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Labour Productivity and Structural Transformation: A Tale of 3 African Economies

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Abstract: Structural transformation is hypothesized by growth accounting to be at the core of the process of economic development and a crucial source of labour productivity growth. Despite the key importance of structural transformation in driving economic performance, investigations on the impacts of structural change on labour productivity growth in Sub-Saharan Africa region has been minimal if not absent from the literature. This paper caters for this literature gap by examining the extent to which structural change explain the dynamics of labor productivity growth in three African countries. Using data from Benin, Mauritius and Tanzania the study adopts a mixture of approaches: trend analysis, regression analysis and the shift-share analysis to achieve its objective. The main findings indicate that first in both Benin and Tanzania workers' productivity are far higher in non-agricultural sectors and hence a reallocation of labour from the agriculture sector would boost overall productivity in these two economies. Second, countries which 'leap frog' from the agriculture to the services sector, bypassing the industry sector, tend to experience weak if not negative dynamic effects of a reallocation of workers from agriculture to services. Third, countries which have undergone advanced structural transformation, like Mauritius need to revamp their sectors or look for new emerging sectors if they are to further exploit the contribution of structural change to labour productivity growth.

Keywords: Labour Productivity Growth, Structural Transformation, Mauritius, Benin, Tanzania

1. Introduction

Numerous authors have emphasised the positive relationship between labour productivity and economic growth [2, 4, 20, 27, 35] and even in the standard growth accounting models following Solow [30], labour productivity has been attributed a notoriety standing. Moreover, as an indicator the merit of labour productivity lies in providing valuable information not only on labour market situation but also on the progress towards the achievement of specific Sustainable Development Goals (SDGs). Information on labour productivity equally helps in understanding the comparative advantage of different sectors and thus assist in designing policy options and making investment decisions for economic development endeavours. In fact countries which manage to sustain labour productivity growth are also most likely to experience long-term growth in GDP per capita and be upgraded in the classification of countries by income level,

developed by the World Bank. Hence given the crucial role played by labour productivity understanding its trend and the driving forces behind it, becomes imperative for formulating policies to champion sustainable economic development. This paper focusses mainly on structural change as a driver of labour productivity growth in three Sub-Saharan African (SSA) countries which have recently been upgraded in their World Bank classification by income [1] : namely Benin, the Republic of Tanzania (upgraded to lower-middle income group category) and Mauritius (upgraded to high income group category in 2020)[2].

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1 https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2021-2022

2 On 1st July 2020, Mauritius was upgraded a high-income group category but has moved back to upper-middle income country group as per the latest World Bank data 2021, due mainly to the impacts of the Covid-19 pandemic on the country.

We use the famous shift-share analysis [3] to derive a deeper understanding of the effects of structural change on labour productivity growth. To be more specific the shift-share analysis decomposes labour productivity growth as the sum of three components: i) Within Effect -the contribution of productivity growth within sectors to overall productivity growth; ii) Static Effect -the contribution of changes in the average hours worked or employment shares of sectors with different productivity levels to overall productivity growth and iii) Dynamic Shift Effect -the contribution of changes in the average hours worked or employment shares of sectors with different productivity growth rates to overall productivity growth. The within effect is usually the consequence of technical progress, improved processes and/or innovation within the concerned sector (s) while the static and dynamic effects are the result of structural transformation. For example as an economy transits from and agrarian economy to an industrial one, a rise in agricultural production result in declining food prices and industrial growth is assisted by investment from farm revenues and rural markets for manufactured goods. At the same time labour begins its migration to manufacturing so that the latter's share in total employment rises while that of agriculture sector declines [31-33]. This reallocation of labour from a sector where its marginal productivity is low (agriculture: due to surplus of labour) to one (manufacturing) where it is high, contributes towards overall productivity of an economy and embodies the static effect of the structural change. In the next stage of the structural transformation, as advanced services become more prominent, they can indeed generate industrial as well as agricultural activities. The emphasis on sustainable and inclusive growth, enhances domestic interindustry linkages and spillover effects [9, 10, 18]. This coevolution of services and manufacturing and agriculture leads not only to the reallocation of labour across sectors but also to changes in productivity growth within the sectors (induced within effects). The interaction between changes in sectoral labour share and productivity growth influences a country's overall labour productivity and is referred to as the dynamic effect of the shift-share approach.

A number of authors [15, 19, 23, 32, 33] have applied the shift-share approach to decompose labour productivity at different level of sectoral disaggregation. There is a stark of difference between our work and that of the studies of the above-mentioned authors, in several ways. First our chosen context, the Sub-Saharan countries have not been investigated in the existing literature, at least not focusing on countries which have upgraded in their income classification. As pointed out by Diao, Harttgen and McMillan [12], African countries have been generally excluded from labour productivity decomposition analysis and including them could deepen the present understanding of how structural change has performed in the region and also offer insights into the drivers of its economic performance. Second we are investigating three countries with different economic structures: i) Benin- an agrarian economy with high reliance on mainly one crop-cotton which accounts for nearly 40% of its GDP and 80% of official export receipts[4];- yet the services sector dominates in terms of employment share ii) Tanzania- another country dependent on agriculture not only in terms of output composition but also in terms of employment; iii) Mauritius – an economy driven by the services sector, whose contribution to GDP is around 76%. [5] Third labour productivity in the three countries will be explored using both window years based analysis (10-years window; 20-years window and 30-years window) as well as successive years based analysis.

The remainder of this paper is structured as follows. In section 2 we present the context under study, with specific focus on the structural transformation undergone by the three economies and the evolution of sectoral labour productivity. The next part is devoted to examining whether labour productivity across sectors has converged over time. Section 4 analyses the contribution of within and structural effects to labour productivity growth at different levels of disaggregation. The final section concludes.

2. Contextual Analysis

This section is divided into 3 parts: the first one is devoted to overviewing the trend in GDP growth per capita, the sectoral share of value added (VA) in GDP and sectoral share of employment in total employment[6] since 1991 in these three countries. Part 2 provides evidences for periods of industrialisation/de-industrialisation using regression anlaysis and the final part focusses on the evolution of sectoral labour productivity from 1995[7] till 2019.

