Structural Change in Ghana 1960-2010*

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Abstract

Development is associated with structural transformation, i.e. the decline of agriculture and the rise of manufacturing and services. Conversely, the lack of structural change can constrain development, as exemplified by Sub-Saharan Africa. This case study investigates the causes and consequences of the lack of structural change in Ghana over the period 1960-2010. Over fifty years after its independence, Ghana remains a poor and mainly agricultural economy, with limited industrialization and an unproductive service sector. First, we use sectoral data and the methodology of McMillan and Rodrik 2011 to estimate the contribution of structural change to productivity growth. We find that structural change was neither growth-enhancing nor growth-reducing and that changes in overall productivity were mostly explained by the performance of individual sectors. Second, we look at individual sectors and discuss why growth-enhancing structural change did not occur in Ghana. Third, we refine the analysis by examining the respective roles of economic geography, informality and government policies in structural change. Lastly, we highlight the fact that Ghana has transitioned into a more efficient and more formalized economy in the last 20 years.

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1 Introduction

Development is associated with structural transformation, defined by the decline of agriculture and the rise of manufacturing and services. Standard structural transformation models distinguish "labor push" and "labor pull" factors as the main drivers of this transition (Alvarez-Cuadrado and Poschke, 2011). The labor push approach shows how a rise in agricultural productivity - a *green revolution* - reduces the food problem and releases agricultural labor for the modern sector (Schultz, 1953; Gollin, Parente and Rogerson, 2002, 2007). The labor pull approach describes how a rise in non-agricultural productivity - an *industrial revolution* - attracts underemployed labor from agriculture into the modern sector (Lewis, 1954*a*; Harris and Todaro, 1970; Hansen and Prescott, 2002; Lucas, 2004). No matter the origin of structural change, labor moves from lower-productivity to higher-productivity activities, increasing overall labor productivity in the economy.

Historical data indicates that England adopted this model during the 18th-19th century, and was succeeded in the 19th and early 20th centuries by each of France, Germany and the United States. In turn, Far Eastern countries started implementing the model in the 20th century, led by Japan and South Korea which were followed by Malaysia and China in the late 20th century (Bairoch, 1988; Young, 2003; Kim and Margo, 2004; Brandt, Hsieh and Zhu, 2008; Allen, 2009). Seemingly, various parts of the world have already experimented with structural change, but what about Sub-Saharan Africa? In 2010, the region was still poor, with the same per capita GDP as Western Europe and the U.S. had in 1860 (Maddison, 2008). This non-evolution is related to the lack of structural transformation. First, there has been no green revolution in Africa. Its food yields have remained low (Evenson and Gollin, 2003; Caselli, 2005); in 2009, cereal yields were 2.8 times lower than in Asia, while yields were 2.1 times lower for starchy roots (FAO, 2010). The fact that agriculture still accounts for 58% of employment and constitutes 20% of GDP delineates the magnitude of the "food problem" for a large share of the population. Second, to this day, no industrial revolution has occurred in Africa. Its manufacturing and service sectors are relatively small and unproductive (McMillan and Rodrik, 2011; Badiane, 2011); in 2007, employment shares in industry and services were 10% and 26% in Africa, as opposed to 24% and 35% in Asia. African labor productivity was 1.7 and 3.5 times lower in industry and services respectively (World Bank, 2010). It is thus essential to study the causes and consequences of the lack of structural change in Africa.

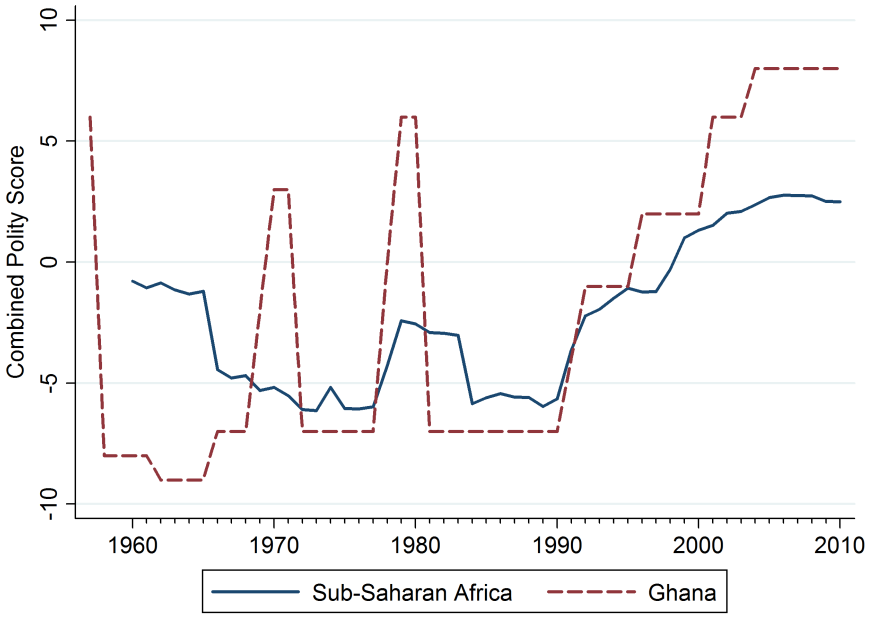
In this case study, we replicate the methodology of McMillan and Rodrik (2011) and focus on one African country, Ghana. Why adhere to the method of McMillan and Rodrik (2011)? This is because it allows one to decompose changes in

overall productivity into changes of productivity *within* sectors and changes in the allocation of labor *between* sectors. They call the second channel the "structural change" channel. If labor moves from low-productivity to high-productivity sectors, overall labor productivity would increase and structural change would be growth-enhancing. Contrarily, if labor moves from high-productivity to low-productivity sectors, overall productivity would decrease and structural change would be growth-reducing. Why is the study centered on only one country? Country case studies force us to understand the historical and institutional context in which these mechanisms operate. If structural change is growth-reducing, there must be idiosyncratic factors that explain why employment relatively increases in lower-productivity sectors. Lastly, why was Ghana chosen in particular? The country was selected because it provides an ideal laboratory to understand the failure of structural transformation in Africa, as argued below.

First of all, political progression in Ghana has often been an indicator of upcoming events in the rest of the continent. Figure 1 shows the evolution of political regimes in Ghana and Africa from 1957 to date. In 1957, Ghana was the first African country to claim independence. This happened one year before Guinea's independence and three years before 16 other countries. Ghana quickly became a single-party autocracy with an autocratic president, Kwame Nkrumah. After his overthrow in 1966, Ghanaian politics became marked by a succession of military coups and fragile political regimes. With the transition to democracy after 1992, the situation of institutions started improving. Ghana has now become one of the most democratic African countries.

Second, the economic evolution of Ghana is symptomatic of what happened elsewhere. Figure 2 shows the evolution of income in Ghana and Africa from 1960 to date. Throughout the post-independence period, The country has been largely dependent on natural resource exports such as cocoa, mining (mostly gold) and timber. Its manufacturing and service sectors, on the other hand, have remained small and/or unproductive. Figure 3 confirms the weight of commodity exports in total exports throughout the period. Economic growth in the immediate post-independence period was driven by import substitution industrialization, and an increasing role of government in the economy. However, in the 1970s and early 1980s income declined due to macroeconomic disequilibria and austerity measures adopted as a result of mounting public deficits (see Fig. 2). Growth resumed after two structural adjustment programmes (1983, 1987-1989), and after a post-2000 improvement in the business environment and a boom in commodity prices (see Fig. 2). According to McKinsey (2011), Ghana now belongs to the group of Africa's transition economies which also includes countries like Senegal, Kenya and Mozambique. Although its GDP is lower than the diversified North African

Figure 1: Evolution of Political Regimes in Ghana and Africa, 1957-2010.



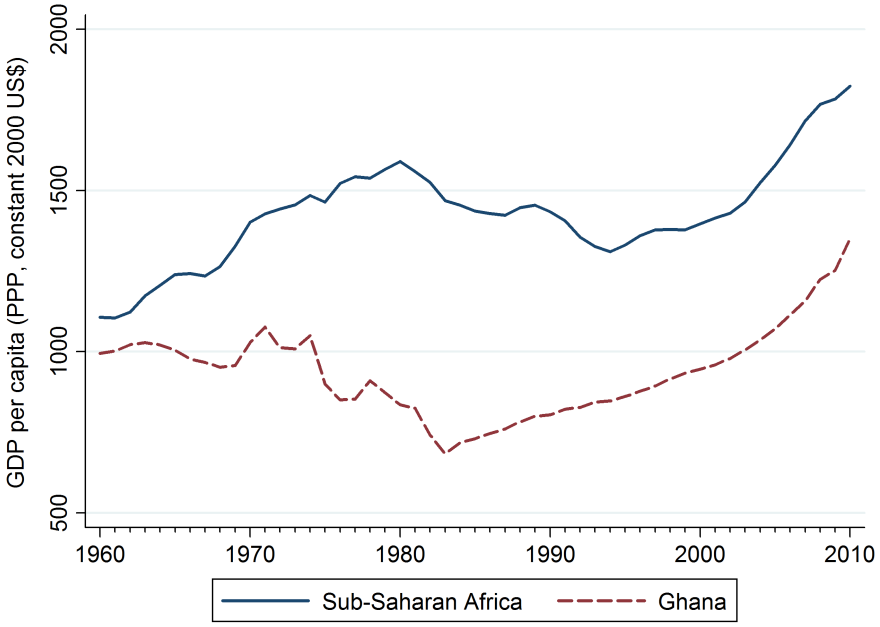
Notes: This figure plots the revised combined polity score for Africa (average) and Ghana. Polity IV defines three regime categories: autocracies (-10 to -6), anocracies (-5 to +5) and democracies (+6 to +10). See Data Appendix for data sources.

economies and the African oil and gas exporters, its economy is growing rapidly. It is increasingly exporting manufactured goods, which could soon enable it to compete with low-cost emerging economies in Asia.

Third, in 1954, Arthur Lewis, the intellectual father of structural transformation, wrote a report on industrialization in Ghana (Lewis, 1954*b*). He was also Ghana's first chief economic advisor in 1957-1958, but Nkrumah and Lewis strongly disagreed over the policies to be adopted for the development of Ghana. His economic analysis and its policy recommendations for Ghana serve as a useful benchmark to gauge the various policies implemented over the past 50 years. Retrospectively, his analysis of the strengths and flaws of the immediate post-independence Ghanaian economy and his recommendations were probably right.

