

# Structural Change and Productivity Growth in Guinea

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## Abstract

This paper documents that structural change positively contributed to labor productivity growth in Guinea during 2006–15. However, the contribution of structural change to productivity growth was modest (about one percentage point per year on average), because labor moved from agriculture, the least productive sector, into other relatively low-productivity activities, such as wholesale and retail trade and community services. Although such services are

more productive than agriculture, they are low-productivity activities because of the high level of informality. The paper also finds that the contribution of structural change to productivity growth has declined over time, mainly due to the increased labor market rigidity, lower competitive real exchange rate, declining human capital, and weaker government effectiveness. The paper provides a discussion of the policy implications of the findings.

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## 1. Introduction

Guinea has rich natural resource endowments, especially in mining, agriculture and hydropower. It has the world's largest reserves of bauxite, the ore used to produce aluminum. Guinea's bauxite reserves are estimated at more than 40 billion tons. Guinea also has one of the largest unexploited iron deposits known in the world, in the Simandou mountains, as well as large reserves of gold, diamonds, uranium, and some 20 other minerals. The country's water potential is estimated at 27,000 m<sup>3</sup> per capita per year. Large rivers such as the Niger, Senegal and Gambia have their source in Guinea, making the country the "water tower" of West Africa. With such important endowment of water resources, Guinea can develop a hydroelectric potential estimated at more than 6,000 megawatts. Moreover, Guinea's huge agricultural potential remains largely unexploited. Of 6.2 million hectares of arable land, only 25 percent is farmed and of 364,000 hectares for irrigation potential, less than 10 percent is developed.

Despite its enormous potential, Guinea remains one of the poorest countries in the world. Guinea's GNI per capita was estimated at US\$830 in 2018 (current US\$, Atlas method). With a Human Development Index of 0.459, Guinea was ranked 175<sup>th</sup> of 189 countries in 2018 (UNDP, 2018). The country's Human Capital Index (HCI) is estimated at 0.37, which means that a child born in Guinea today will grow up to be, at best, 37 percent as productive as she could be if she enjoyed complete education and full health. Based on the HCI, Guinea was ranked 141 of 157 countries in 2017.<sup>1</sup> Poverty has increased from 49 percent (national poverty line) in 2002 to 55 percent in 2012, according to the most recent available national poverty survey. After the Ebola crisis, the poverty rate has probably further increased to about 60 percent in Guinea (World Bank, 2016).

Lack of economic growth largely explains the paradox between rich natural resources endowments and low level of human development outcomes and high level of poverty in Guinea. Indeed, since its independence in 1958, Guinea has experienced slow and volatile economic growth rates.<sup>2</sup>

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<sup>1</sup> The Human Capital Index has been recently developed by the World Bank. It quantifies the contribution of health and education to the productivity of the next generation of workers. For further information on the methodology, see Kraay (2018).

<sup>2</sup> For further discussion on growth binding constraints in Guinea, see Mijiyawa (2017a).

Moreover, lack of structural change, i.e., the process through which labor and other resources move from agriculture into modern activities, may have also played a significant role in the disappointing economic performance and poor development outcomes in Guinea. Early development economists such as Lewis (1955) highlighted the importance of structural change in the process of economic development. In fact, as structural change occurs, overall productivity rises, and incomes expand. The speed with which structural change takes place is the key factor that differentiates successful countries from unsuccessful ones (McMillan *et al.*, 2014).

This paper analyzes whether Guinea has experienced structural change, and what have been the driving factors. By doing so, it contributes to filling in the gap in economic research on Guinea. Indeed, Guinea has been largely absent from policy-oriented research, especially on growth and structural change issues. Furthermore, by focusing on Guinea, the paper also contributes to filling the gap on the limited number of quantitative studies on structural change in today's poor economies, as highlighted by Herrendorf *et al.* (2013). More importantly, the paper contributes to evidence-based policy making by shedding light on measures that are necessary to accelerate structural change, economic growth, and poverty reduction in Guinea.

The rest of the paper is organized as follows. The next section presents an overview of recent empirical literature on structural change, while highlighting the contributions of the paper. Section 3 discusses some stylized facts on labor productivity in Guinea. Section 4 analyzes the drivers of structural change and its contribution to labor productivity growth. The policy implications of the main findings of the paper are discussed in Section 5, while Section 6 concludes the paper.

## **2. Structural Change: An Overview of Recent Empirical Literature**

The literature on structural change dates to Kuznets (1957), Chenery (1960), and Chenery and Taylor (1968). These pioneer authors highlighted important stylized facts on the relationship between a country's economic structure and its income level. There has been a recent emphasis on structural change that led to rapidly growth of empirical works, especially on Africa. Recent empirical works can be grouped into two main categories: (i) empirical studies that analyze the

determinants of structural change; and (ii) empirical studies that compare the experiences of structural change across developing regions and countries.

## 2.1 Empirical studies on the determinants of structural change

McMillan *et al.* (2014) are among the pioneer authors who have recently undertaken quantitative analysis on structural change, while examining its determinants across countries. These authors show that since 1990 structural change has been growth reducing with labor moving from high to low productivity sectors in both Africa and Latin America. However, things seem to be turning around in Africa: after 2000, structural change contributed positively to Africa's overall productivity. Using data over the period 1990-2005, and covering 38 countries, including 29 developing countries and 9 in Sub-Saharan Africa (SSA), McMillan *et al.* (2014) identify three factors that determine whether or not structural change contributes to overall productivity; these include: the share of primary products in total exports, competitive or undervalued currencies, and labor market rigidity.

Mensah *et al.* (2018) use an updated and expanded version of the Africa Sector Database developed by the Groningen Growth and Development Centre to analyze the role of structural change and job reallocation in the economic growth performance of African countries over the past 50 years. The results show that productivity growth has been generally low with moderate contributions from structural change across the 1960-2015 period. However, a regional comparison shows that structural change is more rapid in East Africa than in the other regions of SSA. Using econometric analysis covering 18 countries, the paper shows that more rigid labor markets reduce job reallocation across sectors, impeding structural change and productivity growth in Africa.

More recently, Martins (2019) also analyzes the pace, patterns, and determinants of structural change in the world economy. Using a data set comprising 169 countries and covering the period from 1991 to 2013, the paper finds that structural change has played a critical role in enhancing economic performance since the early 2000s, even if it remains comparatively less important than within-sector productivity improvements. The widespread reallocation of labor from agriculture to the services sectors has been the key driver of structural change. The paper also finds robust evidence that the pace of structural change is significantly shaped by human and physical capital.