2.1. Evolution of Variables of Interest

From Figure 1 it can deduced that the growth rate of GDP per capita experienced by Benin over the period 1991-2019 has been fluctuating substantially between recovery and decline, mainly because the country is strongly influenced by economic trends, especially fuel prices, in Nigeria. This volatility in per capita GDP growth can also be explained by the high dependence of Benin on cotton[8], which in turn is subject to internal shocks like weather and external ones such as volatility in world prices of primary commodities. Part of the country's intense exposure to external adverse impacts is the consequence of delays in putting into effect the structural reforms which were initiated during the 1990s. Recently due to increased public investment and enhanced cotton production, the growth rate

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3 The shift-share analysis was initially introduced by Fabricant (1942)

4 https://en.wikipedia.org/wiki/Economy_of_Benin

5 http://www.mauritiustrade.mu/en/trading-with-mauritius/mauritius-economics-outline

6 Employment in our dataset is defined as 'all persons employed', thereby including wage-earners, as well as self-employed and family workers.

7 Earliest data available as from 1995 at sectoral level.

8 Cotton accounts for 90% of total exports (Coulibaly and Iyadema, 2005).

of Benin has shown significant recovery and surpassed that of Mauritius in 2019. A more fastidious examination at Figure 1 unfolds that over nearly three decades (1991-2019), Benin's economy has not undergone major structural transformation, since services share in GDP increased from 53% to 57%, while that of industry from 12% to 16% and the share of agriculture declined from 35% to 27%. It is noteworthy to point out that though the share of agriculture sector has been declining, it stills remains one of the main employer accounting for 38.6% of total employment in 2019, standing just behind services with 42.4%., while industry accounts for only 19% of total employment. This finding hints at the fact that the services sector has been the key recipient of labour exiting from agriculture, thereby confirming the observation of McMillan and Rodrik [23] who stated that in African countries workers from the primary sector have been mainly reallocated to the low productive services sector, compared to other regions where industrialization has been at the centre of the structural change process. Moreover the declining share of industry from 19% to 16% from 2000 to 2019, also signals that Benin has endured a period of de-industrialisation. To confirm the period (s) of de-industrialisation we will have recourse to some regressions in the next sub-section.
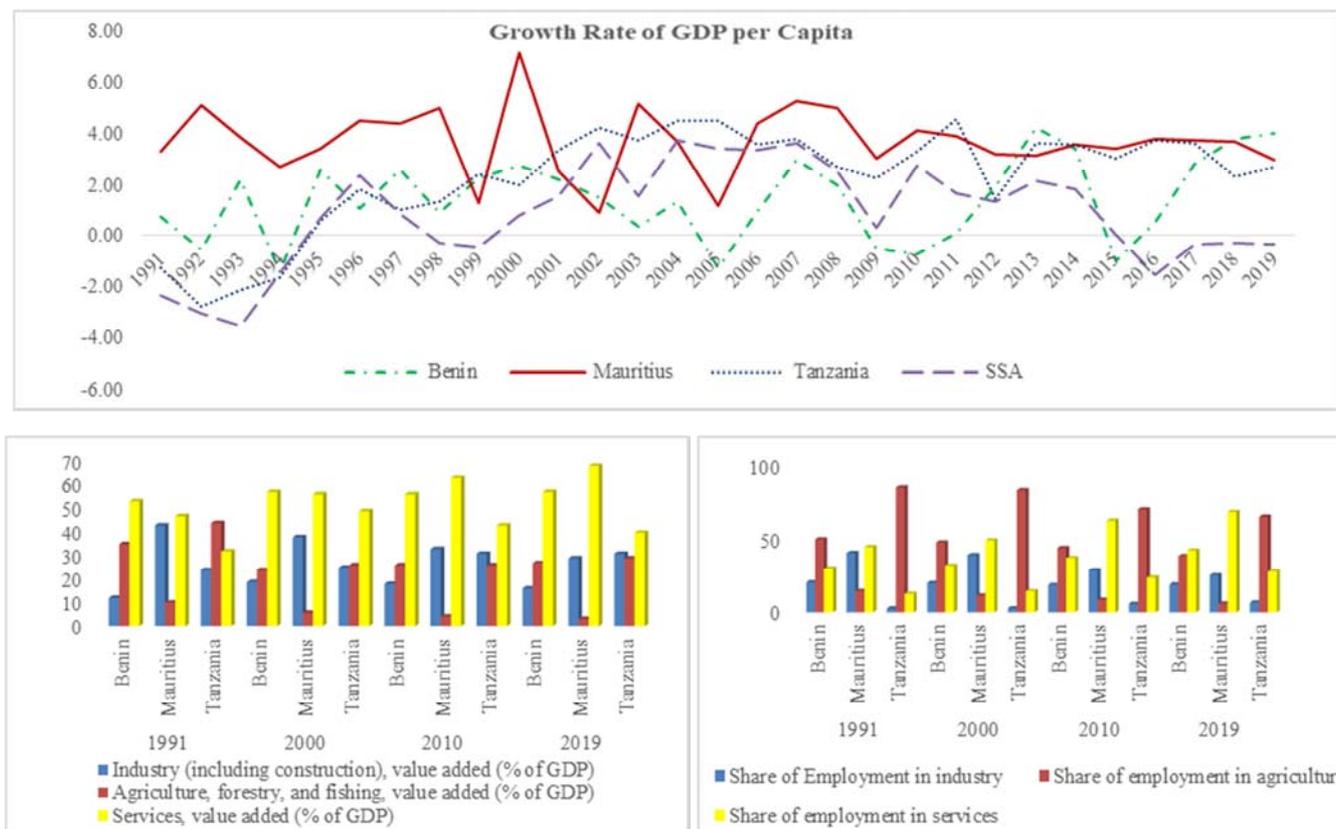

Figure 1. GDP growth rate per capita, share of sectoral value added in GDP and share of sectoral employment in total employment.

The Mauritian GDP growth rate per capita on the other hand shows a more stable trend, with figures always higher than that of Sub-Sharan Africa (SSA)'s average. The sectors' share in GDP and in total employment also reveal that from 1991 to 2019 the island economy has experienced a remarkable economic transformation from a low-income, agriculturally based economy to a diversified, upper middle-income economy with growing industrial, financial, and tourist sectors. Reliance on numerous economic pillars has to some part contributed to growth and mitigated output volatility. This striking structural transformation has assisted the country in tackling decreasing returns to scale of capital accumulation at the sectoral level[9]. The county is a perfect example of the remark made by McMilland and Rodrik that 'the speed with which this structural transformation takes place is the key factor that differentiates successful countries from unsuccessful ones" [23]. Moreover in view of the recent stagnating GDP per capita growth rate, the government has put forward its 'Vision 2030'[10] which includes positioning the economy as a key regional investment gateway and a financial services hub, revamping the manufacturing base, and advancing the information, technology and communications (ICT) sector.