Finally, analyzing structural change in one country requires that we have access to sectoral productivity and employment data over a rather long period. Sub-Saharan Africa is not only poor, but it is also suffering from data shortage, which limits our ability to better understand the reason behind its poverty. Fortunately, because Ghana has one of the best statistical systems in Africa, we were able to obtain all the data for this study by working closely with various institutions in

Figure 2: Evolution of Per Capita GDP in Ghana and Africa, 1960-2010.



Notes: This figure plots GDP per capita (PPP, constant 2000 US$) for Sub-Saharan Africa (average) and Ghana. Source: authors' calculations, Maddison 2010 and World Bank 2011. See Data Appendix for data sources.

Ghana and with several university libraries in England. There are probably only a few African countries where such results can be replicated today.

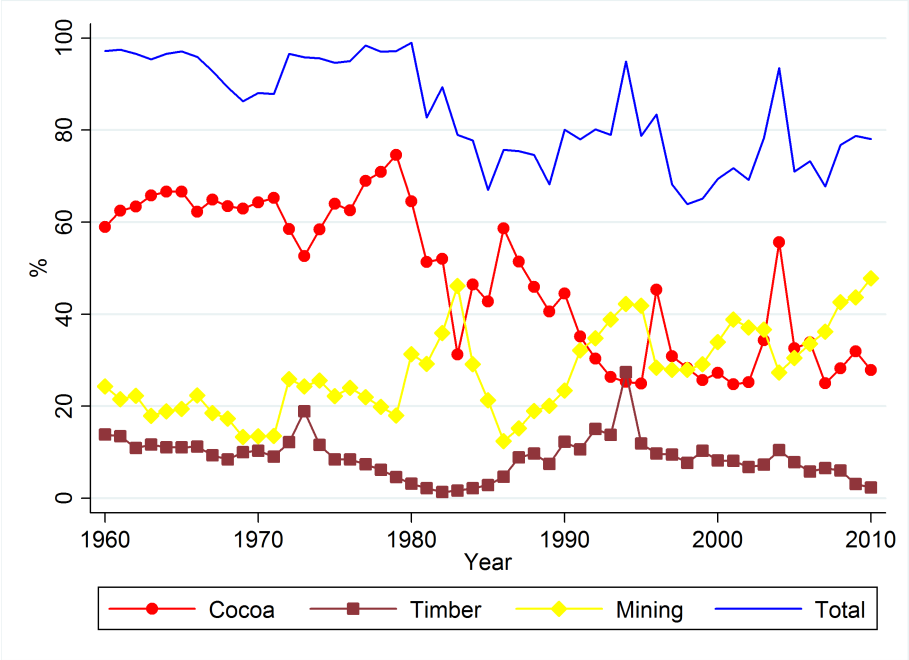
The case study is organized as follows. Section 2 describes the broad patterns of economic development and structural change in Ghana from 1960 to date. Section 3 presents various results on structural change using data for 9 sectors, 15 sectors and 20 manufacturing subsectors in 1960-2006. Section 4 focuses on the geography of structural change, the respective contributions of formal and informal employment to structural change and the role of public policies in promoting structural change. Section 5 concludes.

2 Patterns of Economic Development and Structural Change, 1960-2010

2.1 Economic History of Ghana

This section summarizes the economic history of Ghana, which is useful in determining turning points that could affect patterns of structural change. This

Figure 3: Ghana's Exports of Main Commodities (%), 1960-2010.



Notes: This figure plots the share of primary commodities in total exports. *Total* reports the total contribution of cocoa, timber and mining exports. See Data Appendix for data sources.

section draws on Aryeetey, Harrigan and Nissanke (2000), Agyeman-Duah (2008), Kolavalli et al. (2011).

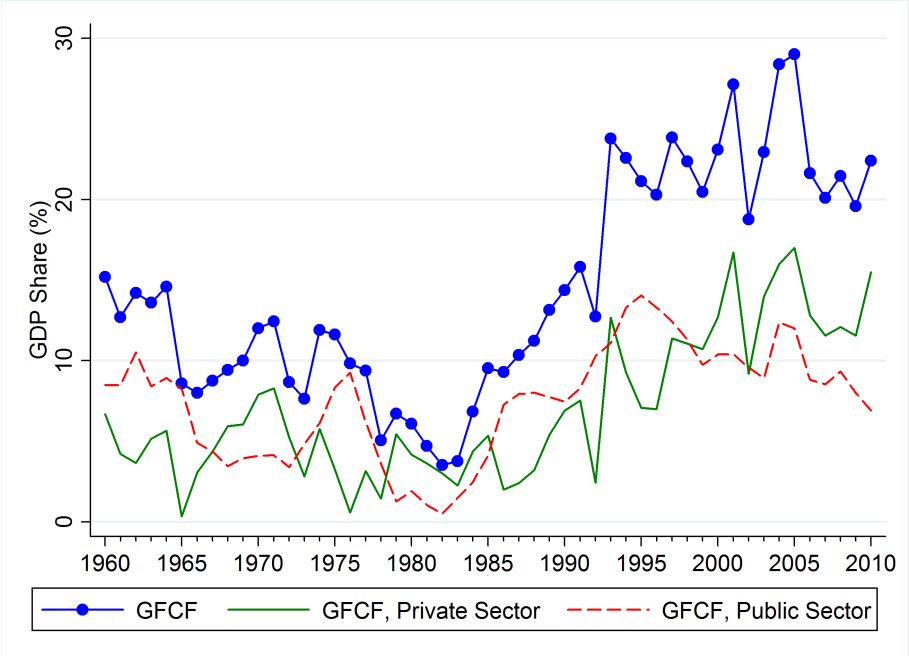
1957: When it first claimed its independence, Ghana was one of the most developed Sub-Saharan African non-island countries. It was the leading British colony, and the fact that it experienced a boom in cocoa production in the 1930s made it one of the leaders of the African "cash crop revolution" (Tosh, 1980; Teal, 2002; Austin, 2008; Jedwab, 2011). According to Arthur Lewis (Lewis, 1954*b*), Ghana could not develop without Import-Substitution Industrialization (ISI). Yet pursuing this strategy was not possible in the 1950s for two reasons (Pickett and Shaeeldin, 1990; Agyeman-Duah, 2008). First, because land was still relatively abundant, the price of labor was too high. Therefore, Ghana was not in a situation of labor surplus in the agricultural sector, and the development of labor-intensive manufacturing for the home and foreign markets implied that the country primarily needed a "vigorous agricultural programme". Although Arthur Lewis is often described as a proponent of the labor pull hypothesis and pro-industrialist policies, he clearly thought that labor push factors were more important for Ghana at that

time. Second, there were not enough skilled people in the economy, so developing capital-intensive manufacturing was not a sound economic strategy. Arthur Lewis thus recommended the colonial government to increase agricultural productivity and lay the foundations for future industrialization; by providing infrastructure and investing in human capital, it would be possible to create a larger, healthier and more educated labor force. As Pickett and Shaeeldin (1990) put it: "Lewis thus thought that many years would elapse before large investments in industry could be justified economically."

1957-1966: When Kwame Nkrumah took power in 1957, his government adopted a capital-intensive ISI strategy with a central government. This strategy was in line with Lewis' model of development, but was in contradiction with Lewis' own recommendations to be more "patient". The rationale behind Nkrumah's policy was that development would only come from industrialization and that the surplus from the agricultural sector (e.g., cocoa) had to be used to expand the industrial sector. Due to coordination failures, only an enlightened leader could implement this massive industrial policy, or "big push". Another benefit of a strong state was that it promoted national building, especially in a context of marked ethnic fractionalization. Investment rates increased but this evolution was mostly driven by public investments. This is portrayed in Figures 4 and 5 which plot the investment rates and the GDP share of government expenditure from 1960 to date. There were 53 state enterprises and 12 public boards in 1966 (Agyeman-Duah 2008). Government consumption also increased, as the number of publicly-paid employees increased from 140,000 in 1957 to about 280,000 in 1965. Yet these investments had no impact on per capita GDP due to wrong investment decisions, mismanagement, and the inflationary effect of import restrictions. When cocoa prices collapsed in 1965, the government had to rely on printing money and public debt, and Nkrumah was consequently overthrown in 1966.

1966-1981: The Nkrumah presidency was followed by a succession of military coups and fragile political regimes which were interrupted by short democratic episodes. The National Liberation Council (NLC) was composed of army and police officers and assumed executive power till 1969 when Kofi Busia was democratically elected. Busia was overthrown by another army coup in 1972 and Colonel Acheampong became the new head of state till 1978. Although Nkrumah was held responsible for the lack of economic growth before 1966, the following NLC, Busia and Acheampong governments all adopted the same policies, with a more limited budget. Government consumption remained high (see Fig. 4 and 5) and the number of state enterprises kept increasing. At the same time, the country

Figure 4: Ghana's Investment Rates (% GDP), 1960-2010.

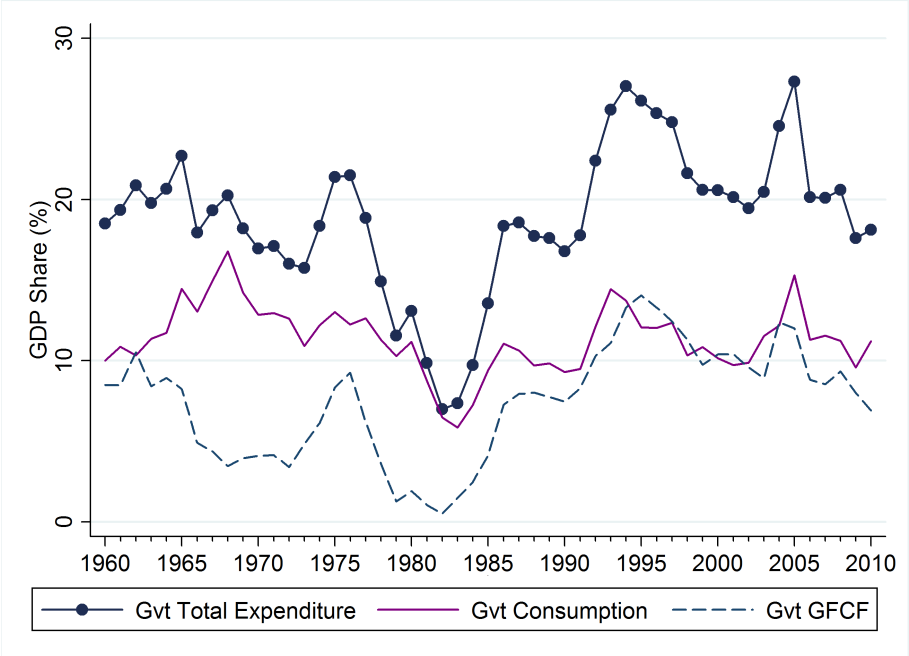


Notes: This figure plots the investment rates for Ghana as a whole (*gross fixed capital formation* = GFCF), and separately for the private and public sectors. See Data Appendix for data sources.

accumulated debt, inflation was soaring and private investment was collapsing. As a result, between 1974 and 1983, per capita income declined by 34.9% (see Fig. 2).