## 2.2 Empirical studies comparing the experience of structural change across developing regions and countries

Using data from both the national accounts and Demographic and Health Surveys (DHS),<sup>3</sup> and covering 19 SSA countries, McMillan and Harttgen (2014) show that between 2000 and 2010, the share of the labor force employed in agriculture declined by roughly 10 percentage points. This decline has been accompanied by a systematic increase in the productivity of the labor force, as it has moved from low productivity agriculture to higher productivity manufacturing and services. The decline has been accompanied by higher economic growth rates and poverty reduction. Both the declines of poverty and agriculture's labor share have been more rapid in countries where the initial share of the labor force engaged in agriculture is the highest and where commodity price increases have been accompanied by improvements in the quality of governance.

Likewise, Diao *et al.* (2017) also use both data from the Groningen Growth and Development Center's Africa Sector Database and the DHS to show that much of Africa's recent growth and poverty reduction has been associated with a substantive decline in the share of the labor force engaged in agriculture over the period 1994-2008. This decline is most pronounced for rural females over the age of 25 who have a primary education; it has been accompanied by a systematic increase in the productivity of the labor force, as it has moved from low productivity agriculture to higher productivity services and manufacturing.

Haile and Moller (2018) examine the determinants of growth acceleration in West African Economic and Monetary Union (WAEMU) countries over the period 2011-17. Using the structural change lens as one of the methods of analysis, they find that growth was driven by static structural change and within-sector productivity growth. However, productivity growth was low in the sub-region over the period of analysis.

de Vries *et al.* (2015) analyze structural change in Africa and its implications for productivity growth during the past 50 years. According to this paper, during the early post-independence

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<sup>3</sup> DHS are nationally representative surveys designed to collect detailed information on child mortality, health, and fertility, as well as on households' durables and quality of dwellings. In addition, DHS data include information on gender, age, location, education, employment status, and occupation of women and their partners between the ages of 15 and 59.

period, resources were reallocated to manufacturing activities with high productivity growth in Africa. Structural change stalled in the mid-1970s. When it resumed in the 1990s, workers mainly relocated to distributive trade services. Productivity levels in these activities were higher than in agriculture, enhancing overall economy performance. But services productivity growth was sluggish and increasingly falling behind the world frontier. This pattern of static gains but dynamic losses of reallocation since 1990 is found for many African countries. It is comparable to patterns observed in Latin America, but different from those in Asia.

Along the same vein, Diao *et al.* (2017) also find that in contrast to the East Asian experience, none of the recent growth accelerations in Latin America, Africa, or South Asia was driven by rapid industrialization. Beyond that, these authors document that recent growth accelerations were based on either rapid within-sector labor productivity growth (Latin America) or growth increasing structural change (Africa), but rarely both at the same time. The African experience is particularly intriguing, as growth-enhancing structural change appears to have come typically at the expense of declining labor productivity growth in the more modern sectors of the economy. The paper explains this anomaly by arguing that the forces that promoted structural change in Africa originated on the demand side, through either external transfers or increase in agricultural incomes. In contrast to Asia, structural change was the result of increased demand for goods and services produced in the modern sectors of the economy rather than productivity improvements in these sectors.

Mallick (2017) also highlights the importance of demand factors for structural change in Asian countries. This author examines the sources of structural change and its contribution to labor productivity growth in China and India in the context of globalization. He found that changing final demand is the most crucial factor in labor reallocation in India. In China, both changes in final demand and technology are the driving factors of labor allocation. The regression analysis confirms that structural change, globalization, and human capital significantly contribute to labor productivity growth in both countries.

Grabowski and Self (2019) have also examined the experience of structural change in Asian countries. Using data over the period 1985-2015, covering four Southeast Asian countries

(Indonesia, Malaysia, Vietnam, and Thailand), this paper shows that the rise of price of agricultural goods relative to price of manufactured goods slows the rate of structural change. According to these authors, in order to avoid unexpected consequences on structural change of policies that indirectly reduce tax on agricultural goods, there is a need for a significant increase of agricultural productivity in the studied countries.

In addition to regional perspectives, recent empirical work on structural change also entails country studies. For instance, McMillan *et al.* (2016) edit a book that provides an overview and seven country studies related to structural change. The overview lays out a unifying framework for thinking about economic growth as a combination of two challenges. The “structural change challenge” is focused on moving resources from traditional low-productivity activities into modern, more productive industries. The “fundamentals challenge” faced by policy makers in the developing world is about how best to develop broad capabilities such as human capital and infrastructure. Of the seven countries studied (Botswana, Brazil, Ghana, India, Nigeria, Vietnam, and Zambia), only Vietnam seems to be in the midst of rapid structural change based on an expansion in modern manufacturing. By contrast, India’s growth has been driven primarily by increases in within-sector productivity. In Ghana, Nigeria, and Zambia, structural change has helped boost growth in labor productivity largely as a result of an expansion in the services sector. Botswana and Brazil experienced rapid structural change decades ago, but recent growth in these middle-income countries has come from investments in fundamentals. The book and its findings demonstrate that with all things considered, rapid structural changes are now more difficult to achieve and investments in fundamentals will be key to sustaining growth in low-income countries.

Diao *et al.* (2018) find that labor productivity in Tanzania grew at roughly 4 percent per annum between 2002 and 2012, a growth rate more rapid than any other time in recent history. Roughly 80 percent of this productivity growth is accounted for by structural change as employment shares in agriculture declined while employment shares in services and manufacturing rose. Although employment in the formal sector has increased, the bulk of employment growth is accounted for by firms in the informal sector; these informal firms contributed more than one percentage point to economy-wide labor productivity growth.

Uganda is another East African country whose structural change experience has been examined by Ahmed *et al.* (2015). These authors document that Uganda's economy underwent significant structural change in the 2000s, whereby the share of non-tradable services in aggregate employment rose by about 7 percentage points at the expense of the production of tradable goods. The process also involved a 12-percentage-point shift in employment away from small and medium enterprises and larger firms in manufacturing and commercial agriculture mainly to microenterprises in retail trade. In addition, the sectoral reallocation of labor on these two dimensions coincided with significant growth in aggregate labor productivity.

Nigeria's structural change experience has been examined by Adeyinka *et al.* (2013). This paper documents that structural change accounts for approximately one-fifth of the total change in labor productivity in Nigeria between 1996 and 2009. Labor moved out of the agricultural and wholesale and retail trade sectors into manufacturing, transportation and communications, business services, and general services. While structural change did occur in this period, significant gains to aggregate labor productivity are still available from further shifts of labor to higher-productivity sectors. The paper discusses the factors limiting structural change, which include poor agricultural productivity, insufficient infrastructure to support high productivity sectors, and a lack of appropriate skills in the labor force.

The World Bank 2018 Systematic Country Diagnostic (SCD) for Guinea comprises an analysis of labor productivity and structural change. According to the report, labor productivity growth was driven for the most part by structural change and, to a lesser extent, by within-sector productivity growth. More specifically, static structural change contributed approximately 12 percentage points of the 10 percent labor productivity growth during 1994-2015, and within-sector productivity changes accounted for -1.2 percentage points.

