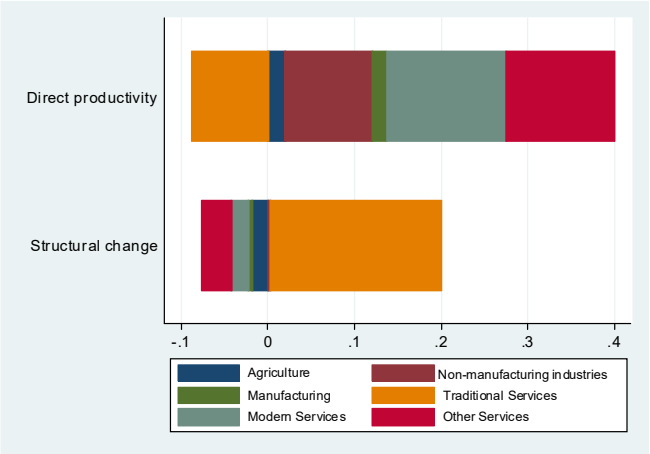


Source: Authors' elaboration based on the GGDC 10-sector database.

Note: Productivity levels in constant 2005 national prices.

Decomposition of the labour productivity growth reveals that structural change accounted for 41 per cent of the total productivity growth in the economy. Figure 32 breaks down how various sectors contributed to direct productivity and structural change effects. The labour productivity growth was most pronounced within modern services, other services and non-manufacturing industries. The structural change effects were negative for all industries except traditional services and non-manufacturing industries. These were also the only two industries that expanded their employment shares from 1991 to 2010. Overall, these findings confirm that structural transformation has not been pervasive and has primarily benefited the services industry.

Figure 32. Zambia: Direct productivity and structural change effects by sector, 1991–2010

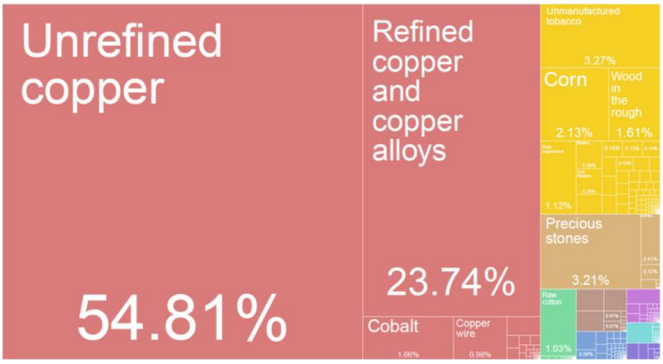


Source: Authors' computations based on GGDC 10-sector database.

Notes: For the sake of simplicity, we aggregated the 10 sectors into 6 broadly defined sectors: agriculture, non-manufacturing industries, manufacturing, and traditional, modern and other services. "Non-manufacturing industries" include mining, utilities and construction. "Traditional services" refer to retail trade, restaurants and hotels. "Modern services" refer to finance, insurance, real estate and business services and transport, storage and communication. "Other services" include government services and community, social and personal services.

We now assess the export structure and diversification opportunities for Zambia. Figure 33 shows the export structure in 2016. The country's total exports were worth $5.13 billion. Copper mining and related industries accounted for 88 per cent of the country's entire export basket. The export structure reaffirms the economy's overwhelming reliance on the mining industry which, due to the capital intensiveness, tends to be limited in its employment generation capacity.

Figure 33. Zambia: Export basket in 2016



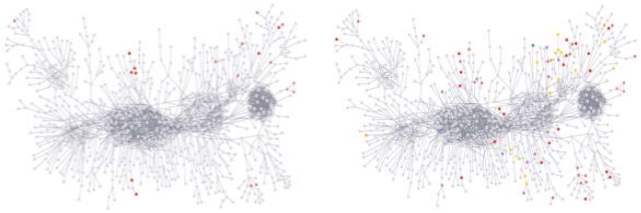
Source: Atlas of Economic Complexity, Harvard University.

Figure 34 visualizes the evolution of Zambia's productive structure from 1970 to 2014. The following stylized facts emerge: the country enjoyed revealed comparative advantage in a handful of products in 1970. In comparison, the product structure had become more diversified in 2014. The diversification, however, has mainly taken place in the

peripheral products, particularly in metals and related manufacturing.

Figure 34. Zambia: Product space in 1970 and 2014

Panel a: Product space 1970 Panel b: Product space 2014



Source: Atlas of Economic Complexity, Harvard University.

Figure 35 shows the transformative wherewithal for Zambia in 2014. The distribution of the yet-to-be exported goods suggests that most complex products are beyond the existing productive capacities in Zambia. Focusing on the distribution products above the average economic complexity suggests that the country is likely to develop capacities for producing mainly more complex agro-based manufacturing and chemicals and plastics products. Furthermore, opportunities to develop transport and vehicles related products can also be leveraged in the years ahead.