1981-2001: When Lieutenant Jerry Rawlings came to power after two successive coups in 1979 and 1981, he also thought that the economic situation was due to mismanagement rather than to poor policies (Agyeman-Duah, 2008). In 1983, Ghanaians had the same level of per capita income as in 1939. By then, cocoa production had collapsed, the manufacturing sector was severely affected by cronyism, import restrictions and price controls, and infrastructure was in a dire state. Moreover, Ghana had just been hit by the worst drought in fifty years, it was suffering from hyperinflation, and the state was bankrupt. In addition, the repatriation of about 1 million Ghanaians from Nigeria further heightened economic, political and social pressures (Killick, 1978). Rawlings had no choice but to implement the Economic Recovery Program in 1983, a structural adjustment program under the guidance of the World Bank and the International Monetary Fund. The government initially reduced expenditure while creating incentives for the development of the private sector, such as abolishing price controls and import restrictions. From 1987 to 1989, state enterprises were privatized and the

Figure 5: Ghana's Government Expenditure (% GDP), 1960-2010.



Notes: This figure plots the share of total government expenditure in GDP. Total government expenditure can be separated into government consumption ("Recurrent Expenditure") and government investment ("Development Expenditure"). See Data Appendix for data sources.

Ghanaian cedi was further devalued. The economy slowly recovered (see Figures 2, 4 and 5) and Rawlings was democratically elected in 1992 and re-elected in 1996.

2001-2010: In 2001, Rawlings peacefully handed over power to his main opponent John Kufuor. The macroeconomic situation was still unstable but the economy rapidly took off, recording annual growth rates of 5-6% (see Fig. 2). This evolution was not coincidental as there was continuous improvement across all dimensions. Ghana is currently one of the most democratic countries in Africa. It is also the only country in which two peaceful political transitions have occurred, as challenger John Atta Mills won the presidential election in 2008. The business environment has become more favorable, captured by rising investment rates in both the public and private sectors (see Fig. 4). The value of cocoa and gold exports has boomed, and the manufacturing and service sectors have become more competitive and more productive. The issue now is whether this economic growth is sustainable. Is Ghana just benefitting from rising commodity prices or is the Ghanaian economy experiencing growth-enhancing structural change? It is all the more important that Ghana has started exporting oil to foreign countries. This

could either push economic growth even further (the GDP growth rate was 11.8% in 2011) or have a detrimental effect on long-term development due to the Dutch Disease and the institutional resource curse.

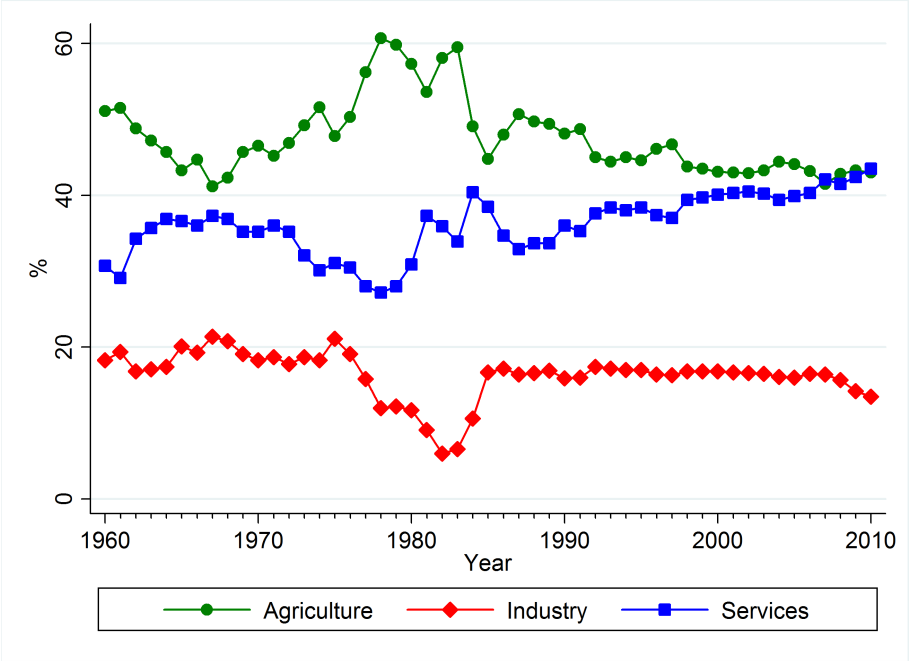
Turning points used in the analysis are the years 1957, 1966, 1974, 1983, 1992, 2001 and 2010. We have sectoral GDP data for most years between 1960 and 2010, but that is not the case for sectoral employment data. Although employment data is only available for 1960, 1970, 1984, 1992, 2000, 2006 and 2010, we believe that the periodicity of the data set captures relatively well the economic history of Ghana. The 1960-1970 period was characterized by ISI policies and income stagnation. The 1970-1984 period was marked by structural problems and economic decline. The Ghanaian economy slowly recovered in 1984-1992 and 1992-2000, after two structural adjustment programs were adopted in 1983 and 1987-1989. Lastly, the economy improved in 2000-2006 and boomed in 2006-2010.

2.2 The Sectoral Composition of Ghana's Economy

In 1960, agriculture still accounted for 51.1% of GDP and 61.8% of the labour force. Figure 6 shows the sectoral composition of GDP from 1960 to date, while Figure 7 plots the sectoral composition of employment for the same period. While Ghana experienced some structural change _ a decline in agricultural employment _ till 1966, the period from 1967 to 1984 saw a significant decline in economic activity and structural change in the wrong direction. The GDP share of agriculture increased to 60.7% in 1978, while both the industrial and service sectors collapsed. Interestingly, the service sector resumed its expansion in the late 1970s and early 1980s, while industrial output only returned to its pre-crisis level in 1986.

Before analyzing the specific evolution of each individual sector, we would like to make three comments. First, economic development and structural change are intertwined, as shown by the comparison of Figures 2 and 6. Periods of economic growth are associated with a decreasing agricultural share of GDP, whereas periods of economic stagnation or decline see a rise in the same share. Second, structural change in Ghana did not manifest itself in terms of less agriculture and more industry, but in less agriculture and more services. The GDP and employment shares of industry are almost the same in 2006 and 1960. This is interesting as Ghana's economic development seems to take place without industrialization, contrary to what occurred in South-East Asian countries or China today. Third, the employment share of agriculture decreased from 61.8% in 1960 to 54.3% in 2006 and 41.6% in 2010, while its GDP share decreased from 51.1% to 43.2% in 2006 and 43.0% in 2010. Basic calculations indicate that agricultural productivity was

Figure 6: Sectoral Composition of GDP (%), 1960-2010.

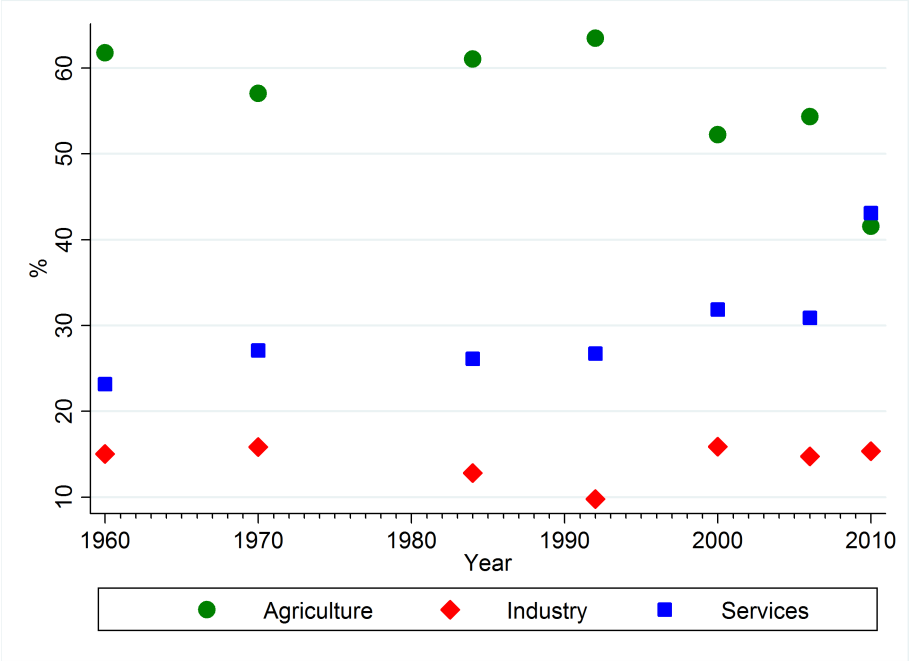


Notes: This figure plots the sectoral composition of GDP, using the three aggregate sectors "agriculture", "industry" and "services". See Data Appendix for data sources.

almost the same in 2006 and 1960, which confirms the lack of a green revolution during most of the period. Agricultural productivity strongly increased after 2006, yet this had no effect on the industrial sector.