In Northern Africa, the experience of Tunisia has been examined by Marouani and Mouelhi (2015). These authors analyze the dynamics of sectoral productivity growth in Tunisia and assess the contribution of structural change to these dynamics. Using sectoral and firm data, the paper shows that productivity increased at a relatively sustained pace in Tunisia in the last three decades, but that the contribution of structural change remained limited. Trade and labor market reforms did

not seem to increase it. The main reasons are barriers to entry in some sectors, the inefficiency of factor markets, and the focus of the firms' upgrading program only on some selected sectors.

As for Moussir and Chatri (2019), they examine if Morocco has engaged in a structural transformation process. The analysis of the economic structure reveals a structural inertia, linked to a volatile agriculture sector and poorly and weakly integrated industrial and services sectors. The results of the decomposition show that the intra-sectoral component (within) would account for much of the growth in labor productivity in Morocco.

Our paper makes three main contributions to the literature. First, we provide an overview of the recent empirical literature on structural change. Second, we examine Guinea's experience of structural change. Though a similar question was analyzed in the World Bank 2018 SCD, our paper uses more recent data, reflecting the GDP rebasing, which Guinean authorities have recently undertaken with IMF support. By focusing on Guinea, we aim at filling the gap highlighted by Herrendorf *et al.* (2013), who call for more quantitative studies on structural transformation in today's poor economies. Third, based on existing findings in the literature, we develop a methodology that helps to identify potential drivers of the dynamics of structural change in Guinea. Indeed, though structural change has made a positive contribution to productivity growth in Guinea over the period 2006-15, that contribution has been modest and declining (comparing the period 2006-10 to 2011-15). We develop a methodology that helps to understand factors behind the decline of the contribution of structural change to productivity growth in Guinea.

### **3. Some Stylized Facts on Labor Productivity in Guinea**

For the analysis of labor productivity, we collect our own data from Guinea's National Institute of Statistics (INS). More specifically, we compute labor productivity as the gross value-added per worker at constant 2010 prices, in millions of GNF.<sup>4</sup> We disaggregate the data into 10 sectors, consistently with the approach developed by Timmer and de Vries (2007, 2009).

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<sup>4</sup> GNF stands for Guinean franc (*Franc Guinéen*), the country's currency. As of July 5, 2019, one dollar is equivalent to GNF9,160, according to the information from the Central Bank of Guinea, published on: <https://www.bcringguinee.org/marches/taux-de-change>. The country uses a managed float exchange rate regime.

According to the data, agriculture is the least productive sector, and mining is the highest productive sector in Guinea. Productivity in agriculture represents only the equivalent of 29.6 percent of the economy-wide productivity. Another key characteristic of the Guinean economy, highlighted, is the large productivity gaps between different sectors. Productivity in the mining sector is 54 times larger than that of agriculture. In fact, if all Guinea’s workers could be employed

**Table 1.** Guinea: Sectoral labor productivity and sectoral share of total employment in 2015

Sector	Labor Productivity (millions of GNF)	Ranking by level of sectoral labor productivity	Sectoral share of total employment	Ranking by sectoral share of total employment
Agriculture, hunting, forestry and fishing	2.75	10	67.14	1
Mining and quarrying	149.47	1	0.71	9
Manufacturing	20.67	6	4.95	3
Public utilities	63.52	2	0.13	10
Construction	28.79	4	1.62	8
Wholesale and retail trade, hotel and restaurants	15.13	8	13.72	2
Transport and communication	20.21	7	2.79	6
Finance, insurance, real estate and services to business	23.31	5	3.60	4
Community, social and personnel services	14.07	9	3.30	5
Government services	47.85	3	2.02	7
<b>Economy-wide</b>	<b>9.40</b>	<b>-</b>	<b>100</b>	<b>-</b>

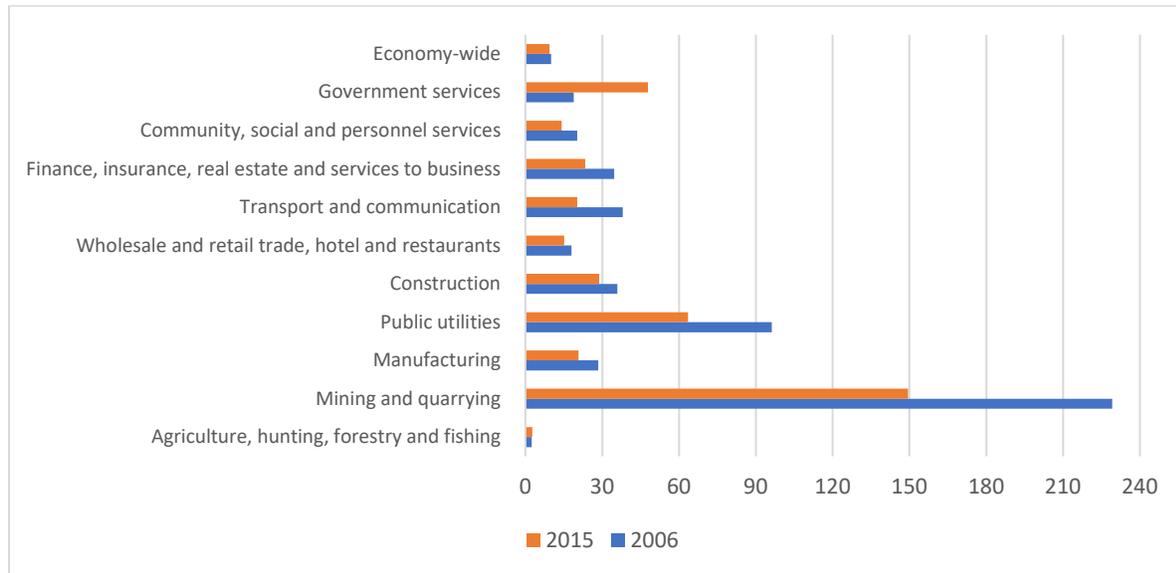
Source: Authors’ calculations based on data from the INS.

in the mining sector, the country’s overall labor productivity would be multiplied by 2,230 times. Unfortunately, mining cannot absorb such large number of workers. Comparing sectors that have similar potential to absorb labor also reveals large gaps between sectors. For instance, productivity in construction is more than 10 times larger, and productivity in manufactures is 7.5 times larger than productivity in agriculture.<sup>5</sup> The productivity gap between agriculture and other sectors is also confirmed when comparing the situation in 2006 with that of 2015. The data also depict declining

<sup>5</sup> For a discussion on the reasons for the productivity difference between agriculture and other sectors, see Mundlak *et al.* (2012), and Gollin *et al.* (2014a, b). In the specific case of Guinea, that difference could be due to weak and less efficient investment in the agriculture sector and the slow path of adoption of new technologies by that sector.

productivity across almost all the sectors. As highlighted by McMilan *et al.* (2014), inter-sectoral productivity gaps are a feature of underdevelopment, and the data confirms that Guinea does not depart from that reality.