Tanzania's transition from a command to a market economy since 1995, has resulted in accelerating in GDP per capita growth rate to an extent that according to the 2020 African Economic Outlook[11] report Tanzania is

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9 https://www.un.org/esa/socdev/egms/docs/2016/AliZafar.pdf

10 https://www.un-page.org/files/public/mauritius_jan-feb_2017_reprint_compr.pdf

11 https://www.afdb.org/en/knowledge/publications/african-economic-outlook

among the world's 10 fastest-growing economies. [12] Observations from Figure 1 shows that indeed the country's per capita growth surpassed that of SSA by 1998 and approaching that of Mauritius by 2009. From 1991 to 2000 the declining share of agriculture value added in GDP (44% to 26%) and the rising ones of industry and services sectors (24% to 31% and 32% to 49%, respectively), disclose that Tanzania's economy has responded to the structural transformation progressively. As mentioned by Msame and Wangwe [25], the agriculture and industry sectors fairly rely on each other, since industrial sector, particularly the agro-processing sub-sector, depends on agriculture for raw materials; whilst the agricultural sector cannot progress without the advancement of the manufacturing sector. Such backward and forward linkages have been well acknowledged by the Tanzanian government, and came up with the integrated industrial development strategy (IIDS) stressing on resource-based industrialisation, with sub-sectors with direct linkage with the agricultural sector, obtaining highest priorities. [13] However when it comes to employment, the agriculture sector still dominates the scene, by employing more than 50% of the labour force (65.3% in 2019), implying that sectoral employment shift in the country has been minimal, despite government's attempt to develop the industrial sector.

2.2. Industrialisation or Premature De-industrialisation

From section 2.1 it appears that among the three countries Benin seems to be plagued with premature de-industrialisation whilst Mauritius appears to be the one with the most successful and lengthy period of industrialisation. To confirm these observations, for each of the three countries we regress employment share as a function of log GDP per capita as well as its square, for the period 1991-2019.

The results summarised in Table 1 unveil that in both Mauritius and Tanzania, early stages economic development, captured by log GDP per capita resulted in the expansion of the industry sector as shown by the statistically positive coefficient of employment share of industry (225.06 and 213.8 respectively). As the economies have further developed two different trends emerged: i) structural transformation continued its trend in Mauritius with the contraction of the industry sector demonstrated by the statistically negative coefficient (-34.88) of log GDP^2 per capita and an expansion of the services sector-positive coefficients of 31.22; ii) in Tanzania industry's and services' employment shares both plummeted whilst employment share of agriculture swelled. This confirms our findings in section 2.1, implying that agriculture stills employs the majority of the labour force and sectoral employment shift in the country

has only been marginal despite the promising growth rates of Tanzania. Benin is the conspicuous case among the three countries, as the coefficient of log GDP is statistically negative in its industry equation, thereby indicating that the industry sector has contracted at an early stage of economic growth. This result corroborates with the earlier made observation that Benin has experienced a period of premature de-industrialisation and also provides evidence of 'leapfrogging' in the country, that is jobs from the agriculture sector directly replaced by jobs from the service sector. Hence structural change seemed to have played differently in Benin and was mainly services-driven. It must however be noted that such a trend was also visible in other developing countries as pointed out in a study by Dasgupta & Singh [9, 10], using data from 14 developing countries for the period 1986-2000, that manufacturing tends to monotonically rise with per capita income until it hits its highest point and starts to decline and this fall happens at lower levels of income than developed countries.

2.3. Sectoral Evolution of Labour Productivity

Figure 2 displays how labour productivity, measured by log VA per worker, has evolved over time in the three main sectors. In the agriculture sector Benin is almost at par with that of lower middle income countries in terms of VA per worker, whilst Tanzania exhibits the lowest VA per worker, even much lower than that of SSA. This can be explained by the fact that in Tanzania agriculture remains small‐scale, undercapitalized and labour intensive, partly as a result of its agricultural policy which has long been characterised by tension between faith in the market system and in the state [6]. This trend gives a first signal of the need to reallocate labour to other more productive sectors in Tanzania like the industry and services sectors, which fare much better in terms of VA per worker. Another eye-catching point from Figure 2 is that the gap in VA per worker between Upper Middle Income countries and the two countries which have just been upgraded to lower-income status-Benin and Tanzania, has widened over time. Hence if Benin and Tanzania have the vision of escalating to a higher income status in the years to come, then sectoral shifts in labour must take place at least at the same pace as countries in Asia and Pacific[14]. As far as Mauritius is concerned in terms of VA per worker in the agriculture sector, it stands far behind the High Income countries and the leader, Norway. Such an observation can be justified on the grounds that the massive shift of labour mainly to the services sector, has led to a shortage of labour in the agriculture sector. To be more precise the latter sector requires more labour with specific green skills to boost its productivity level and live up to the Government's vision of promoting sustainable agro-processing, establishing bio-agricultural zones and developing bio-food and bio-farming, amongst others[15].

Figure 2. *Labour Productivity in Agriculture, Industry and Services Sectors.*

The data for labour productivity in the industry sector reveals that Benin is the worst performer, parading values which trail behind the average SSA and Lower Middle Income countries. On the other hand, labour productivity in Tanzania's industry sector has matched that of the average Lower-Middle Income country, over almost the whole period of 1995-2019. Though still lower than that of the average SSA. Sector-wise, industry proves to be the most productive sector in terms of VA per worker, in Tanzania followed by the services sector. Yet there are various challenges that the former sector needs to address in order to heighten its productivity level at least to that of SSA. Some of these hurdles include inadequate access to sustainable energy, limited supply of raw materials from the agriculture sector due to poor technology and small scale operation; unavailability of semi-skilled and skilled workers; weak business and regulatory framework as indicated by the country's declining Doing Business Indicators.[16] The island economy, Mauritius shows a slightly upward trend in labour productivity in the industry sector during the period 1995-2019 and the figures do not diverge much from those experienced by SSA. Data from Figure 2 divulge that that the island economy has to make significant efforts to be able to catch up with the labour productivity prevailing in High Income economies and that in Norway, which globally flaunts the highest labour productivity figures in the industry sector. Recognising the urgent need to raise productivity in the industry sector in order to progress on its development path, Mauritius with the assistance of the UNDP came forward with a five year Industrial Policy and Strategic Plan for Mauritius (2020-2025) with particular focus on upgrading of value chains, creation of quality employment creation, increasing domestic market supply, absorption of advanced technology and regional and global export growth.[17]

In the services sector, both Benin and Tanzania are lagging behind SSA, Lower Middle Income countries and Upper Middle Income countries, when ranked by VA per worker. This indicates that in Benin the employment shift from agriculture to the services sector has not been 'productivity-enhancing' for the period 1995-2019, given that the majority of the labor force shed by agriculture, nevertheless, got employed in low-productivity and mostly informal trade and distribution services.[18] Whilst in Tanzania the majority of the workers are still employed in the low VA per worker agriculture sector and there is a need to reallocate workers away from agriculture towards services and industry. The figures for Mauritius indicate that the country has been faring well compared to SSA but that there is much room for improvement if it wants to attain VA per worker as those experienced by High Income economies or the global leader Luxembourg, in the services sector.