Agriculture: The GDP and employment shares of agriculture have remained almost unchanged between 1960 and 2006, with the exception of the 1967-1984 period. During this period, the economy was contracting and the GDP and employment contributions of the industrial and service sectors were decreasing. What could account for this non-evolution? Agriculture consists of four sectors in Ghana: "agriculture, hunting and livestock", "cocoa", "forestry and logging" and "fishing". First, Figure 8 shows that the GDP share of "agriculture, hunting and livestock" _ more or less the food sector _ remained high (around 30%) throughout the period and even increased during the 1967-1984 period. Employment followed a parallel evolution, except in 2006-2010, when employment decreased relatively more in this sector than in the others. As a result, food productivity strongly increased in 2006-2010, after more than 50 years of stagnation. Why did food productivity remain low before 2006? Clearly, it was caused by the "food problem" which

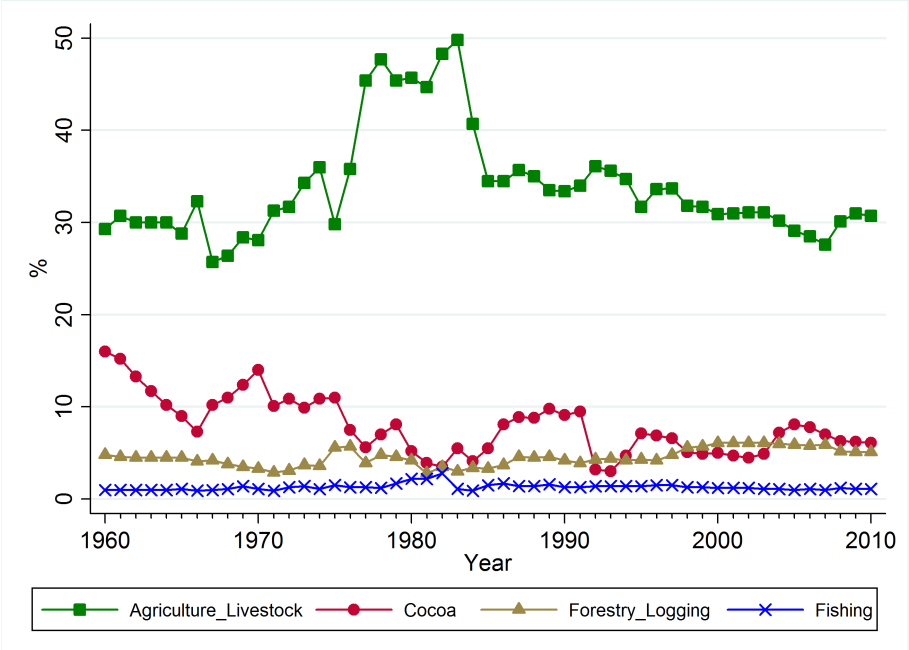
Figure 7: Sectoral Composition of Employment (%), 1960-2010.



Notes: This figure plots the sectoral composition of employment, using the three aggregate sectors "agriculture", "industry" and "services". Data is available for the following years = [1960, 1970, 1984, 1992, 2000, 2006, 2010]. See Data Appendix for data sources.

forced farmers to remain producers in the food sector. In 2000, Ghanaians derived 71.2% of their calorie intakes and 58.7% of their protein intakes from cereals and starchy roots (FAO, 2010). Yet cereal yields in Ghana were respectively 2.0 and 4.7 times lower than in Asia and the U.S. Yields were respectively 1.5 and 3.8 times lower if we consider starchy roots instead. These low yields can be partly explained by: (i) population pressure and a decrease in the land-labor ratio from 1.19 Ha per farmer in 1960 to 0.92 in 2006, (ii) a low adoption rate of modern agricultural inputs, e.g. Ghanaian farmers only used 2 kg of fertilizer per hectare as opposed to farmers in the rest of the world who used 94 kg per hectare in 2000 (World Resources Institute, 2007), and (iii) a low level of mechanization, e.g. there are only 4.9 tractors per 100 sq. km of arable land in Ghana against 120.7 in Asia and 256.8 in the U.S. in 2000 (World Bank, 2010). Why did food productivity increase after 2006? Interestingly, the GDP share of the food sector remained unchanged while the number of people working in this sector decreased, so Ghana had surplus labor in 2006. The economy had finally become "Lewisian". This performance was reflected by booming yields: while cereals and starchy roots yields remained unchanged between 1995 and 2005, they both increased by 27%

Figure 8: Sectoral Composition of GDP (%), Agriculture, 1960-2010.



Notes: This figure plots the sectoral composition of agricultural GDP, using four agricultural sectors. See Data Appendix for data sources.

between 2005 and 2010. Based on only a few years of data, it is difficult to assert whether this evolution did indeed reflect a new green revolution in Ghana. There are other reasons why productivity may have gone up, like, for example, the dramatic increase in world food prices after 2006.

Second, the cocoa sector started collapsing from the early 1960s, due to low producer prices after 1958, restrictive migratory policies after 1969 and frequent droughts in the early 1980s. This is all the more relevant as cocoa accounted for 48% of total exports on average during the 1960-2010 period. It should also be noted that sectoral GDP does not properly capture the economic weight of cocoa in Ghana's GDP as it is measured at producers' prices. The producer price of cocoa has always been fixed by the government _ and its Cocoa Marketing Board _ to protect farmers against fluctuant international prices. Yet since the producer price was always below the international price, this served as a taxation mechanism of the sector (Bates, 1981). Accounting for this measurement issue, cocoa accounted for 10.0% of GDP in 1960-2010 against a current 5.4%.[1] This is in accordance

[1]We estimate the true economic weight of the cocoa sector by recalculating the total added value of the sector if producers had been paid the export price at the main port (minus an estimate of average transportation costs) instead of the distortedly low producer price.

with an average taxation rate of about 46% in 1960-2010. While this could be an issue in measuring "real" productivity in the cocoa sector, we abstract from it in the rest of the analysis and use official data.

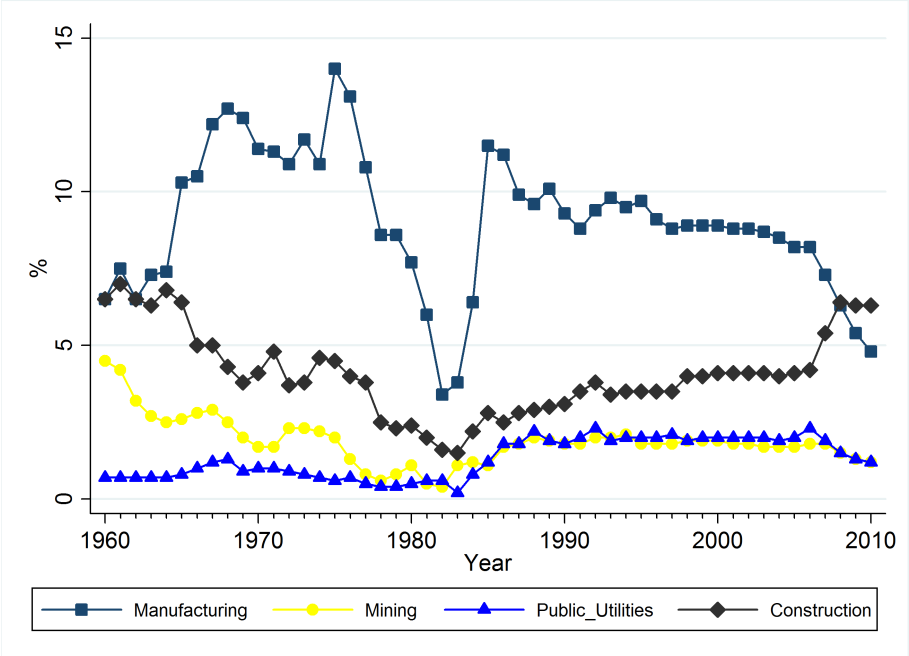
Third, the GDP and employment shares of the forestry and fishing sectors were the same in 2010 as in 1960. While the fishing sector contributes little to the economy, the forestry and logging sector has boomed after 1992. Both productivity and employment have relatively increased.[2]

Industry: It is worthy to note that the GDP and employment shares of industry have not changed much over the past 50 years, with the exception of the late 1970s and early 1980s when the sector was shrinking (see Fig. 6 and 7). In 2010, it accounted for 13.5% of GDP and around 10.8% of employment. Industry in Ghana consists of four sectors: "manufacturing", "public utilities" (water, gas and electricity), "mining and quarrying" (gold, bauxite, manganese and diamonds) and "construction". The Nkrumah government and the following governments all thought that industrialization is the only source for development. Massive public investments in the 1960s and 1970s led to a slight increase in the GDP and employment shares of manufacturing (see Figure 9). Productivity increased but this rise was not sustainable as it did not represent a structural change of the economy but reflected biased public policies. When per capita income declined after 1976, the whole manufacturing sector contracted and productivity dropped. It was only after the structural adjustment program in 1983 that manufacturing production was successfully resumed. Yet the fact that manufacturing productivity in 2010 was about the same as in 1970 confirms the lack of structural transformation in this subsector. Manufacturing exports have also remained very low due to high wages relative to productivity (Teal, 1999).

Construction tends to follow economic activity and two urban housing and infrastructure construction booms occurred in the early 1960s and the late 2000s. "Public utilities" and "mining" have not contributed much to industrial development. The mining sector collapsed in the 1960s and 1970s due to low investment levels and poor maintenance. Nevertheless, mining GDP may not capture the true economic weight of mining in Ghana's economy as it is measured at producers' prices, for the same reasons as for cocoa. Accounting for this measurement issue increases the share of mining in GDP from 2.4% to 6.3% in 1960-2010. Again, we abstract from this issue in the rest of the analysis. The contribution of the mining

[2]As shown in Jedwab (2011), the cocoa boom in the Western province has led to massive deforestation, with positive externalities on the logging sector. However, the boom will probably be short-lived, as the sector does not follow sustainable forestry practices. The forested surface of Ghana decreased from 2.1 million hectares in 1970 to 1.6 million in 2001.

Figure 9: Sectoral Composition of GDP (%), Industry, 1960-2010.