**Figure 1.** Guinea: Labor productivity (millions of GNF) across sectors and over time

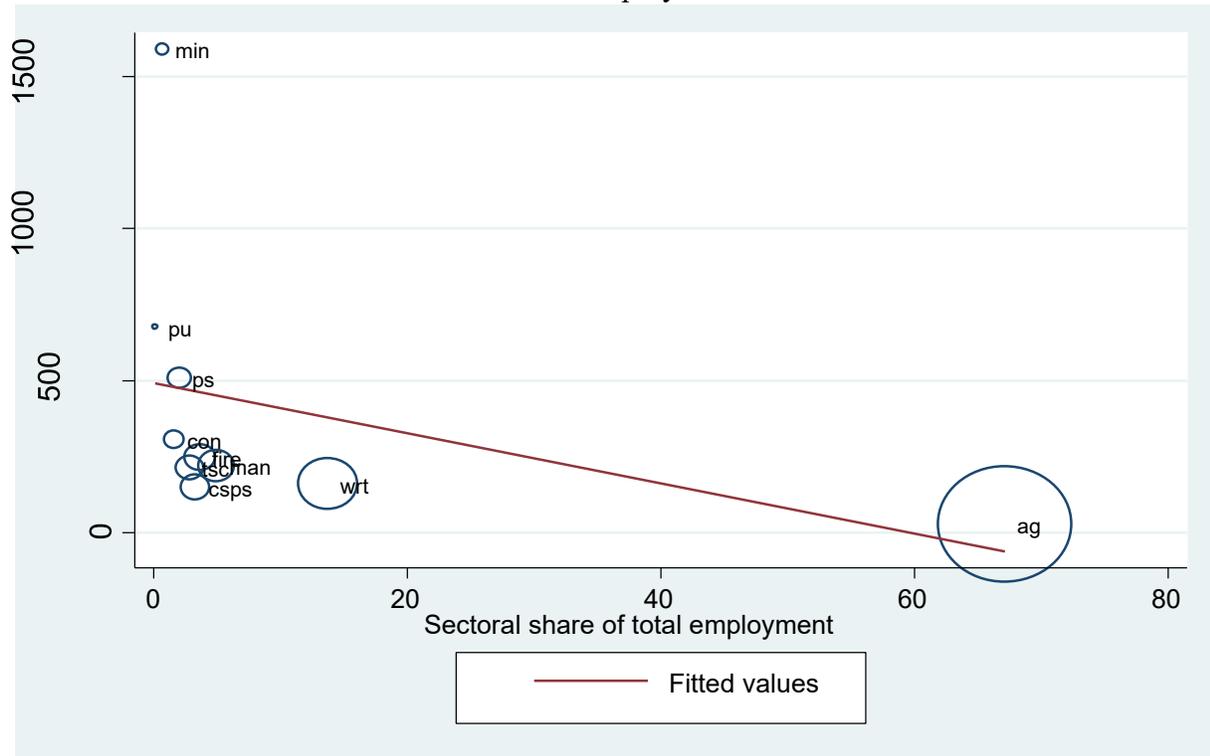


Source: Authors' calculations based on data from the INS.

Another interesting stylized fact about Guinea's labor market, is the concentration of workers in lower-productivity sectors. While agriculture is the least productive sector, it concentrates about 67 percent of workers, making agriculture the largest employer sector in Guinea. On the other hand, mining is the most productive sector, but one of the least employer sectors in Guinea. Thus, there is a negative correlation between sectoral productivity and sectoral share of total employment.

Overall, the data highlight a dual economy in Guinea, where agriculture, the least productive sector co-exists with non-agriculture sectors that are relatively more productive. This is not a bad thing, if labor could flow from agriculture to more productive sectors of the economy. The question is whether such flow of labor happens in the Guinean economy. This is what we analyze in the next section.

**Figure 2.** Guinea: Correlation between sectoral share of total productivity and sectoral share of total employment



Source: Authors' calculations based on data from the INS.

*Note:* Size of circle represents employment share in 2015; agr= agriculture; min= mining and quarrying; man= manufacturing; pu= public utilities; con= construction; wrt= wholesale and retail trade, hotels and restaurants; tsc= transport and telecommunications; fire= finance, insurance and real estate; csps= community, social and personal services; ps= government services.

#### 4. Structural Change and Productivity Growth in Guinea

##### 4.1 Defining the contribution of structural change to productivity growth

Labor productivity growth in an economy can be achieved in one of the two ways. First, productivity can grow *within* economic sectors by capital accumulation, technological change or reduction of misallocation *across* firms. Second, productivity in the economy can grow by flow of labor from low-productivity to high-productivity sectors. This can be expressed using the following decomposition, borrowed from McMillan *et al.* (2014):

$$\Delta Y_t = \sum_{i=n} \theta_{i,t-k} \Delta y_{i,t} + \sum_{i=n} y_{i,t} \Delta \theta_{i,t}, \quad (1)$$

where  $Y_t$  and  $y_{i,t}$  refer to economy-wide and sectoral labor productivity levels, respectively, and  $\theta_{i,t}$  is the share of employment in sector  $i$ . The  $\Delta$  operator denotes the change in productivity or employment shares between  $t - k$  and  $t$ . The first term in the decomposition is the weighted sum of productivity growth within individual sectors, where the weights are the employment share of each sector at the beginning of the time period. This is called the “within” component of productivity growth. The second term is called the “structural change” component of productivity growth. It captures the productivity effect of labor re-allocations across different sectors. When changes in employment shares are positively correlated with productivity levels, the second term in the decomposition is positive, and structural change increases economy-wide productivity growth.