3. Productivity Gaps

As pointed out in the literature [3], labour productivity tends to be relatively lower in the agriculture sector compared to other sectors and the gaps in sectoral productivity are usually the result of misallocation of resources. Applying micro-level data, Gordon [16, 17] for example found that a large gap in labour productivity between agriculture and non-agriculture sectors was prevalent due to misallocation of labour resources at the macro level. Hence this section consists of identifying whether such sectoral productivity gaps exist and to what extent in the three countries under study.

The figures from Table 2, disclose that mining and utilities display the highest level of productivity in all the three countries irrespective of the year considered. This result is expected given this sub-sector is highly capital intensive and create relatively few jobs, which in turn implies that the higher return earned are appropriated mainly by capital owners. In the case of Benin the two sub-sectors whose productivity deviates by 5 to 4 times from that of agriculture in 2018, are the construction and transport, storage and communication sectors respectively. This large productivity gap between agriculture and the two above mentioned sectors, indicates that productivity growth can be attained by shifting labour to construction and transport, storage and communication sectors. As hypothesized by Timmer and de Vries [32], over time as labour relocation will continue as part of structural change, productivity gaps across the sectors will shrink, thereby equalizing returns to labour across sectors. McMillan and Harttgen [24] even go to the extent of stating that the exit of labour from agriculture with initially high labour share, can result in escalating commodity prices, good governance, growing female education and agricultural productivity growth. An interesting phenomenon in the case of Benin is that the productivity gap between wholesale, retail trade, restaurants and hotels and agriculture is almost zero in 2009 as well as 2018. This can be justified on the grounds that in Benin wholesale-retail trade which is closely linked to cross-border trade with neighbouring countries, mainly Nigeria, is dominated by the informal sector where mainly low productivity activities and services prevail. There exists a vast literature revealing a robust negative correlation between informality and productivity of firms in developing countries [1, 22, 28, 31]. Furthermore, as advanced by Lewis [21] this dual economy caused by large productivity gaps across sectors tend to reduce a country's overall labor productivity.

Focussing on Mauritius, except for the mining and utilities sector, there seems to be no major gap in productivity across the sub-sectors. This is an indication of the significant structural change that took place in the country and the fact that markets have been performing well, since productivities across sectors at the margin should be equalized in the absence of structural constraints and good governance of institutions. Moreover, the convergence in productivities between the sectors has assisted in reducing overall income inequality in the country, particularly

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16 https://set.odi.org/wp-content/uploads/2018/11/Monitoring-Tanzania-policies-industrialisation_JKweka_Final.pdf

17 https://unctad.org/news/mauritius-unveils-plan-expand-its-industrial-output

18 https://www.afdb.org/en/countries-west-africa-benin/benin-economic-outlook

given earned income is a significant share of household income. Nevertheless according to the figures manufacturing, transport storage and communication and other services still flaunt productivity levels that are at least twice as much as that of agriculture. Yet since our measure of productivity is VA divided by employment, the results may be misleading particularly where there are large differences in employment share across sectors, as is the case with Mauritius, where services sector account for more than 60% of total employment since 2010 (this issue is not of major concern in the case of Benin employment share is more or less more fairly distributed, at least between agriculture and services sector). Hence the productivity gap between agriculture and services sub-sectors like other services and wholesale retail-trade and hotels and restaurants, given their labour intensity, may be higher than the figures revealed in Table 2.

***Table 1.** Regression Results.*

Variables	Benin	Mauritius	Tanzania	Benin
	Employment share of Agriculture			**Employment share of Industry**
Log GDP Per Capita	713.68** (2.60)	-47.99 (-1.01)	-705.51** (-6.68)	-87.81* (-1.77)
Log GDP^2 Per Capita	-131.51** (-2.88)	3.50 (0.58)	112.86** (6.03)	12.24 (0.64)
Constant	-911.64* (-2.02)	141.06 (1.55)	1165.92** (7.82)	172.49 (1.00)
Observations	29	29	29	29
R^2	0.9747	0.97	0.98	0.88
Prob > F	0.000	0.000	0.000	0.000

***Table 1.** Continued.*

Variables	Mauritius	Tanzania	Benin	Mauritius	Tanzania
	Employment share of Industry		**Employment share of Services**		
Log GDP Per Capita	225.06** (2.54)	213.8** (6.66)	-34.94 (-0.28)	-176.60* (-1.83)	493.05** (6.47)
Log GDP^2 Per Capita	-34.88** (-3.01)	-35.27** (6.20)	2.69* (2.13)	31.22** (2.48)	-77.82** (-5.77)
Constant	-317.34* (-1.88)	-317.39** (-7.10)	96.67 (0.52)	275.38 (1.50)	-750.42** (-6.98)
Observations	29	29	29	29	29
R^2	0.97	0.98	0.92	0.98	0.97
Prob > F	0.000	0.000	0.000	0.000	0.000

*, ** Statistically significant at 5 and 1% respectively.