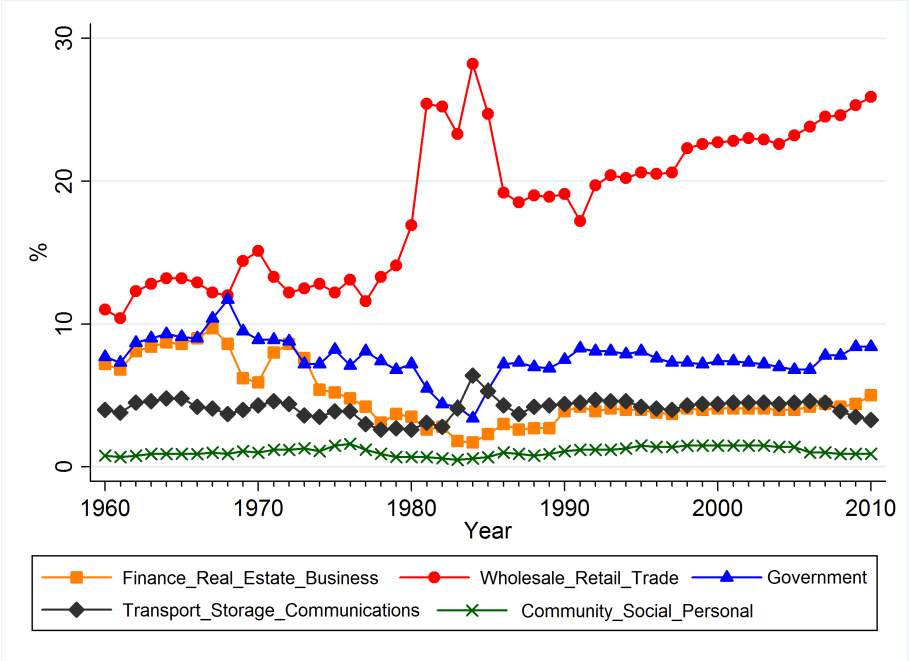
Notes: This figure plots the sectoral composition of industrial GDP, using four industrial sectors. See Data Appendix for data sources.

sector is likely to increase in the future as a result of oil exports. For example, it jumped to 8.5% of GDP in 2011 (6.8% considering oil only).

Services: Until the late 1970s, the expansion of the service sector was limited by the economic crisis in 1967-1983 (see Fig. 6 and 7). The GDP share of services is now around 43.5% against 30.7% in 1960. The employment share increased even more, from 23.2% in 1960 to 43.1% in 2010, and productivity decreased. Yet this evolution masks significant disparities across sectors. Services consist of five subsectors in Ghana: "wholesale and retail trade, hotels and restaurants", "government services", "finance, real estate and business services", "transport, storage and communications" and "community, social and personal services". Figure 10 plots the sectoral composition of service GDP from 1960 to date.

First, the GDP share of "wholesale and retail trade, hotels and restaurants" has been continuously increasing over time. The trade sector shrank relatively less than the other sectors during the economic crisis in 1978-1986, and its contribution to GDP mechanically (and temporarily) increased. It increased even further from the early 1980s, as a result of globalization (and an increasing dependence upon food and manufacturing imports) and tourism. The number of tourists steadily

Figure 10: Sectoral Composition of GDP (%), Services, 1960-2010.



Notes: This figure plots the sectoral composition of service GDP, using five service sectors. See Data Appendix for data sources.

grew after 1985, from less than 100,000 arrivals in 1985 to around 1 million in 2010. The share of service exports increased from 0.6% of GDP in 1985 to 10.3% in 2005, with most of this evolution being driven by tourism. This share has since decreased to around 5.0% as other sectors have boomed even more.

Second, "government services" have remained relatively stable over the past 50 years. They accounted for 7.7% of GDP in 1960 and 8.3% in 2010. This sector is clearly procyclical, and shrank as a result of the economic crisis. The evolution of the "finance, real estate and business services" subsector was relatively more important in the 1960s, when government banks played a significant role in the economy. Lastly, "transport, storage and communications" and "community, social and personal services" contribute little to GDP. Additional data indicates that there has been a mini-boom in the "communications" sector, probably as a result of the new technologies of information and communication. Yet the GDP share of communications remains quite low, at 0.8% of GDP in 2010.

3 Methodology and Main Results

The following analysis replicates and extends the analysis of McMillan and Rodrik (2011) to the 1960-2010 period for Ghana. First, per capita GDP ($PCGDP$) is a function of the *activity rate* _ the employed population L divided by the total population of the country N _ and *labor productivity* _ gross domestic product GDP divided by the employed population L:[3]

$$PCGDPt = Lt/Nt \times GDPt/Lt = Lt/Nt \times Pt \tag{1}$$

In the case of Ghana, per capita GDP increased from $955.5 in 1960 to $1350.9 in 2010. The activity rate hovered around 40% throughout the period, meaning that there were two workers for every three non-workers. The evolution of per capita GDP was thus driven by changes in labor productivity growth. According to McMillan and Rodrik (2011): "It can be achieved in one of two ways. First, productivity can grow within existing economic activities through capital accumulation or technological change. Second, labor can move from low-productivity to high-productivity activities, increasing overall labor productivity in the economy. This can be expressed using the following decomposition:

$$\delta P_t = P_t - P_{t-1} = \sum_j \theta_{j,t-1} * (P_{j,t} - P_{j,t-1}) + \sum_j (\theta_{j,t} - \theta_{j,t-1}) * Pj,t \tag{2}$$

where P_t and $P_{j,t}$ refer to economy-wide and sectoral labor productivity levels (for sector j), respectively, and $\theta_{j,t}$ is the share of employment in sector j. 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. We call this the "within" component of productivity growth. The second term captures the productivity effect of labor re-allocations across different sectors. It is essentially the inner product of productivity levels (at the end of the time period) with the change in employment shares across sectors. When changes in employment shares are positively correlated with productivity levels, this term will be positive and structural change will increase economy-wide productivity growth. We will call this second term the "structural change" term." Four questions arise here: (i) Is labor productivity increasing or decreasing?, (ii) What are the respective contributions of the within and structural change components? (iii) Which sectors are driving the results? and (iv) Are results

[3]Broadly defined, the *activity rate* is the share of the population that constitutes labor supply. The labor force consists of all residents who are working or looking for a job. We adopt a more narrow definition and only consider residents who are working.

driven by the number of sectors? If sector s consists of two subsectors s_1 and s_2, a productivity change in sector s is due to its within term and its structural change term. Yet the contribution of the latter term is not estimated if sectoral data is aggregated. As a result, the estimate of the structural change term for the economy as a whole could depend on how disaggregated the sectoral data is.

3.1 Analysis on 9 Sectors: Main Results

We use the same 9 sectors as in Timmer and Vries (2007) and McMillan and Rodrik (2011). We have collected GDP and employment data for the following years: 1960, 1970, 1984, 1992, 2000, 2006 and 2010. As argued in Section 2.1, the periodicity of the data allows capturing the main turning points of Ghana's economic history. Table 1 displays labor productivity for each sector and the economy as a whole in 2005-06. We choose 2005-06 to compare our estimates for Ghana with other countries studied by McMillan and Rodrik (2011). First, economy-wide labor productivity is 9.7 times lower than in the rest of the world. Second, labor productivity in Ghana is always relatively lower, whichever sector is considered. Third, the Ghanaian ranking of sectors in terms of labor productivity is relatively similar to what can be found elsewhere. Interestingly, the mining sector is not as productive in Ghana as it is in the rest of the world. However, we believe that the difference stems from the fact that some countries export oil and gas, which are very profitable capital-intensive economic activities. Ghana exports not only gold, but also small quantities of manganese, bauxite and diamonds. Producer prices have also been manipulated so that the true contribution of mining is not well captured. Ghanaian manufacturing is much less productive than in the rest of the world, which could be explained across sectors by limited human capital, mismanagement, etc. It could also be due to a composition effect, if more unproductive manufacturing subsectors are relatively more represented within the manufacturing sector, e.g., clothing, furniture and processed foods. Lastly, agricultural labor productivity is 7.8 times relatively lower in Ghana (see Section 2.2).

Appendix Figures A.1-A.7 show the correlation between sectoral productivity and the change in employment shares for various periods. Appendix Figure A.1 reproduces the figure for 1990-2005 Ghana in McMillan and Rodrik (2011), while Appendix Figures A.2-A.7 display these correlations for the following periods: 1960-1970 (whose average annual growth rate is 0.83%), 1970-1984 (-3.83%), 1984-1992 (1.26%), 1992-2000 (1.38%), 2000-2006 (4.50%) and 2006-2010 (1.82%). There is structural change in the right direction when this correlation is positive, and structural change in the wrong direction when this correlation is negative. Except between 1992 and 2000, there has been no structural change or structural

Table 1: Sectoral Labor Productivity in 2005-06 (2000 PPP $US), 9 Sectors.

	McMillan and Rodrik 2011			**Case Study on Ghana**		
Sector:	Ranking (2005)	World Av. Labor Productivity (2005)	World Min. Labor Productivity (2005)	Ranking (2005-06)	Labor Productivity (2005-06)	Ratio Labor Prod. World/ Ghana
Mining and Quarrying (min)	1	154,658	3,652	5	4,309	35.9
Public Utilities (pu)	2	146,218	6,345	1	16,980	8.6
Finance, Insurance, Real Estate & Business Services (fire)	3	62,184	9,301	2	9,919	6.3
Transport, Storage and Communications (tsc)	4	46,421	6,671	4	4,360	10.6
Manufacturing (man)	5	38,503	2,401	9	1,980	19.4
Construction (con)	6	24,462	2,124	3	6,912	3.5
Wholesale and Retail Trade, Hotels and Restaurants (wrt)	7	22,635	1,507	6	3,780	6.0
Community, Social, Personal and Government Services (cspgs)	8	20,534	264	7	2,685	7.6
Agriculture, Hunting, Forestry and Fishing (agr)	9	17,530	521	8	2,254	7.8
Economy-wide		27,746	1,354		2,851	9.7

Notes: This table displays sector labor productivity (in 2000 PPP $US) using a decomposition of 9 sectors as in McMillan and Rodrik 2011. See Data Appendix for data sources.

change in the wrong direction, as employment has increased in relatively less productive sectors. These results are in line with McMillan and Rodrik (2011) who argue that structural change has usually been growth-reducing in Africa. Contrary to Appendix Figure A.1, we show that growth-enhancing structural change only happened between 1992 and 2000, as a result of a significant decline in agricultural employment. Nevertheless, these changes may not necessarily lower economy-wide labor productivity if they are more than offset by within-sector productivity growth. This is what we examine now.