#### *4.1.1 Structural change in Guinea during the period 2006-15*

We use Guinea’s labor data and apply the method of productivity decomposition over the period 2006-15. This is a recent period marked by several socio-political and economic shocks. Indeed, this period covers political transition before the first democratic presidential elections since the independence of Guinea, organized in 2010. It is also a period that was marked by the adoption of the new mining code, which contributes to Guinea’s attractiveness to foreign direct investments. This period was also marked by the outbreak of the Ebola crisis in Guinea in 2014. Thus, it is important to analyze how the country handled the challenges and opportunities that it faced for structural change during the period 2006-15. From a statistical perspective, the period of analysis is also relevant. Indeed, Guinean authorities recently adopted the 1993 U.N. System of National Accounts 1993 (SNA 1993), with IMF technical support, and revised the national accounts for the period 2006–15. The adoption of SNA 1993 led to more accurate estimates of national accounts data; for instance, nominal GDP was revised upward by 40 percent.<sup>6</sup>

The data show that structural change has made a positive contribution to productivity growth in Guinea during the period under investigation.<sup>7</sup> This suggests that labor has flowed from the lower productivity agriculture sector. Labor has moved from agriculture, but not to the highest productive

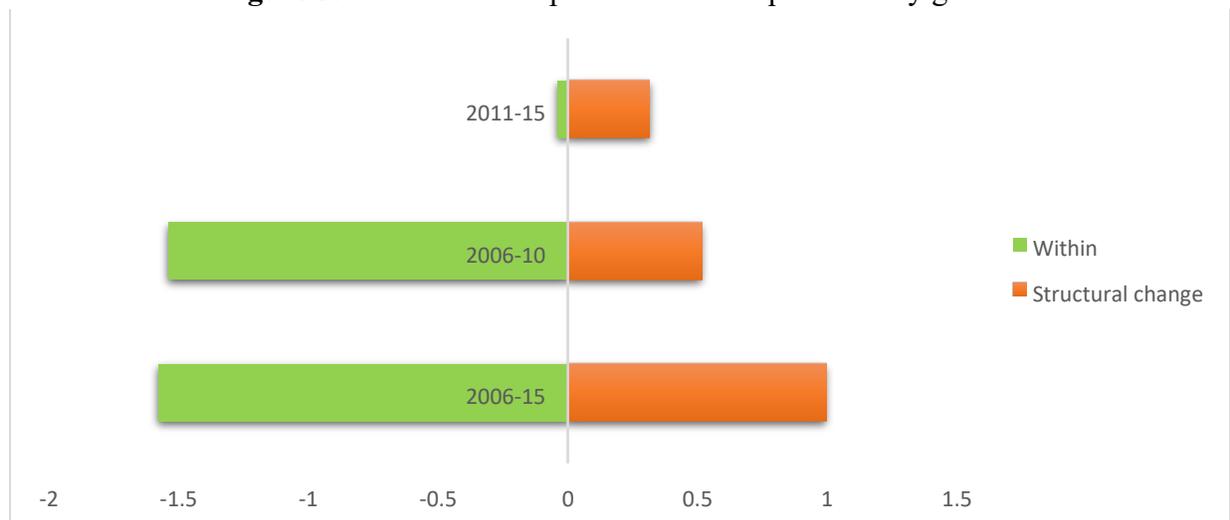
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<sup>6</sup> For further details, see IMF Country Report No. 17/387.

<sup>7</sup> Such a result is consistent with the one found by McMillan *et al.* (2014) for African countries in the post-2000. Their Africa sample includes Ghana, Ethiopia, Kenya, Malawi, Mauritius, Nigeria, Senegal, South Africa, and Zambia.

sectors. Indeed, most workers have moved from agriculture to wholesale and retail trade and community, social and personal services, which are also among the least productive sectors, due to a high level of informality. Because of the flow of labor from agriculture to other lower-productivity sectors, the contribution of structural change to productivity growth was small, though positive. Structural change has contributed about 1 percentage point per year on average to labor productivity growth in Guinea. This is similar to what McMillan and Harttgen (2014) have found on average for a number of African countries over the period 2000-10.

**Figure 3.** Guinea: Decomposition of labor productivity growth



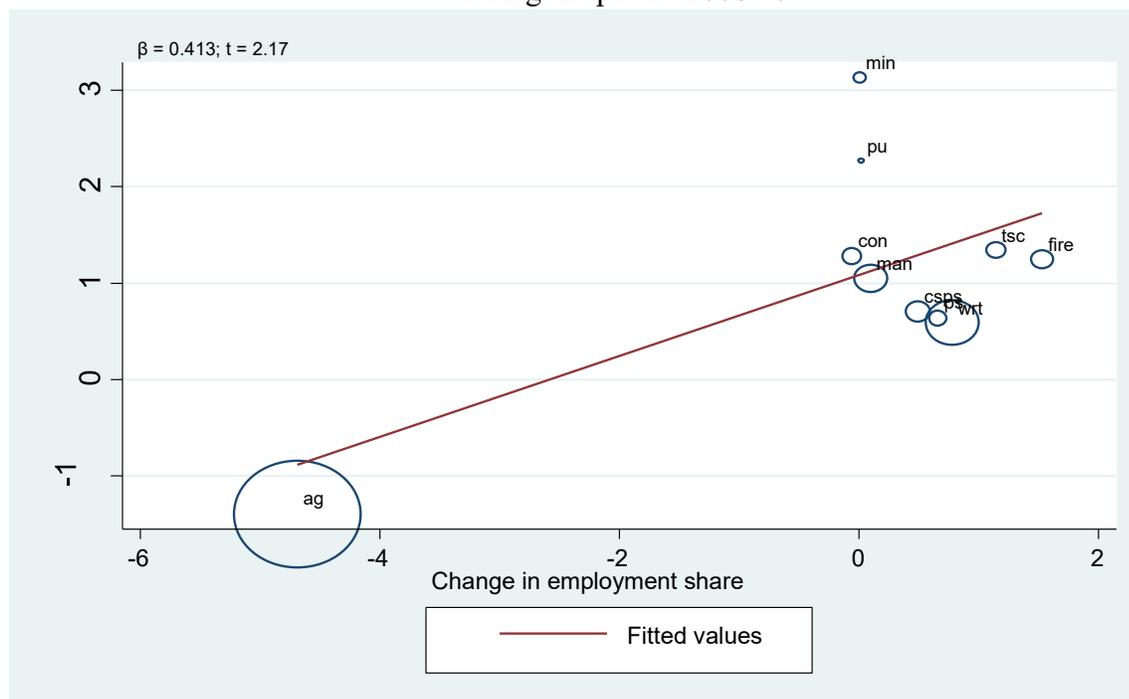
Source: Authors' calculations based on data from the INS.

Note: The “within” component stands for productivity growth due to capital accumulation, technology change or reduction of resources misallocation across firms, while the “structural change” component measures productivity growth due to labor flow from low to high-productivity sectors.

While structural change has made a small and positive contribution, the data show a large negative contribution of the within component to productivity growth in Guinea during the period 2006-15. From that perspective, the finding in Guinea is different from many developing countries, where the “within” component generally contributes positively to productivity growth. This highlights a lack of capital accumulation, lower technological adoption and higher resources misallocation within firms, weighing on productivity growth.<sup>8</sup>

<sup>8</sup> Along the same vein, the global innovation index ranked Guinea 119<sup>th</sup> of 126 countries in 2018. More information on the index can be found at: <https://www.wipo.int/publications/fr/details.jsp?id=4330>

**Figure 4.** Guinea: Correlation between sectoral productivity and change in employment share during the period 2006-15



Source: Authors' calculations based on data from the INS.