Figure 35. Zambia: Feasible products in 2014

Source: Atlas of Economic Complexity, Harvard University.

To sum up, Zambia has undergone a limited structural transformation, with agriculture continuing to employ a large proportion of the workforce. Spurred by rapid productivity growth, services became an important employment source, while manufacturing could not develop a more solid foothold. These structural transformation dynamics have also affected the Zambian export structure, which is heavily driven by a single commodity. Even simple manufacturing goods such as textiles would be difficult to add to the export basket. Because of these factors, an active industrial policy will be of critical importance to sustain industrialization, export diversification and upgrading in Zambia.

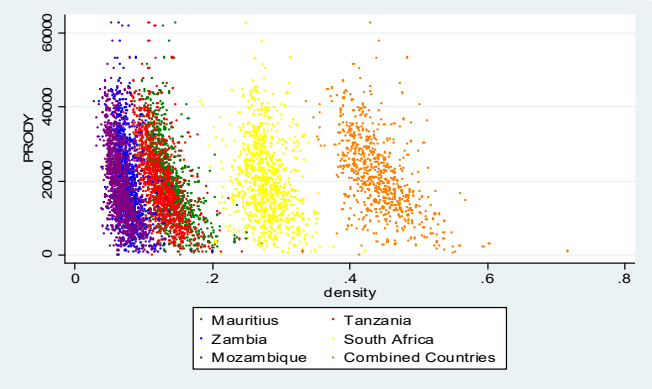
5. An experiment of regional integration

As a final exercise, this section attempts the following thought experiment: What would the export diversification opportunities look like if the five countries were to act as a single economy? Following Hidalgo (2011), figure 36 displays not-exported products and products exported with RCA below 1 for the five economies under analysis and for a hypothetical country, resulting from the combination of the five economies. This combination is obtained from a simple "best case scenario" in which the RCA for each commodity is equal to the maximum RCA among the five countries.

On the vertical axis, we use another proxy of product complexity (PRODY), which is the income level associated with a given product. It is calculated as the weighted per capita income of the countries that export the given product. The horizontal axis uses another proxy for the likelihood of a given product being exported, density, which is estimated by the proportion of its neighbouring products that are already being produced in the economy.

The combined country would export 674 products with RCA below 1 and would not export 18 products. Moreover, it would be much better positioned to exploit existing opportunities for export diversification. The large increase in the density of products outside the export basket suggests complementarities between the productive structures of the five economies. Such complementarities would create a larger and more diverse pool of resources and capabilities. This, in turn, would make products relatively closer, thus facilitating export diversification.

Figure 36. An experiment of regional integration: Export opportunities for the combined countries



Source: Authors' elaboration based on United Nations Comtrade Database, 2014.

6. Conclusions

This paper analysed the structural transformation dynamics of five Southern African economies: Mauritius, Mozambique, South Africa, the United Republic of Tanzania and Zambia. Most of these economies underwent limited structural transformation, with sluggish productivity growth. The

primary sector dominates their production structure, accounting for large shares of output and exports, and it is therefore a major source of economic growth and foreign exchange. This leaves the Southern African economies vulnerable to the volatilities typical of commodities and to the "Dutch Disease" effects. In this context, the design of effective industrial policies can play a critical role to limit dependence on a few commodities and foster diversification and technological upgrading.

Mauritius and South Africa are different in several respects. They underwent structural transformation away from the primary sector, even though South Africa has deindustrialized prematurely. Primary products and resource-based manufactures are important sources of foreign exchange, but their export baskets are relatively diversified, with some products well integrated in production structures and global value chains. Notwithstanding the differences between these countries, regional integration could prove beneficial. Our quantification exercise suggests that, by aligning their strengths, knowledge and capabilities, these five economies could enhance their export capacities, making export diversification and industrial upgrading relatively easier.

Annex I

Productivity and structural transformation

Labour productivity growth can be decomposed in two main components: direct productivity growth (or within effect) and structural change (or reallocation effect). Whether labour productivity growth comes from within sectors of productivity growth or structural change – or both – matters a great deal. Sustained economic growth is therefore inextricably linked to productivity growth within sectors and to structural transformation. Economic growth can only be sustainable, and lead to socio-economic development, if these two mechanisms work simultaneously.

Formally, productivity growth can be composed following this formula:

$$\Delta Y_t = \sum_{i=n} \theta_{i,t-k}\, \Delta y_{i,t} + \sum_{i=n} y_{i,t}\, \Delta \theta_{i,t}$$

where Y_t and $y_{i,t}$ refer to economy-wide and sectoral labour productivity and $\theta_{i,t}$ captures the share of employment in sector *i* at time *t*. Δ denotes changes in productivity ($\Delta y_{i,t}$) or employment shares ($\Delta \theta_{i,t}$). The first component (the within component) is the sum of productivity growth within each sector weighted by the employment share of each sector at the beginning of the period. It captures the idea that the larger the sector with higher-than-average productivity growth in the economy, the larger the aggregate labour productivity growth of that economy. The second component (the structural change, or reallocation, or between component) captures the impact of labour movements across sectors along the period. It accounts for the fact that when labour moves from a lower-productivity sector to a higher-productivity sector, the employment share of the former decreases and the employment share of the latter increases, thus increasing aggregate labour productivity. In this study, the method used to decompose aggregate labour productivity into sectoral contribution effects is based on the Divisia index (UNCTAD, 2016b).