***Table 2.** Labour Productivity Levels (GVA/Employment) and Productivity Gaps, 1991-201819.*

	Agriculture, Hunting, Forestry, Fishing	Manufacturing	Mining, Utilities	Construction	Wholesale, Retail Trade, Restaurants And Hotels	Transport, Storage & Communications	Other Services
BENIN							
Year 1991 Level	606.74	1982.88	47060.92	4343.62	1311.98	4841.74	3037.22
Gap From Agric.	1.0	3.3	77.6	7.2	2.2	8.0	5.0
Year 2000 Level	748.75	2459.78	9474.81	4916.45	1206.15	5055.69	2921.85
Gap From Agric.	1.0	3.3	12.7	6.6	1.6	6.8	3.9
Year 2009 Level	916.78	1843.36	6357.88	5276.32	1043.17	5245.44	3397.84
Gap From Agric.	1.0	2.0	6.9	5.8	1.1	5.7	3.7
Year 2018 Level	1133.25	2099.80	7928.09	6289.61	1077.46	4605.49	2623.32
Gap From Agric.	1.0	1.9	7.0	5.6	1.0	4.1	2.3
MAURITIUS							
Year 1991 Level	4160.10	5988.01	20403.90	6099.53	12544.09	9634.09	9218.60
Gap From Agric.	1.0	1.4	4.9	1.5	3.0	2.3	2.2
Year 2000 Level	5197.23	9197.61	31389.37	7387.62	12963.62	12174.96	16606.49
Gap From Agric.	1.0	1.8	6.0	1.4	2.5	2.3	3.2
Year 2009 Level	7270.61	14477.48	55528.09	10588.43	13816.21	20326.65	20929.79
Gap From Agric.	1.0	2.0	7.6	1.5	1.9	2.8	2.9
Year 2018 Level	10695.42	21152.54	43208.21	9562.95	16180.32	25243.35	25366.24
Gap From Agric.	1.0	2.0	4.0	0.9	1.5	2.4	2.4
TANZANIA							
Year 1991 Level	488.90	5432.95	43442.19	4901.42	1800.52	7825.12	4679.56
Gap From Agric.	1.00	11.11	88.86	10.03	3.68	16.01	9.57
Year 2000 Level	527.61	5207.53	50737.59	7244.37	1735.64	8492.52	4202.37
Gap From Agric.	1.00	9.87	96.17	13.73	3.29	16.10	7.96
Year 2009 Level	724.49	4250.94	24323.62	9032.40	1399.71	7179.15	4305.10
Gap From Agric.	1.00	5.87	33.57	12.47	1.93	9.91	5.94
Year 2018 Level	892.42	6696.05	23567.19	13712.57	1411.69	7054.80	6138.59
Gap From Agric.	1.00	7.50	26.41	15.37	1.58	7.91	6.88

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19 Latest data available at sectoral disaggregated level.

The data for Tanzania present a scene similar to that of Benin but with larger productivity gaps, such that in 2018, workers employed in the construction were 15 times more productive whilst those engaged in other services, transport, storage and communication and manufacturing had productivity levels at least 7 times higher than employees of the agriculture sector. With agriculture accounting for more than 65% of employment share, these statistics make evident that the majority of employment in Tanzania is in the most unproductive sector. This is a perturbing information since agricultural labor productivity growth is particularly critical because of the direct effects on the many workers who participate in the agricultural sector, and also because of its impacts on development in other sectors [5, 11]. These large productivity deviations also suggest that in Tanzania, living standards are much inferior for agricultural households, and that barriers in the form of economic, social, or political is inhibiting workers from exiting the agriculture sector. Spotting and getting rid of those hurdles could result in massive increases in the livelihoods of many Tanzanians. As mentioned earlier the productivity gap figures should be treated with caution given our chosen measure of productivity. However, some authors [13] have argued that even when better measurement of labour input (such as hours worked[20]) or consideration is given to human capital, large differences in productivity between agriculture and other sectors still prevail in SSA. On overall results from Table 1 shows that there are potent opportunities for labour productivity growth through structural change, more so in Benin and Tanzania which are at an earlier stage of development compared to Mauritius.

4. Decomposition of Labour Productivity

Understanding which factors drive labour productivity is important as the latter also turn out to be the key determinants of long-run growth and poverty reduction. In the same line of thought it is valuable to decompose the changes in labour productivity growth into its sources or components. This paper adopts the shift-share approach as presented in Fagerberg [15] or Timmer and Szirmai [33] to decompose the aggregate growth of labour productivity, where the left-hand side term refers to labour productivity growth.

$$\frac{P_t - P_{t-1}}{P_{t-1}} = \sum_{i=1}^{n}\left[\left(\frac{P_{it}-P_{it-1}}{P_{it-1}}\right) \times \frac{Y_{it-1}}{Y_{t-1}}\right] + \sum_{i=1}^{n}\left[\left(\frac{P_{it-1}}{P_{t-1}}\right) \times \left(\frac{L_{it}}{L_t} - \frac{L_{it-1}}{L_{t-1}}\right)\right] + \sum_{i=1}^{n}\left[\left(\frac{P_{it}-P_{it-1}}{P_{t-1}}\right) \times \left(\frac{L_{it}}{L_t} - \frac{L_{it-1}}{L_{t-1}}\right)\right]$$

On the right-hand side of the equation, the first term encapsulates the intra-sectoral effect (within-effect); the second term captures the migration of workers to sectors with above-average productivity levels (static reallocation effect, also known as the cross-sectoral effect) and the third term is

referred to as the transversal term or interaction term (dynamic effect). The latter depicts the combined impact of changes in employment shares and sectoral productivity. To sum up the first term portrays the within effect which can be the result of capital accumulation, technological change, or reduction of misallocation across plants, whilst the second (static reallocation effect) and third term (dynamic effect) together englobe the structural/reallocation effect, which takes place as workers move from low to high productive sectors. The results of the decomposition are illustrated in Figure 3 below.

An initial browse at the statistics of Figure 3a reveals that in Benin labour productivity growth has benefited from both the within effects (resulting from either capital accumulation, technological change, and/or a reduction of the misallocation of resources across plants) and structural effects, though the latter's contribution (mainly driven by its static component) significantly outweighs that of the within effects. A similar trend is also observed in the case of Mauritius and Tanzania. The negative values associated with the dynamic component of the structural effects, reaching an average of -0.45 in the period 2010-2019, indicates that in Benin employment shares have shifted away from progressive sectors (industry's labour share declined by 12.3% in the period 2010-2019, figure 3b) to those with lower labour productivity growth (agriculture labour share grew by 1.6% and that of services[21] by 14% on average during 2010-2019, figure 3b. On the other side, labour productivity growth fell in the industry sector as a consequence of de-industrialization and the shrinking share employment in the sector.