Note: Size of circle represents employment share in 2006; agr= agriculture; min=mining and quarrying; man=manufacturing; pu=public utilities; con= construction; wrt=wholesale and retail trade, hotels and restaurants; tsc=transport and telecommunications; fire=finance, insurance and real estate; csps=community, social and personal services; ps= government services.  $\beta$  = coeff. of independent variable in regression.  $\ln(p/P) = \alpha + \beta \Delta \text{Emp. Share}$ .

**Table 2.** Guinea: trends of labor productivity growth and its components

	2006-15	2006-10	2011-15
Labor productivity growth rate	-0.58	-1.02	0.27
Within component	-1.57	-1.53	-0.04
Structural change component	0.99	0.51	0.31

Source: Authors' calculations based on data from the INS.

Note: The same as in Figure 2.

#### 4.1.2 More detailed analysis

As outlined above, the period 2006-15 was marked by several shocks, including a major political transition that followed the death in December 2008 of the second President of Guinea, General Lansana Conté. The political transition period was ended in 2010, with the first ever democratic

presidential elections since the independence of Guinea. Following the presidential elections, the new regime has undertaken several reforms, including the adoption of a new mining code in 2011, the construction of Kaleta dam, as well as the implementation of an Extended Credit Facility with the International Monetary Fund, launched in January 2012. Moreover, the country reached the completion point under the Heavily Indebted Poor Countries program in September 2012. Thus, for a deeper analysis, we split the period 2006-15 into two periods of five years each: 2006-10 and 2011-15.

The main findings show that structural change has made a positive contribution to productivity growth, during each of the two periods under consideration. However, the contribution of structural change to productivity growth has declined over time. While structural change has contributed to productivity growth to 0.5 percentage point per year on average during the period 2006-10, that contribution was reduced by 0.2 percentage point during 2011-15. Such finding raises a question about the driving factors of the dynamics of structural change in Guinea.

## 4.2 What are the driving factors of the dynamics of structural change in Guinea?

### 4.2.1 *Strategy of investigation*

For the analysis of the drivers of the dynamics of structural change, we rely on the findings of McMillan *et al.* (2014), and Martins (2019). Using cross-section data over the period 1990-2005 and covering 38 countries (including 9 SSA countries), McMillan *et al.* (2014) find that three factors significantly affect structural change. These include: (i) natural resources abundance, (ii) currency undervaluation, and (iii) labor market rigidity. Natural resources abundance negatively affects structural change because the mining sector does not generate much employment, unlike manufacturing industries. Likewise, labor market rigidity does not facilitate structural change. Structural change is facilitated when the existing regulatory framework allows the easing flow of labor across sectors. Finally, countries that maintain competitive or undervalued currencies tend to experience more growth enhancing structural change, because undervaluation acts as a subsidy for tradable and modern industries and facilitates their expansion (Rodrik, 2008). As for Martins (2019), he runs econometric regressions with a sample of 169 countries (including 47 countries in Africa) to highlight the importance of human and physical capital for structural change. Skilled and healthy workers are more likely to develop the right capabilities to move to higher-productivity

jobs. In addition to the aforementioned variables, good governance and institutions create a more conducive environment for investing in modern activities, thus are necessary for structural change.<sup>9</sup>

We analyze the dynamics of factors that could affect structural change in order to understand factors behind its evolution. This is an important analysis, as it will shed light on factors that Guinean policy makers could affect to accelerate structural change in the country. More specifically, we compare the average annual growth rates of the proxy variables for natural resources abundance, currency competitiveness, labor market rigidity, physical and human capital, and quality of governance and institutions. We compare the average annual growth rates of the proxy variables over the two periods of 2006-10 and 2011-15. Between these two periods, the contribution of structural change to productivity growth has declined in Guinea. Thus, by comparing the average annual growth rates of factors that could affect structural change between 2006-10 and 2011-15, we could understand better the driving factors of its dynamics.

Our strategy of investigation is straightforward and relevant from a policy perspective. It helps to identify factors that policy makers could focus on to support structural change. Furthermore, our strategy allows analyzing the drivers of structural change in a context where available data do not permit running econometric regressions.

We use the share of primary commodities in total merchandise exports as a proxy for natural resources abundance. The higher the value of this proxy variable, the larger the country's endowment of natural resources. As for the proxy for currency competitiveness, we use the real effective exchange rate (REER) index. The higher the REER index, the less competitive a country is compared to its trade partners. As for the proxy for labor market rigidity, we use labor tax and contributions as percentage of profit. More specifically, this variable measures all government mandated labor contributions that are borne by the business in the second year of operation,

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<sup>9</sup> McMillan *et al.* (2014) have not found a significant effect of governance variables on structural change. As for Martins (2019), he finds that political regime matters more for structural change in developed than in developing countries. However, given the country context and theoretical arguments, it is important to examine whether the quality of governance and institutions has affected structural change in Guinea. Indeed, poor governance has been identified as a binding constraint for private sector and economic development in Guinea; see World Bank (2018) for more details.

expressed as a share of commercial profit. The higher the labor tax rate, the higher the labor cost, the less firms are willing to recruit; thus, reducing chances for structural change.<sup>10</sup>

We use the access to electricity rate as a proxy for physical capital. The higher this variable, the larger the proportion of population with access to electricity. We expect a positive effect of access to electricity on structural change. Having access to electricity is fundamental for the development of modern and higher-productivity activities. We consider two aspects for human capital: education and health. For education, the gross primary enrollment rate is used as a proxy, and life expectancy is used as a proxy for health. The gross primary enrollment rate is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the primary education level. Primary education mainly provides children with basic reading, writing, and mathematics skills. Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout his or her life.<sup>11</sup>

We use two proxy variables for measuring the quality of governance and institutions: government effectiveness and control of corruption.<sup>12</sup> Government effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Control of corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. For both proxy variables of the quality of governance and institutions, we use the percentile rank, which indicates the country's rank among all countries covered by the aggregate indicator, with 0 corresponding to the lowest rank, and 100 to the highest rank.

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<sup>10</sup> Labor tax measures one aspect of labor market rigidity. It would have been better to have another proxy, integrating other aspects of labor market rigidity such as hiring and firing regulations, minimum wage and hours regulations. But such a comprehensive proxy for labor market rigidity does not exist for Guinea.

<sup>11</sup> Other indicators could have been used for human and physical capital, but data availability limits such option.

<sup>12</sup> We focus on control of corruption and government effectiveness, because they are two governance aspects that could reduce market and government failures, thus contributing to innovation and modern activities development. Along the same vein, Mijiyawa (2017b) shows that good governance, especially a low level of corruption and better government effectiveness contribute to manufacturing development in Africa.