Annex II

The product space literature

The product space literature (Hausmann and Klinger, 2007; Hausmann et al., 2007; 2011; Hidalgo et al., 2007) relies on the idea that what economies produce and export matters for their economic growth and development, and provides a framework to identify avenues for export diversification strategies. According to this framework, countries cannot produce a good for which they have no knowledge. This puts learning, capabilities, and technological change at the centre of structural transformation processes.

This literature sees production possibilities as a space in which economies move. More specifically, the product space is an illustration of all goods exported in the world, where the distance between two goods is defined by the probability of producing one of the goods if an economy already produces the other. In this framework, structural transformation entails moving from a good that countries already produce to another one that is close enough to it, where "close enough" is defined based on the knowledge and capabilities needed to produce a certain good. Hence, in the product space, goods are close if the knowledge used to produce them is similar, and goods are far away if producing them requires completely new sets of skills. This ultimately configures a network of goods, a sort of map in which economies move from one point to another, leading to diversification and production of increasingly sophisticated goods.

We structure our product space analysis around two key questions:

(a) What are these countries good at exporting?

(b) In which directions could these countries diversify their export basket?

To tackle the first question, we use the concept of revealed comparative advantage (RCA). This is an index commonly used to assess the relative importance of a country as an exporter of a certain class of goods or services. We use the

notion of RCA introduced by Balassa (1977), according to which a country j has a revealed comparative advantage in product k if the share of this product within the country's export basket is larger than the share of this product in the global market (RCA > 1). Therefore, the RCA of a certain product k for a certain country j is computed as:

$$RCA_{jk} = \frac{X_{jk} / \sum_{jk} X_{jk}}{\sum_{j} X_{jk} / \sum_{j} \sum_{k} X_{jk}}$$

Based on the concept of RCA, the literature has developed a measure of distance between the products of the product space, proximity. Given two products, proximity is defined as the minimum of the proportion of countries that specialize in both products (i.e. whose RCAs are greater than 1 for both products). By saying how many countries specialized in both products, proximity gives an indication of how close or distant is each pair of products. In more technical terms, proximity is defined as:

$$\varphi_{kh} = min\{P(RCA_k > 1 | RCA_h > 1), P(RCA_h > 1 | RCA_k > 1)\}$$

where φ_{kh} is defined as the probability that a country exports good k with RCA > 1, given that it also exports good *h* with RCA > 1. More specifically, proximity is calculated by comparing how many countries that export product *k* with RCA > 1 also export product *h* with RCA > 1. For example, if 10 countries export product *k* with RCA > 1, and 5 of those 10 countries also export product *h* with RCA > 1, then the proximity (or the general probability to export) for product *k* in relation to product *h* is 0.5.

This is a crucial concept if we are interested in understanding the diversification opportunities of an economy, because how close products are depends on the extent to which products share the same knowledge and capabilities requirements, and therefore how easy it could be to move from one product to another. In a nutshell, the higher the proximity between two products, the closer the products and the easier the diversification from one product to the other.

To tackle the second question, we use the concept of density. Density captures how distant are products to the export basket of the country. Countries will have low densities around faraway products and high density around close products. Density contains, and depends on, two elements: proximity and composition of the export basket of a given economy. In more formal terms, density is defined as:

$$W_{kj} = \frac{\sum_i D_i \varphi_{ki}}{\sum_i \varphi_{ki}}$$

where $D_i = 1$ if $RCA_i > 1$ and 0 otherwise. A value of W_{kj} equal to 0.5 for a given product/country means that in country *j*, from the perspective product *k*, 50 per cent of the neighbouring space seems to be developed.

Another important concept that guides this analysis is the concept of export sophistication, intended as the level of complexity of products as different as potato chips and microchips, for example. Hausmann et al. (2007) introduced one of the key indicators of export sophistication, PRODY, which can be thought of as the income level associated with each commodity. It aims at reflecting the idea that richer countries export more sophisticated products. This is computed as the average of the incomes of the countries exporting each traded commodity, weighted by the revealed comparative advantage of each country in that commodity, i.e. by the degree to which a country specializes in that product.[9] Formally:

$$PRODY_k = \sum_j \frac{\frac{X_{kj}}{X_j}}{\sum_j \left(\frac{X_{kj}}{X_j} \right)} Y_j$$

where represents the value of product k exported by country j; the total value of exports of country j; and its GNI per capita.

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[9] These are normalized so that the weights sum up to 1.

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