We use the decomposition of equation (2) to estimate the respective contributions of the within and structural components of labor productivity growth. Table 2 displays the results for the six periods of study. Following the classification of Timmer and Vries (2007), 1960-1970, 1984-1992, 1992-2000 and 2000-2006 have been periods of "moderate growth", while there have been "growth decelerations" in 1970-1984 and "growth accelerations" in 2000-2006.

Table 2: Decomposition of Productivity Growth, 9 Sectors, Ghana 1960-2010.

Period:	**Labor Productivity**		**Component due to:**	
	at starting year	growth (annual, %)	within	structural
1960-1970	2622.4	0.83	0.87	-0.04
1970-1984	2849.7	-3.83	-3.78	-0.04
1984-1992	1650.6	2.54	2.82	-0.28
1992-2000	2017	1.03	0.32	0.71
2000-2006	2189.8	4.50	5.12	-0.62
2006-2010	2851.1	2.74	2.36	0.37

Notes: This table displays labor productivity at starting year (in 2000 PPP $US) and the decomposition of annual productivity growth (%) into its "within" and "structural change" components. See Data Appendix for data sources.

First, in all periods but 1992-2000 and 2006-2010, the structural component was negative and barely contributed to the change in labor productivity. For example, "Agriculture", "Manufacturing" and "Community, Social, Personal and Government Services" were the three least productive sectors in 2006. For the structural component to be positive, we need people to move from these sectors to higher-productivity sectors. Regarding agriculture, the employment share decreased in 1992-2000, while agricultural productivity only slightly increased. This explains why the structural component became positive. In 2006-2010, the employment share of agriculture further decreased, but agricultural productivity strongly increased and the employment reduction had no effect on overall productivity. This would have been different had the agricultural sector remained very unproductive. As shown by Gollin, Parente and Rogerson (2002), any increase in food productivity decreases agricultural employment if the income elasticity of demand for

food is less than one. We should not expect any major growth-enhancing effect of structural change then, at least in the short term. Regarding manufacturing, productivity has always been relatively small, except in 1970, after years of major public investments. Employment slightly decreased with the economic crisis in 1984 and 1992. Similarly, the employment share of "Community, Social, Personal and Government Services" faintly decreased during that period. Yet this could hide the fact that the employment share of government services decreased while the employment share of community, social and personal services increased.

Second, within-sector productivity collapsed between 1970 and 1984, and this was true across all sectors. Some sectors such as manufacturing (in which productivity dropped by almost 60%) might have been more severely hit by this evolution. Yet the fact that the decline was widespread indicates the importance of national rather than sectoral factors. The fact that within-sector productivity boomed in 2000-2006 and that all sectors were symmetrically concerned reinforces this idea. In the end, the two periods of "growth deceleration" and "growth acceleration" have been the product of the within component. We now investigate how using more disaggregated sectoral data affects the results.

3.2 Analysis on 15 Sectors

We have been able to collect GDP and employment data for 15 sectors for the same years as before. These are the same sectors as the ones described in Section 2.2. These sectors are also listed in Appendix Table A.1.[4] We use the same decomposition of equation (2) to estimate the respective contributions of the within and structural components of labor productivity growth. Table 3 displays the results for the six periods of study. We also report the estimate of the structural change component when using 9 sectors only (as in Table 2).

The estimates of the structural change component are modified upward in 1992-2000 and 2006-2010 when using 15 sectors. This means there was some growth-enhancing reallocation within the 9 sectors that we had previously not accounted for. We look at individual sectors in order to identify which subsectors drove these results. For each sector which can be decomposed in the period of 1992-2000, we compare the total structural terms when the sector is not decomposed and when it is decomposed into several subsectors.[5] The structural term strongly increases

[4] "Public Utilities", "Hotels and Restaurants" and "Forestry and Logging" were the three most productive sectors in 2005-06. The three least productive sectors were "Community, Social and Personal Services", "Agriculture (Other than Cocoa)" and "Manufacturing". "Community, Social and Personal Services" is a refuge sector for the poor, while "Manufacturing" is mostly labor-intensive and unproductive in Ghana, as discussed below in Section 3.3.

[5] The total contribution (within + structural change) of each sector (N = 9) does not change

Table 3: Decomposition of Productivity Growth, 15 Sectors, Ghana 1960-2010.

Period:	**Labor Productivity**		**Component due to:**		
	at starting year	growth (annual, %)	within	structural	structural (9 sectors)
1960-1970	2622.4	0.83	0.88	-0.05	-0.04
1970-1984	2849.7	-3.83	-3.72	-0.10	-0.04
1984-1992	1650.6	2.54	3.56	-1.02	-0.28
1992-2000	2017	1.03	-1.00	2.03	0.71
2000-2006	2189.8	4.50	5.08	-0.58	-0.62
2006-2010	2851.1	2.74	1.56	1.17	0.37

Notes: This table displays labor productivity at starting year (in 2000 PPP $US) and the decomposition of annual productivity growth (%) into its "within" and "structural change" components. See Data Appendix for data sources.

for "Wholesale and Retail Trade, Hotels and Restaurants" when we decompose it into "Wholesale and Retail Trade" and "Hotels and Restaurants". The structural change term for the trade sector is almost nil while the one for "Hotels and Restaurants" is very high. This means that the employment share increased in this more productive sector in 1992-2000. This boom was clearly driven by tourism, as explained in Section 2.2. The second sector for which we observe a significant rise in the structural change component is agriculture, with most of the change stemming from the forestry sector (see Section 2.2). The third sector for which there is a noticeable change is "Community, Social, Personal and Government Services". The Government sector was much more productive than the "Community, Social and Personal Services" sector, and its employment share rose after 1992. It seems that the two SAPs Ghana adopted in 1983 and 1987-1989 paid off making the government sector more productive over time. Repeating the same exercise for the period 2006-2010, we find that most of the change in the aggregate structural term was due to tourism, whose employment share kept growing. It was the second most productive sector in 2006 and it now accounts for 5.5% of employment.

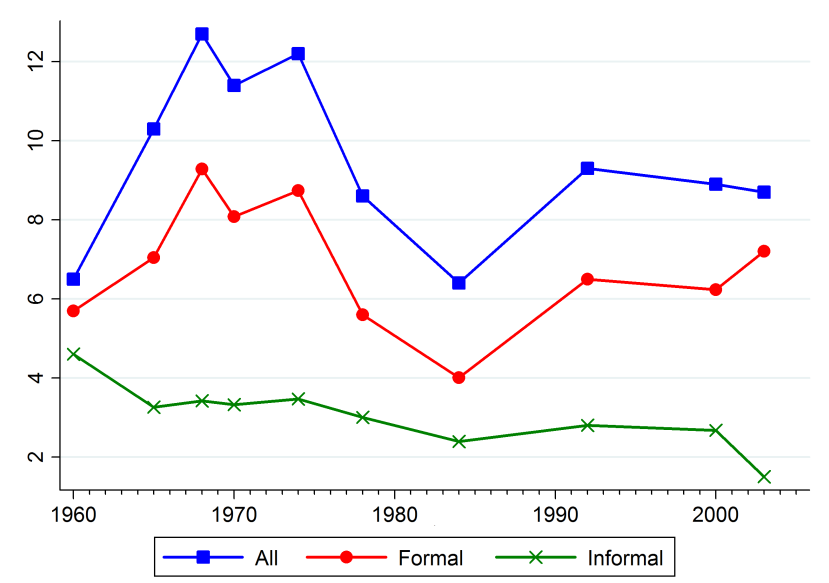
3.3 Analysis on Manufacturing Subsectors

The poor performance of the manufacturing sector in Ghana, and more generally in Africa, leads us to devote one section to this specific sector. We use data from various sources to recreate total GDP and employment for formal and informal

when using more subsectors (N = 15), whereas the respective contributions of the within and structural change components vary if there is some growth-enhancing or growth-reducing structural change *within* the sector *across* subsectors.

manufacturing sectors in 1960, 1970, 1984, 1992 and 2000. Appendix Table A.1 lists all the manufacturing subsectors.[6] The formal manufacturing sector includes all paid employees of large-scale manufacturing firms ($\succeq$ 30 employees). The informal manufacturing sector includes all persons engaged in small and medium scale manufacturing firms (0-29 employees). Table 4 indicates that manufacturing productivity is much higher in the formal sector, e.g. it is 22.7 times higher in 2000. The GDP contribution of the formal sector has increased over time, but it decreased in 1984 with the economic crisis. The employment share of the formal sector remained the same between 1960 and 2000, but the share increased in 1970-1992, due to the two SAPs. Clearly, development is associated with a formalization of manufacturing, and average productivity is driven downward by an unproductive but labor-abundant informal sector. This is confirmed by Figure 11, which shows that the GDP contribution of manufacturing is intrinsically related to the GDP contribution of its formal sector. Productivity in the formal manufacturing sector was \$13,260 in 2000, compared to \$38,503 on average for the whole sector in 2005 in McMillan and Rodrik (2011).

Figure 11: GDP Share of Manufacturing (%), Formal vs. Informal, 1960-2003.



Notes: This figure plots the GDP contributions of manufacturing, formal manufacturing and informal manufacturing for the following years = [1960, 1965, 1968, 1970, 1974, 1978, 1984, 1992, 2000, 2003]. See Data Appendix for data sources.

[6] "Tobacco", "Petroleum" and "Beverages" were the three most productive formal manufacturing subsectors in 2000. The three least productive subsectors were "Wood", "Transport Equipment" and "Footwear".

Table 4: GDP, Employment and Productivity in Manufacturing, 1960-2000.

	Share Mfg. GDP		**Share Mfg. Empl.**		**Labor Productivity**		
Year	Formal (%)	Informal (%)	Formal (%)	Informal (%)	All	Formal	Informal
1960	55.3	44.7	9.3	90.7	1,966	11,754	968
1970	70.8	29.2	13.3	86.7	2,740	14,624	921
1984	62.7	37.3	9.5	90.5	1,103	7,290	455
1992	69.9	30.1	5.9	94.1	2,366	27,909	757
2000	70.0	30.0	9.3	90.7	1,766	13,260	584

Notes: This table displays the distribution of manufacturing GDP and employment (%), and sectoral labor productivity (in 2000 PPP $US) for the formal and informal manufacturing sectors. The formal manufacturing sector includes all paid employees of large-scale manufacturing firms ($\succeq$ 30 employees). The informal manufacturing sector includes all persons engaged in small and medium scale manufacturing firms (0-29 employees). See Data Appendix for data sources.