Both the REER index and the share of primary commodities in total exports are retrieved from the UNCTAD database.<sup>13</sup> Labor tax data are from the World Bank, Doing Business project.<sup>14</sup> The proxy variables for governance are from the World Bank, Worldwide Governance Indicators, and the remaining proxy variables are from the World Bank, World Development Indicators database.

#### 4.2.2 Results

The results show that of the eight (8) factors analyzed, only three (3) have positively evolved to support structural change in Guinea. The three factors are: the share of primary commodities in total exports, access to electricity, and control of corruption. The growth rate of the share of primary commodities in total merchandise exports has declined over time. While during the period 2006-10, the share of primary commodities in total merchandise exports has grown by 0.6 percentage point per year on average, this has declined by 1.6 percentage points during the period 2011-15. Thus, between 2006-10 and 2011-15, the dynamics of primary commodity exports should have been favorable to structural change. The average annual growth rate of access to electricity has increased by 0.4 percentage point between 2006-10 and 2011-15.

**Table 3.** Guinea: Dynamics of drivers of structural change

	Average annual growth rate		Variation of average annual growth rate	Positive (+)/Negative (-) evolution
	200610	2011-15		
Primary commodity's share of exports	0.6	-1.6	-2.2	+
Real effective exchange rate index	8.9	11.7	2.8	-
Labor tax and contributions (% of profit)	9.0	15.9	6.9	-
Access to electricity	3.9	4.3	0.4	+
Gross primary enrollment rate	1.5	1.2	-0.3	-
Life expectancy	1.3	0.9	-0.4	-
Control of corruption	-7.8	2.1	9.9	+
Government effectiveness	16.2	3.1	-13.1	-

Source: Authors' calculation based on data from different sources as described in the text.

<sup>13</sup> <https://unctadstat.unctad.org/FR/Index.html>

<sup>14</sup> <https://www.doingbusiness.org/>

This reflects increased investment in the energy sector, including the construction and operationalization of the Kaleta dam in 2015. Thus, access to electricity should have supported structural change in Guinea over the past years. The country's percentile rank for control of corruption has also significantly improved. This suggests that Guinean authorities have increased efforts for controlling corruption over the past years; this should have contributed to structural change.

On the other hand, the real effective exchange rate and labor tax rate have not favorably evolved to support structural change in Guinea. Indeed, the average annual growth of the real effective exchange rate index has increased by almost 3 percentage points between 2006-10 and 2011-15.<sup>15</sup> Such growth of real effective exchange rate negatively affects the country's economic competitiveness, hampering structural change. Likewise, labor tax and contributions as a percentage of profit has increased over time in Guinea: from an annual growth rate of 9 to 15.9 percentage points between 2006-10 and 2011-15. Higher labor tax increases labor cost, reduces labor flow across sectors, and weighs on structural change. The proxy variables for human capital have also not favorably evolved to support structural change in Guinea. The average annual growth rate of gross primary enrollment rate has declined by 0.3 percentage point, as well as life expectancy whose average annual growth declined by 0.4 percentage point during the period 2011-15 compared to 2006-10. Thus, over the past years, Guinea's population has had less access to education, and has been less healthy; these two trends are not favorable to structural change. The quality of government effectiveness has also declined over time in Guinea, as illustrated by the decline of the country's percentile rank. Thus, the ability of the government to design and implement sound policies to support the country's development has declined, which is not favorable to structural change.

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<sup>15</sup> Along the same vein, the IMF estimates an overvaluation of 12-26 percent of Guinea's currency in 2016; see IMF (2019).

## 5. Policy Implications

The results show that of the eight (8) factors that could potentially affect structural change, five have not favorably evolved to support it. These include the real effective exchange rate, labor market rigidity, the primary education rate, health conditions, and the quality of government effectiveness. Indeed, the appreciation of Guinea's real effective exchange rate has increased over time, as well as the country's labor market rigidity. Life expectancy, the primary education rate, and the quality of government effectiveness have all deteriorated. Thus, to promote structural change, Guinean authorities should strive to improve the country's economic competitiveness and reduce labor market rigidity. They should also increase investment in human capital (education and health) and make more efforts for improving the quality of government effectiveness.

Improving the country's economic competitiveness would require greater exchange rate flexibility and containing the inflation rate. More open and competitive auction for foreign exchange allocations would strengthen exchange rate flexibility. Containing the inflation rate would require strengthening the Central Bank independence, a prudent monetary policy, including targeting the monetary base, and maintaining the central bank advances to the government within statutory limits.<sup>16</sup> An effective and transparent mechanism for monitoring the provision of credit to the government will also be necessary. Containing the inflation rate will also require an effective adjustment mechanism of domestic fuel prices to international oil prices. This would avoid abrupt adjustment of domestic fuel prices, which recently has contributed to inflation spikes in Guinea.<sup>17</sup> Likewise, containing the inflation rate would also require an efficient mechanism for determining salary increase in the public sector, which has ripple effects on wages in the private sector and on the inflation rate.<sup>18</sup> These are examples of areas for strengthening the quality of government

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<sup>16</sup> According to the Guinea's Central Bank Law, no more than 5 percent of the average fiscal revenues of the last three years should be repaid to the government within 92 days.

<sup>17</sup> Retail prices of petroleum products were increased by 25 percent on July 1, 2019, the first time since 2015, while international oil prices have been on a rising trend.

<sup>18</sup> For instance, it has been estimated that the wage bill increased by 20 percent (during the first eight months of 2018, compared with the same period in 2017) to reach 2.4 percent of GDP, reflecting the 40 percent increase in salaries for the public administration adopted in March 2018. This has also contributed to increased inflation rate, which was estimated at 9.9 percent in 2018, as compared to 8.9 percent in 2017.

effectiveness, which could contribute to improving the country's economic competitiveness, thus supporting structural change in Guinea.