Turning to Mauritius, it can be observed that over the three window periods within and structural effects (both the static and dynamic components) have been positively contributing towards overall labour productivity growth, though over time their influence has taken a downward trend. According to Cowen [8] and Gordon [16, 17], the declining within effects may be due to the fact that new technologies are associated with lower technological spillovers and diffusions compared to earlier technology breakthroughs. As far the decreasing impacts of structural effects are concerned, this can be partly explained by the fact that being a relatively advanced economy Mauritius has already undergone major structural change from low to high productivity sectors. Consequently the benefits derived from further reallocation of workers from an existing sector to another has resulted in lower productivity rewards. At a more disaggregated sectoral level, Figure 3c displays that structural transformation (with the static component leading the way) has been beneficial mainly to labour productivity in the services sector. The high static effects are a result of the increasing labour share of the sector whilst the relatively low impacts of the dynamic effects (1, 1.18 and 0.79 over the three window periods respectively)

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20 The use of hours worked would fix biases associated with the seasonality of agriculture that might lead to an underestimation of agricultural labor productivity.

21 It must be noted that due to its proportion of under-educated population work opportunities in the services sector take mainly the form of low-productive and unskilled activities. https://www.ulandssekretariatet.dk/wp-content/uploads/2021/04/LMP-Benin-2021-Final.pdf

can be justified by either weak domestic interindustry linkages or spillover effects and/or low value-added employment opportunities generated by the services sector. A

more granular analysis within the sector as presented in Figure 4, may provide more insights into this issue.


c.		Benin			Mauritius			Tanzania		
		Within Effect	Static Effect	Dynamic Effect	Within Effect	Static Effect	Dynamic Effect	Within Effect	Static Effect	Dynamic Effect
1992-2001	Agriculture	0.09	-0.45	-0.15	0.02	-0.60	-0.13	0.07	-0.53	-0.11
	Industry	0.04	-0.12	-0.01	0.17	-1.00	-0.53	0.10	0.09	0.05
	Services	0.04	1.41	0.13	0.20	2.94	1.00	0.16	0.99	0.34
2001-2010	Agriculture	0.05	-0.70	-0.12	0.01	-0.62	-0.14	0.08	-2.68	-0.54
	Industry	-0.03	-0.45	0.05	0.12	-2.57	-0.99	0.08	0.09	0.36
	Services	0.01	2.11	0.05	0.14	5.19	1.18	0.10	4.37	0.98
2010-2019	Agriculture	0.12	-1.24	-0.52	0.02	-0.51	-0.27	0.14	-1.01	-0.53
	Industry	0.04	-0.12	-0.02	0.04	-1.78	-0.27	0.04	0.23	0.04
	Services	0.02	2.67	0.10	0.16	3.49	0.79	0.11	2.10	0.48

Figure 3. *Labour Productivity Decomposition.*

The results for Tanzania depict that during the period 2001-2010, the country has gained substantially in terms of labour productivity growth (259%) from its structural adjustment of raising employment share of both industry (share of employment growing by 107.1%) and services sector (growth in share of employment by 65.3%). It is also interesting to note that during the same period the dynamic effects account for 31% (0.8/2.59) of the total structural effects. However though employment share still grew in the two sectors (by 17.2% in each case) during 2010-2019, the dynamic effects turned out to be negative (-0.02). Dynamic effects are mainly the result of increased labour share in sectors with higher labour productivity. Hence one

justification for this abrupt change in the latter effects in the 2010-2019 era maybe due to the fact that the rise in employment share in the industry and services sector was not as high as during the 2001-2010 interval and/or employment rose but in less productive industries within these the sectors.

Since structural change is not a uniform process and maybe more pronounced in certain sub-sectors and industries and less in others, figure 4 portrays decomposes the structural effects at sub-sector levels[22] for each of the three countries.

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22 On a priori an analysis at industry/firm level would have been preferred to have a better grasp of the impacts of the structural effects. However due to data unavailability an investigation at such a disaggregated level cannot be undertaken.