Unfortunately, we have no panel data on both formal and informal GDP and employment for all manufacturing subsectors. But we have panel data on formal GDP and formal employment for 20 manufacturing subsectors in 1960, 1970, 1984 and 2000. We can test model (2) for formal manufacturing sectors only. In other words, we want to know if the changes in formal manufacturing productivity were mostly driven by the within component or the structural change component. As for the main analysis on 9 or 15 sectors (see Sections 3.1 and 3.2), we find that the within component has a much stronger impact on changes in productivity. The within term was positive in 1960-1970. The strongest changes are observed in food, beverages and tobacco, paper/paper products, printing/publishing, metal products/machinery and transport equipment. These evolutions can be attributed to massive public investments, as Nkrumah thought Ghana should industrialize by transforming raw materials: e.g., cocoa into chocolate, sugar cane into sugar, wood into paper, iron into machinery, etc. The within term was negative in 1970-1984, as all sectors were strongly affected by the economic crisis. These negative effects were reverted in 1984-2000, with economic and political recovery. The structural term was negative in 1984-2000. Three sectors drove this result, beverages, tobacco and textiles. The employment share of the three sectors decreased, although productivity was either high or increasing. Per capita consumption of tobacco continuously decreased after 1978, leading to a total collapse of the industry. There was "rationalization" in beverages and textiles, which both reduced employment and increased productivity.

The issue with the previous analysis is that we do not capture what is happening within the informal manufacturing sector, which significantly accounts for 90.7%

Table 5: Decomposition of Productivity Growth, Formal Manufacturing 1960-2000

Period:	**Labor Productivity** at starting year	growth (annual, %)	**Component due to:** within	structural
1960-1970	11754	2.2	2.3	-0.1
1970-1984	14624	-4.9	-5.7	0.8
1984-2000	7290	3.8	5.5	-1.7

Notes: This table displays labor productivity at starting year (in 2000 PPP $US) and the decomposition of annual productivity growth (%) into its "within" and "structural change" components, using panel data for 20 formal manufacturing subsectors. See Data Appendix for data sources.

of total manufacturing employment in 2000. Although we do not have panel data on GDP for informal manufacturing sectors, we have panel data on employment for 40 (20 times 2) formal and informal sectors in 1960-2000. Appendix Table A.2 shows their formalization rate in 2000, i.e. the subsectoral employment share of the formal sector.[7] 10 out of 40 formal and informal sectors accounted for 84% of manufacturing employment in 2000 (83% in 1960). Looking at individual sectors, the informal clothing and furniture sectors altogether accounted for 43% of total manufacturing employment in 1960, 20% in 1984 and 37% in 2000. In contrast, the informal food and beverages sectors altogether accounted for 18% in 1960, 50% in 1984 and 13% in 2000. As people became poorer, they restricted their consumption to foodstuffs and slashed their consumption of non-essential consumption goods. We also observe significant changes for the informal wood sector, which had been booming as a result of legal and illegal logging in the Western province of Ghana.

4 Extensions: Space, Informality, Public Policies and Structural Change

In this section we address questions on several dimensions of structural change. First, what is the geography of structural change? Are there areas within countries that are experiencing structural transformation while others are left behind? Second, is structural change concomitant to a formalization of employment? Is informality a stepping stone to formality or is it an employer of last resort? Lastly, what is the impact of government policies on structural change?

[7] "Basic Metal Industries", "Petroleum" and "Rubber" were the three most formalized manufacturing subsectors in 2000. The three least formalized subsectors were "Furniture and Fixtures", "Footwear" and "Clothing".

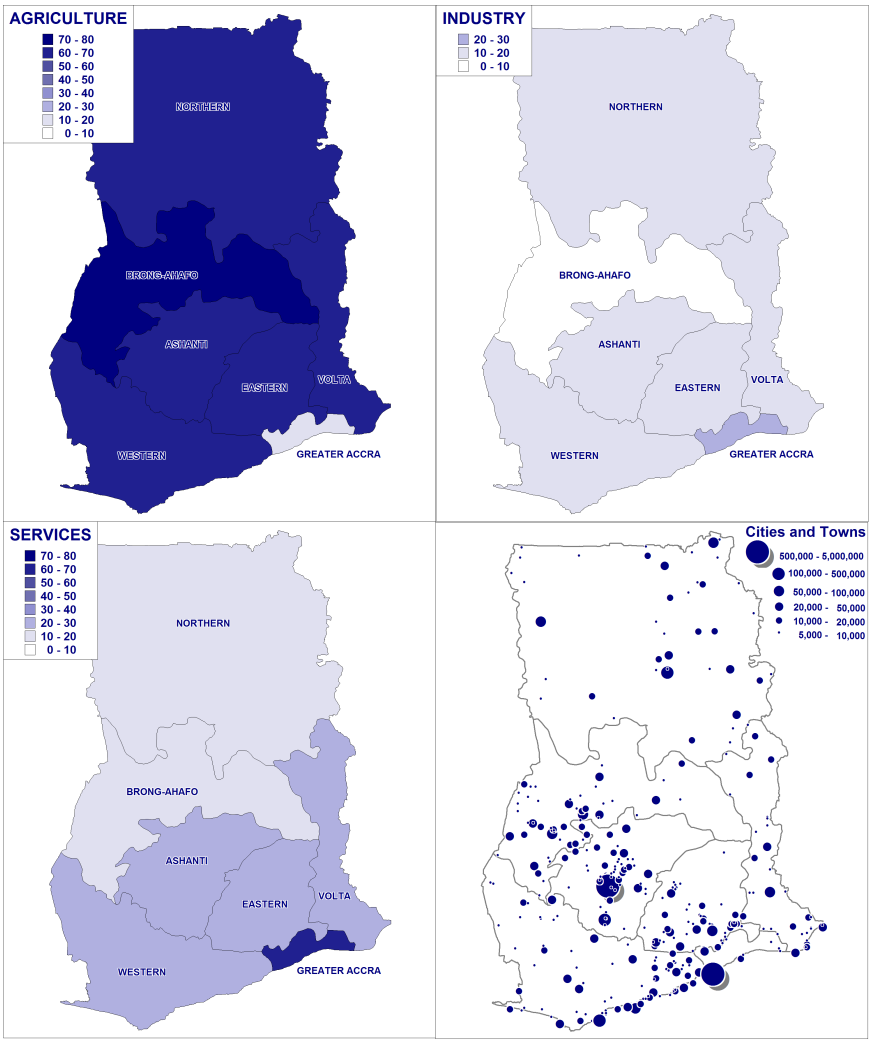
4.1 The Geography of Structural Change: South vs. North

While sectoral GDP data at the province level is not available, we were able to gather employment data for 9 sectors and 7 provinces in 1960, 1970, 1984, 2000 and 2010. The number of provinces increased over time, from 7 in 1960 to 10 in 2010. Therefore we use province boundaries in 1960. Figure 12 shows the employment share of agriculture, industry and services for each province in 2000, the latest year for which we have census data. We distinguish three groups in terms of sectoral composition: (i) Greater Accra, where most people work in industry and services (88%), (ii) the Southern provinces (Western, Eastern, Ashanti and Volta), where the sectoral allocation of employment is balanced between agriculture (55%) and industry-services (45%), and (iii) the Northern provinces (Brong-Ahafo and Northern), where employment was still mostly agricultural in 2000 (72%). These geographical patterns reflect the urbanization patterns of Ghana. Greater Accra contains the capital city Accra, while the South contains Kumasi, the capital of the hinterland, and many medium-sized cities and small towns (see Fig. 12).

Table 6 summarizes the employment shares of agriculture, industry and services from 1960 to 2010. In 1960, there was a clear spatial pattern of sectoral specialization, with agricultural employment representing 12.6% in Greater Accra, 60.0% in the South and 83.8% in the North. In 1970, this share did not change much in Accra and the South, but some convergence happened in the North. In 1970-1984, the employment share of industrial sectors decreased while the employment share of agriculture increased. The North kept converging despite the economic crisis. Between 1984 and 2000, some structural change occurred in the South, while shares remained constant in the North. In 2000-2010, there was no further divergence between the South and the North, but this was mainly due to services. Figure 13 plots the employment share of agriculture for each group of provinces in 1960-2010. Provinces diverged, except in 1970-84.

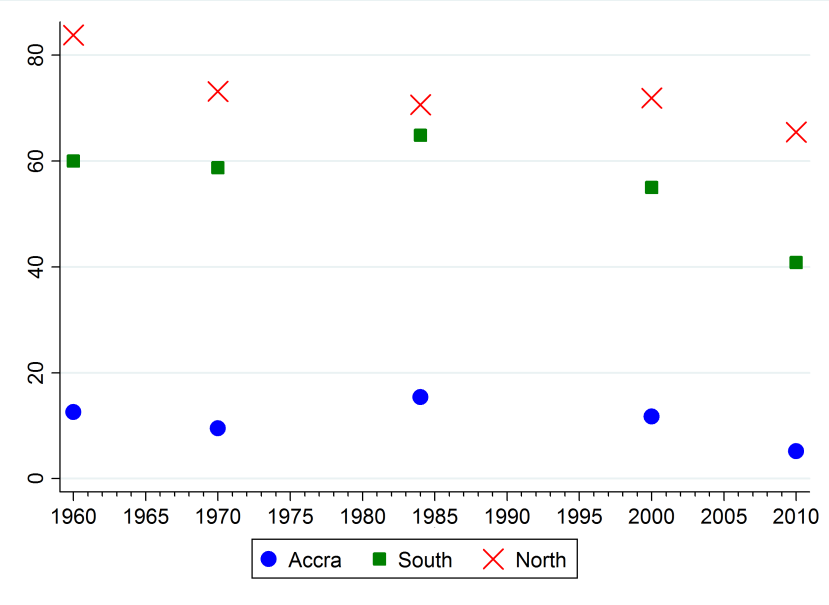
The fact that provinces were "unequal" in 1960 in terms of sectoral composition is in line with the Kuznets inverse-U hypothesis which stipulates that development is initially associated with increasing spatial inequality Kuznets 1973. When the economy declined in 1967-1983, there was provincial convergence, as structural change was going in the right direction in the North and in the wrong direction in the South and Greater Accra. When economic growth resumed after 1984, spatial inequality widened as the South and Greater Accra were experiencing some growth-enhancing structural change. To conclude, periods of economic growth have been mostly associated with rising spatial disparities, while periods of economic stagnation or economic decline have seen provincial convergence. These patterns have also been verified for other countries (Kanbur and Venables, 2005).