Our results suggest that Guinean authorities should also aim at reducing the growth rate of the labor tax and contribution rate. This could be done by expanding the tax base, thus reducing the tax burden on a few modern enterprises. Beyond the labor tax rate, Guinean authorities should also aim at facilitating other aspects for more labor market flexibility, including those related to hiring conditions and working hours. For instance, the maximum length probationary period for a worker with a formal contract is about three to twelve months, but renewable once, which is more restrictive in Guinea than in many developing countries, including in SSA. Likewise, the premium for overtime work is about 30 percent of hourly pay in Guinea, which is largely higher than in comparator countries such as Benin, Burkina Faso and Côte d'Ivoire where the premium is 12, 15 and 23.8 percent, respectively. Furthermore, the paid annual leave for a worker with 1 year of tenure (in working days) is about 30 days in Guinea, which is higher than in many comparator countries.<sup>19</sup>

Though the data show that the dynamics of the primary commodities' share of merchandise exports has not been unfavorable to structural change, Guinean authorities should pursue efforts for getting the maximum of benefit out of the mining sector for the country's development. Indeed, mining revenues could be a source of financing infrastructure development (power, roads, railways, and port), which is highly needed in Guinea.<sup>20</sup> Recently, mining has been utilized to back the development of energy infrastructure, as illustrated by the increased access to electricity in the country. Such experience could be replicated for developing other infrastructure that the country needs, provided that transparency and good governance rules are followed. Guinean authorities should also pursue efforts for diversifying the economy. Indeed, primary commodities account for about 90 percent of merchandise exports, which is a very high level of concentration, exposing the country to external shocks and limiting the possibility for structural change. Agribusiness with

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<sup>19</sup> According to 2019 Doing Business data. It is only recently that data on labor market conditions have been collected for the Doing Business report; thus, available data does not allow comparison over the analysis period.

<sup>20</sup> For instance, of 140 countries around the world, the *2015-16 Global Competitiveness Report* ranked Guinea the least performing country in terms of quality of infrastructure.

higher value chain, and resource-based manufactures are comparative advantage areas for diversifying the economy of Guinea and supporting structural change. The recent launch of the agricultural transformation program is a good and encouraging start.

Economic diversification requires several ingredients, including a skilled labor force. Thus, the need to invest in health and education such as workers can develop appropriate skills that would allow them to move to higher productivity activities. Increasing investment in education and health should be done more efficiently. One key aspect that needs to be addressed when investing in education and health is to make sure that all the country's areas are served. Thus, health workers and teachers should not be concentrated in urban areas only but distributed across the country such that rural areas are also served.<sup>21</sup>

In addition to the aforementioned policy measures that aim at supporting structural change, the results also highlight the need for addressing the negative contribution of the within-sector component to labor productivity growth, which is a symptom of lack of capital accumulation and misallocation of resources in the Guinean economy. Capital accumulation can be enhanced through reforms to support private investment by facilitating access to finance, which has been identified in several studies as a binding constraint to economic growth in Guinea. The development of a credit bureau and increased domestic savings are key factors that could facilitate access to finance in the country. Likewise, developing a leasing market for machinery and equipment, and policy reforms to attract more foreign direct investment could facilitate capital accumulation. Misallocation of resources can be addressed by creating conditions for private sector development and productive self-employment. This can also be addressed by reducing uncertainty in the Guinean economy, through more political and macroeconomic stability, which will allow long-term private investment.

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<sup>21</sup> In fact, one of the reasons why the school enrollment rate and health conditions are low despite recent increases in investment for education and health facilities is misallocation of health workers and teachers, with most of them living in Conakry, the capital city, and other main cities.

## 6. Conclusion

In this paper, we document large productivity gaps between sectors, especially between the agriculture sector and the rest of Guinea's economy. For instance, agricultural productivity is almost one-third the equivalent of the economy-wide productivity, and productivity in the mining sector is 54 times larger than that of agriculture. Thus, Guinea does not depart from the dual economy, which characterizes developing countries. However, large productivity gaps between different sectors is not a bad thing and could be an opportunity for economic growth and development, if labor could flow from low-to high-productivity sectors. Such labor flow is called "structural change" and contributes to labor productivity growth and economic development.

Using data over the period 2006-15, we examine whether the economy of Guinea has experienced structural change. The data suggest that, yes structural change has occurred in Guinea, and it has made a positive contribution to labor productivity growth during the period under investigation. However, the contribution of structural change to productivity growth was modest and declining. Indeed, while structural change has contributed to 1 percentage point increase per year on average in labor productivity growth during the period 2006-15, a detailed analysis suggests that the contribution has declined by 0.2 percentage point per year on average between 2006-10 and 2011-15.

The paper takes a further step to examine the driving factors of the dynamics of structural change in Guinea. To do so, we develop a methodology based on the findings of McMillan *et al.* (2014) and Martins (2019). These authors found that high dependency on primary products, labor market rigidity, and currency overvaluation negatively affect structural change, but human capital (education and health) and physical capital, as well as good governance have positive effects. Thus, based on these findings, we examine the dynamics of proxy variables for each of the factors that have been identified in the literature to affect structural change. More specifically, we compare average annual growth rates of the following proxy variables: (i) primary commodities' share of merchandise exports (a proxy for dependence on primary products), (ii) the real effective exchange rate index (a proxy for currency competitiveness), (iii) labor tax and contribution as a percentage of profit (a proxy for labor market rigidity), (iv) access to electricity rate (a proxy for physical

capital), (v) gross primary enrollment rate (a proxy for education), (vi) life expectancy (a proxy for health conditions), (vii) control of corruption, and (viii) government effectiveness; the latter being proxy variables for the quality of governance and institutions. For the comparison of average annual growth rates, we consider 2006-10 and 2011-15; these are periods during which the contribution of structural change to labor productivity growth has declined. Depending, on the sign of variation of the proxy variables, we could conclude whether or not a specific factor has evolved in a manner to support structural change in Guinea.

The results of the analysis show that of the eight (8) factors examined, only primary commodities' share of merchandise exports, access to electricity, and control of corruption have favorably evolved to support structural change in Guinea. Between 2006-10 and 2011-15, the average annual growth rate of the primary commodities' share of merchandise exports has declined by 2.2 percentage points, the growth rate of access to electricity has increased by 0.4 percentage point, and the country's percentile rank for control of corruption has improved. On the other hand, the evolutions of labor market rigidity and the level of country's competitiveness were not favorable to structural change. Indeed, the annual growth rate of the labor tax rate has increased by 7 percentage points per year on average between 2006-10 and 2011-15, suggesting an increase in labor market rigidity in Guinea. Likewise, the average annual growth rate of the real effective exchange rate index has increased by 3 percentage points, suggesting a loss of Guinea's competitiveness between 2006-10 and 2011-15, which is not favorable to structural change. The annual growth rates of both proxy variables for education and health have declined by 0.3 and 0.4 percentage point, respectively, suggesting a less skilled and healthy labor force, which is not favorable for structural change. Likewise, the country's percentile rank for the quality of government effectiveness has declined, hampering structural change.

The main policy implication of the paper's findings is that in order to support structural change, Guinean authorities should strive to reduce labor market rigidity, improve the country's economic competitiveness, as well as improve the government's effectiveness in designing and implementing sound economic policies. Guinean authorities should also invest more in infrastructure, education, and health for a better skilled labor force. They should also pursue efforts for diversifying the economy to support structural change of the economy. In addition, there is a

need to address lack of capital accumulation and misallocation of resources in the Guinean economy.

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