Turning to Figure 4 its left-hand side panel shows the decomposition of the structural effects for the industry sector as a whole as well as for two of its main sub-sectors: manufacturing and construction. The right-hand side panel repeats the same exercise for the services sector and its sub-sectors: wholesale, retail trade, hotels and restaurants; transport, storage and communications and other services. In the case of Benin although on overall the industry sector has not benefitted from static structural effects, labour productivity in its sub-sector construction has flourished as a result of labour reallocation. Another interesting result is the positive dynamic effects experienced by the manufacturing sub-sector during 2001-2010, although the static effects were negative. This finding implies that during that period in the manufacturing sub-sector the level of labour productivity was low yet the rate at which it was growing was high. More specifically it implies that the employment share of manufacturing has not risen enough to gain from static effects but the marginal productivity of each additional worker in that sub-sector has been higher than that in other industry sub-sectors, during the 2001-2010 interval. In fact in the same period, the positive dynamics effects of manufacturing were large enough to offset the negative dynamic effects of other industry sub-sectors. The static effects for wholesale, retail trade, hotels and restaurants; transport, storage and communications and other services, showed up to be positive signaling the rising labour share of these services sub-sectors. The results also indicate that for the remaining services sub-sectors the impact of the dynamic effects fluctuated between positive and negative values.
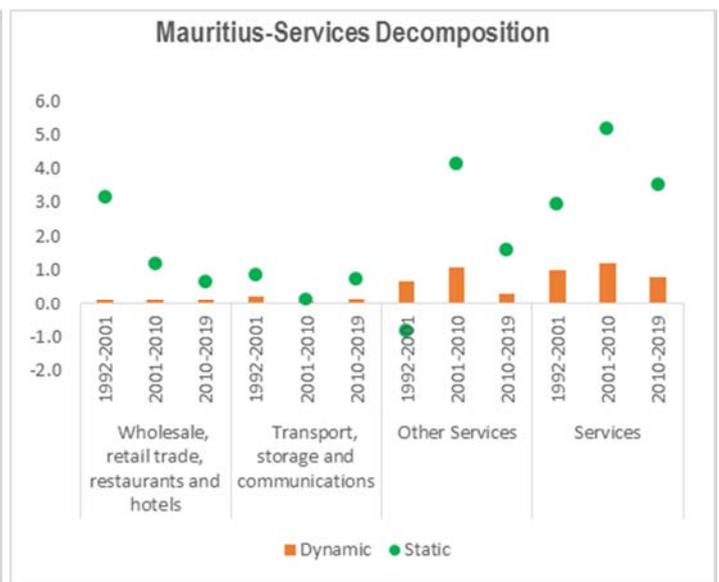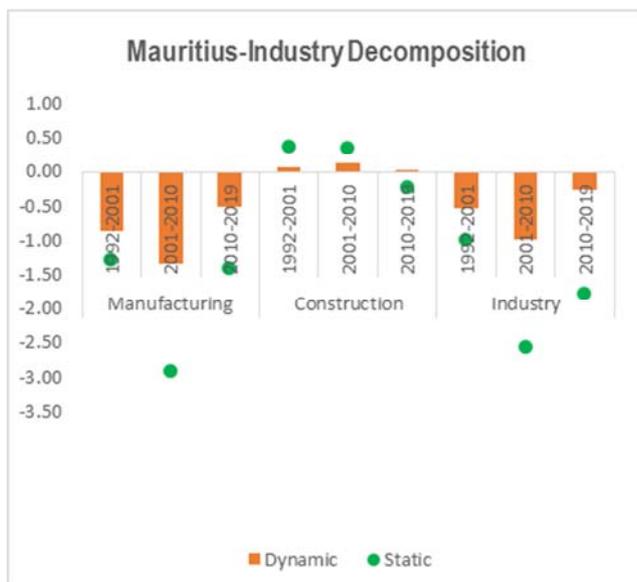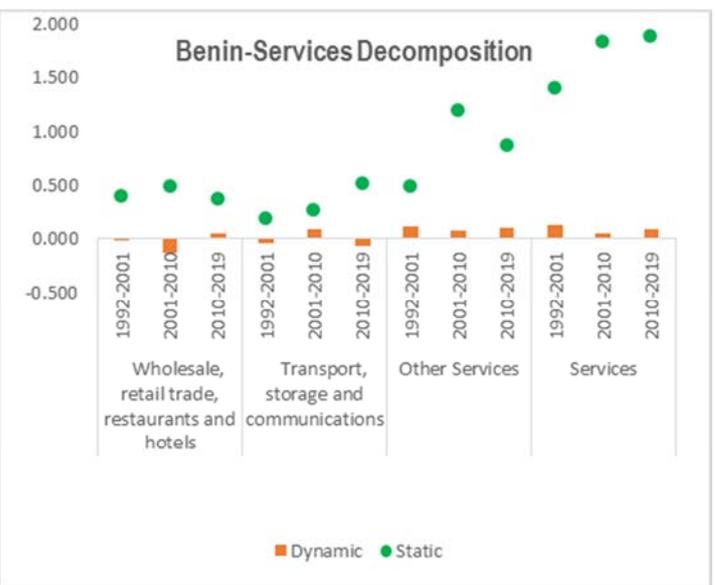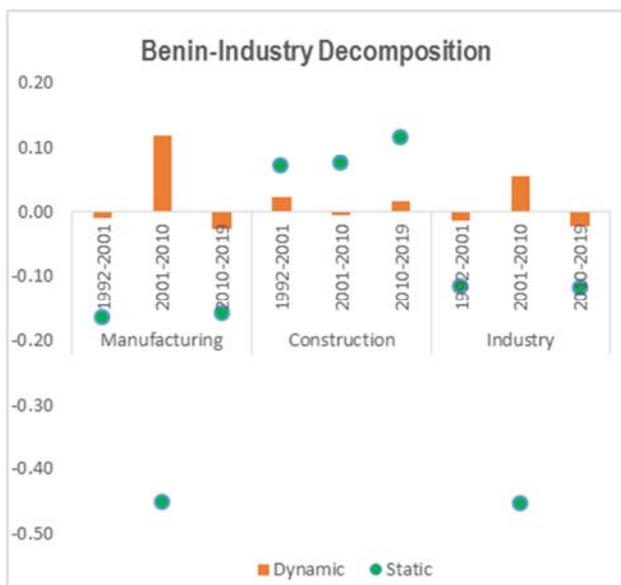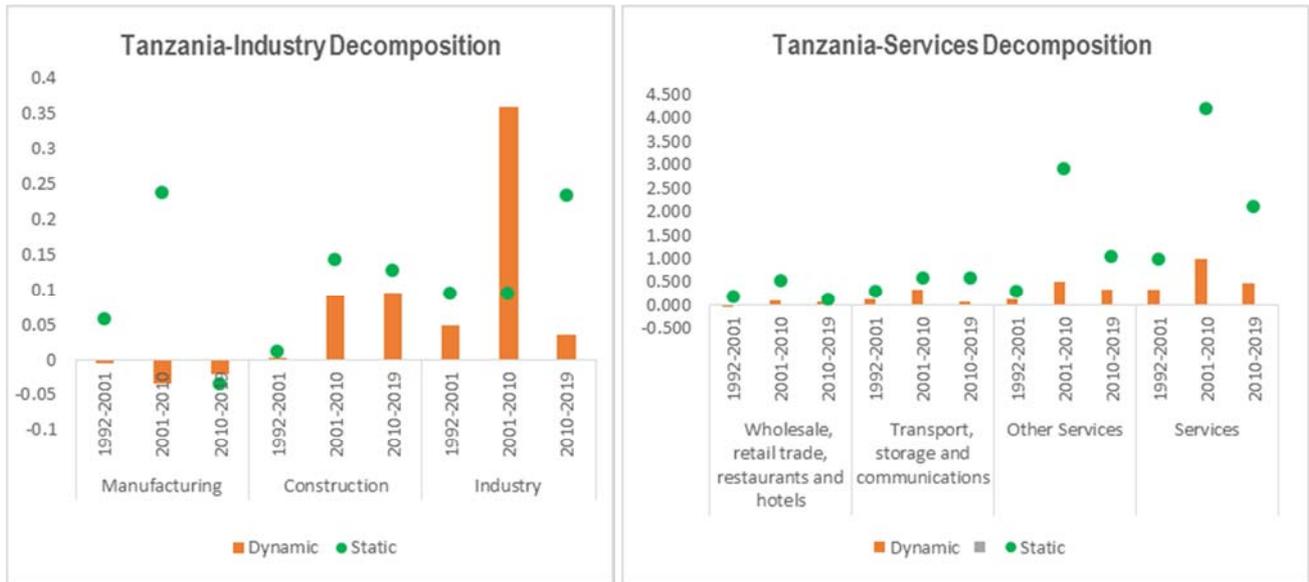
Figure 4. *Structural Effects within Sub-sectors.*

In Mauritius the construction sub-sector has been exhibiting positive static and dynamic structural effects except for the more recent period 2010-2019. The unfavourable structural impacts on labour productivity in the manufacturing sub-sector can be partly explained by the fact that its employment share has been constantly decreasing (mainly in the textile and garment sub-sector) over the years due to the erosion of trade preferences, globalisation induced events such as the dismantling of the Multi-Fibre Agreement (MFA) the rise of China since 2005.[23] At the same time the negative dynamic component of structural change may be the consequence of reallocating workers towards industries with negative labour productivity growth rates, within the manufacturing sub-sector. The data also disclose that the sub-sectors of the expanding services sector all display positive static and dynamic shift effects, with the former effects outweighing the latter in most cases.

On top, Figure 4 illustrates that in Tanzania for the periods 1992-2001 and 2001-2010, the static effects for the manufacturing are positive largely as it was the main sub-sector of industry which absorbed a significant share of reallocated workers compared to other industry subsectors. For instance, Page (2016) pointed out that between 1990 and 2010, the share of workers employed in manufacturing rose from 1.4 to 2.7%. On the other hand the construction sector experienced beneficial structural impacts (both static and dynamic) throughout the three window periods, thereby indicating that reallocation of employment led to both higher levels and higher growth rate for labour productivity in the construction sub-sector compared to other industry sub-sectors. It must be pointed out that the expansion of construction activities was primarily driven by the construction of commercial and residential buildings and ongoing infrastructure projects such as the Standard Gauge Railway (SGR), expansion of Mwanza airport, construction of bridges at TAZARA and the Ubungo

intersection in Dar es Salaam, construction of the Manyoni to Tabora road, the Songosongo natural gas project[24], just to name a few. Moving to the services sub-sectors, the positive static and dynamic effects reveal that in Tanzania the structural process of expanding services sub-sectors has contributed to both higher level and higher growth rate for labour productivity, though not outweighing those brought about by the construction sub-sector.

Across all the three countries, within the industry sector, the construction sub-sector in general appears to be the one benefiting from both the static and dynamic [25] effects of labour reallocation across sectors. In the manufacturing sub-sector only the static effects proved to be positive and that too only in Mauritius and Tanzania. On the other hand the impacts of the structural effects on services sub-sectors are more promising for all the three countries, particularly the static effects. Services under the category other services have achieved higher labour productivity gains from the dynamic structural effects and this is a general observation in all the three countries. It is imperative to point out that that the impact of structural transformation has be most beneficial to the Mauritian services sub-sectors and the rationale behind it is that both Benin and Tanzania did not adhere to the traditional linear sequence of a shift from agriculture to manufacturing, followed by a shift from manufacturing to services. Thy leapfrogged from agriculture to services. Consequently this resulted in services sector which are characterized by low value added products and low productivity levels. Mauritius conversely with its long period of industrialization, managed to develop advanced services associated with higher productivity.

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23 https://www.oecd.org/site/tadicite/48735530.pdf

24
https://oxford.universitypressscholarship.com/view/10.1093/oso/9780198851172.001.0001/oso-9780198851172-chapter-12

25 Except for Benin where the dynamic effects are negative for the construction sub-sector.

5. Conclusion and Way Forward

Understanding the evolution and dynamics as well as the main causal factors of labour productivity, turns out to be a high priority on many governments' agendas, for obvious reasons. Nevertheless it is known that scrutinizing aggregated labor productivity statistics may fail to provide profound insights at policy level and drilling down into more disaggregated data may prove to be more enlightening. Hence this study contributes to the existing literature in this field, by analyzing the evolution of labour productivity, identifying existing labour productivity gaps and assessing the impacts of structural change on labour productivity using the shift-share analysis, from a sectoral perspective in Benin, Mauritius and Tanzania. The productivity gaps' results demonstrate that there significant discrepancies between the productivity of workers engaged in agriculture and those employed in non-agricultural sectors in both Tanzania and Benin, with larger gaps observed in the former case. For instance, a Tanzanian employee in the construction sector in 2018 was 15 times more productive than a worker in the agriculture sector. These results call for burning attention as in both Tanzania and Benin, the agriculture sector proves to be employing the majority of the labour force. Turning to the outcomes of the shift-share analysis in all three countries, the static component of structural change contributed positively to labour productivity growth, though with varying extent across the countries as well as across the three window periods. The negative dynamic component of structural change for Benin throughout the three window periods and for Tanzania in 2010-2019, indicate that labour resources have shifted away from sectors with fast productivity growth (mainly industry) so that the employment share of the latter has been shrinking while that of low performing sectors (agriculture and low value added services) has escalated. On the other hand in Mauritius both the static and dynamic components of structural change were positive indicating that structural transformation in the country has moved in the right direction. Yet over the years the contribution to labour productivity brought about by structural change has been declining, thereby signaling the need for shaping a new economic architecture with emerging and inspiring sectors/industries like the pharmaceutical industry and the ocean-based sectors as well as strengthening domestic interindustry/sector linkages.

From a sectoral angle, in both Benin and Mauritius reallocation of workers to agriculture and industry sectors proved unlikely to boost labour productivity growth in the, though for very distinct reasons. In Benin structural change was too weak- with sectoral composition of output and employment remaining unusually stable over the years, so that agriculture still dominates the economy- to have any positive impacts on labour productivity growth. At the same time structural transformation even went in the wrong direction with the period of de-industrialisation, setting in at lower levels of income per capita and lower employment shares of manufacturing than is typically the case internationally. In Mauritius on the other hand, with its accelerated structural transformation, could not further exploit the benefits of labour reallocation to the existing agriculture and industry sectors. Tanzania turned out of be the only country where the shift of workers to industry has boosted overall labour productivity growth. The increasing employment share of the services sector appeared to be productivity enhancing in all the three countries, with the Mauritian services sector experiencing the highest gains. The Mauritian case can be justified on the grounds that it has not bypassed the industry sector but rather undergone almost 50 years of industrialization before embarking on the services sector, which in turn allowed the latter sector to take a sharp turn and develop highly productive services like banking, finance, transportation, wholesale and retail trade which complements the growth of manufacturing production and act as vital links to the process of round-about or capitalistic production. Further disaggregation into sub-sectors disclose that VA per worker in the manufacturing sub-sector is higher than that in agriculture and manufacturing even exhibited positive structural dynamic effects during 2001-2010, signaling that labour reallocation from agriculture to industry (particularly manufacturing) might be beneficial to boost up Benin's overall productivity. An additional attention-grabbing result is the rising labour productivity level and growth resulting from shifting workers to the construction sector in all the three economies. This hints that construction maybe one of the promising sectors of the future.

Since structural change contributes both positively and negatively to aggregate productivity growth, future work in this field should be directed at using firm level data to provide further insights into the effects which are net out at sector/industry level. Moreover the service sector tends to be rather heterogeneous with a mixture of highly productive as well as poorly productive industries. Hence further disaggregation of the services sector would be more enlightening for policy making.

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