Figure 12: Provincial Sectoral Composition and Urbanization, 2000.



Notes: This set of maps shows the sectoral composition of each province in 2000 (N = 7), using the three aggregate sectors "agriculture", "industry" and "services". The last subfigure shows cities in 2000, i.e. settlements with more 5,000 inhabitants. See Data Appendix for data sources.

Figure 13: Employment Share of Agriculture (%) by Group of Provinces.



Notes: This figure displays the employment share of agriculture (%) for each group of provinces in 1960, 1970, 1984, 2000 and 2010. See Data Appendix for data sources.

Table 6: Sectoral Composition of Employment (%) by Group of Provinces.

Agriculture	**1960**	**1970**	**1984**	**2000**	**2010**
Gr. Accra	12.6	9.5	15.4	11.7	5.2
South	60.0	58.7	64.8	55.0	40.8
North	83.8	73.2	70.6	71.9	65.5
Industry	**1960**	**1970**	**1984**	**2000**	**2010**
Gr. Accra	27.3	29.6	23.5	25.5	21.6
South	16.3	15.6	11.4	15.6	16.2
North	7.0	10.6	11.7	10.4	10.7
Services	**1960**	**1970**	**1984**	**2000**	**2010**
Gr. Accra	60.1	60.9	61.0	62.8	73.1
South	23.7	25.7	23.8	29.4	42.9
North	9.2	16.2	17.7	17.6	23.9

Notes: This table shows the sectoral composition of employment (%) for each group of provinces. Southern provinces include Western, Eastern, Volta and Ashanti. Northern provinces include Brong-Ahafo and Northern. See Data Appendix for data sources.

4.2 The Informalization of Employment in Ghana?

Most African countries implemented structural adjustment programs in the 1980s and, as a consequence, experienced positive economic growth in the 1990s and

2000s. Surprisingly, these economies witnessed a rise in informal or small-scale employment, while it would be expected that a better business environment, and less policy distortions, would lead to formalization (see Kingdon, Sandefur and Teal 2006 for a survey of recent trends in several Sub-Saharan African countries). In the case of Ghana, Sandefur (2010) documents how the proportion of employment in small firms (fewer than 30 employees) increased from 33% in 1987 to 52% in 2003, and this change was driven by massive new entry of small firms. What are the potential welfare consequences of this evolution? Gollin (1995) uses a structural model of the Ghanaian economy to show that this could be due to distortionary taxes that disfavor large firms. However, his results suggest that a uniform rate of taxation would not dramatically improve overall productivity as large firms are not necessarily more productive than small firms.

Two criteria are used to distinguish formal and informal employment. First, formal employment includes recorded employees of the public and private sectors, while informal employment consists of unrecorded employees, self-employed people, employers and unpaid family workers. This is the approach favored by Gollin (1995). Second, the literature has privileged a size criterion. In the case of Ghana, data often distinguishes small-scale employment (in establishments with fewer than 30 employees) and large-scale employment (in establishments with more than 30 employees). Given it is much more difficult to "hide" large-scale establishments to government authorities, this threshold is likely to capture the difference between formal and informal employments. Yet there are many "formal" establishments with fewer than 30 people, and their employees are mistakenly defined as belonging to the informal sector. This is the approach favored by Sandefur (2010), and it is the one which we have adhered to in order to study formal and informal manufacturing sectors in Section 3.3. Unfortunately, since we have no panel data on employment in large-scale establishments for the non-manufacturing sectors, we use the first approach in the rest of the analysis.

Table 7 reports trends in informal employment from 1960 to 2006. Formal employment includes all wage and salary earners in formally registered establishments. First, in 2006, formal employment accounted for only 9.5% of total employment (see Panel A of Table 7). This is actually even less than in 1960, when the share of formal employment was 13%. Formal employment in the public sector accounted for more than half of it. This indicates how small the formal private sector is. Second, the share of formal employment decreased to 2.9% between 1984 and 1992 (see Panel A), as a result of the 1983 and 1988 structural adjustment programmes. Between 1992 and 2000-2006, the share of formal employment considerably increased from 2.9% to around 10%. This result goes against the current belief that there is rising informality in Ghana. Third, Panel B of Table 7 shows that the

Table 7: Trends in Informal Employment, 1960-2006.

PANEL A	**1960**	**1970**	**1984**	**1992**	**2000**	**2006**
Employment - Formal	13.0	12.4	8.3	2.9	10.9	9.5
Employment - Informal	87.0	87.6	91.7	97.1	89.1	90.5
Employment - Formal, Public Sector	7.2	8.7	7.1	2.1	6.6	5.6
Employment - Formal, Private Sector	5.8	3.7	1.2	0.8	4.3	3.9
PANEL B	**1960**	**1970**	**1984**	**1992**	**2000**	**2006**
Employment in Agriculture - Formal	3.5	2.8	1.7	0.5	2.2	1.2
Employment in Industry - Formal	38.0	27.3	15	4.7	13.7	12.4
Employment in Services - Formal	32.6	23.9	20.5	5.7	23.7	22.9
Employment in Agriculture - Formal, Public	2.8	2.5	1.5	0.4	1.4	0.5
Employment in Agriculture - Formal, Private	0.8	0.4	0.2	0	0.9	0.8
Employment in Industry - Formal, Public	13.1	14.6	9.8	2.7	6.3	2.7
Employment in Industry - Formal, Private	24.8	12.7	5.2	2.1	7.5	9.7
Employment in Services - Formal, Public	15.2	18.4	19	5.4	16.8	16.1
Employment in Services - Formal, Private	17.5	5.6	1.5	0.2	6.9	6.8

Notes: This table shows trends in informal employment in 1960-2006. Formal employment includes recorded employees of the public and private sectors, while informal employment consists of unrecorded employees, self-employed people, employers and unpaid family workers.. See Data Appendix for data sources.

industrial and service sectors were more severely hit by the economic crisis and the structural adjustment programmes. For example, formal service employees in the private sector only represented 0.2% of total employment in services in 1992. Appendix Table A.3 reports the formalization rates for each of the 9 main sectors. The numbers show a wide variation of 52.6% in "Community, Social, Personal and Government Services" to 2.2% in "Agriculture, Hunting, Forestry and Fishing". We then decompose the aggregate evolution of the formalization rate between its "within" component _ when sectors become more informal _ and its "structural" component _ when labor moves from more formal to less formal sectors _ as follows:

$$\triangle F_t = F_t - F_{t-1} = \Sigma_j E_{j,t} * (f_{j,t} - f_{j,t-1}) + \Sigma_j (E_{j,t} - E_{j,t-1}) * f_{j,t-1} \qquad (3)$$

where f_t and $f_{j,t}$ refer to economy-wide and sectoral formalization rates (for sector j), respectively, and $E_{j,t}$ is the share of employment in sector j. Results are reported in Table 8. First, the within component of formalization is far more important than its structural component. This suggests that national factors, and not sectoral factors, account for the evolution of the aggregate formalization rate. When the formalization rate collapsed after 1984, the contribution of the structural component was almost nil. It means that the formalization rate did not increase because people were moving to more informal sectors (i.e., informal sectors are employers of last resort) but because each sector was becoming more informal.

However, in 1970-1984 there were significant changes within the informal manufacturing sector, as people were moving from the informal clothing and furniture sectors into the informal food and beverages sectors (see Section 3.3). Second, except for the period 1984-1992 which was affected by the 1983 and 1988 structural adjustment programmes, the contribution of the within component was always negative. This confirms that most sectors experienced a decrease in their formalization rate. Yet this effect was almost nil in 2000-2006. Third, the structural component of formalization was positive in 1960-1970, when public employment increased, as is the case in 1992-2000, when the economy was restructured.

Table 8: Decomposition of Formal Employment Growth, Ghana 1960-2006

Period:	**Share of Formal Employment** at starting year (%)	growth (annual, %)	**Component due to:** within	structural
1960-1970	15.5	-2.2	-4.3	2.2
1970-1984	12.4	-2.8	-1.7	-1.1
1984-1992	8.3	-12.3	-12.4	0.0
1992-2000	2.9	18.0	15.1	2.9
2000-2006	10.9	-2.2	-0.6	-1.6

Notes: This table displays the share of formal employment in total employment at starting year (%) and the decomposition of the growth of this share (%) into its "within" and "structural change" components. See Data Appendix for data sources.

4.3 The Role of Government Policies in Structural Change

The goal of this section is to discuss how government policies played a role in promoting or inhibiting structural change in post-independence Ghana. When it first claimed its independence, Ghana's regime was democratic, it was one of the wealthiest African countries, and a large surplus from the cocoa sector allowed for the financing of the development of other sectors. Yet per capita income and labor productivity did not increase much between 1960 and 2010. In this regard, Ghana did not fare better than other African countries. The economic crisis in 1970-1984 decreased both productivity and the formalization rate for all sectors. Economic recovery in 1984-2000 helped recover the "losses" of the previous period, while significant gains were recorded in 2000-2010. For the first time in the history of Ghana, the agricultural sector employs less than half of the workforce. But Ghana is still twice poorer than India and four times poorer than China.

The results of Tables 2, 3 and 5 suggest that the contribution of the structural term remained small throughout the period and that changes in overall produc-

tivity were mostly driven by changes within sectors. The fact that all sectors were affected by the economic crisis and were then able to recover through economic growth, confirms that poor economy-wide policies _ and not necessarily poor sectoral policies _ constrained economic development. If the structural term had been much stronger, this would have meant that economic development was driven by a few sectors only and that more efficient sectoral policies were needed. For example, the structural change literature has shown how an industrial revolution _ a rise in manufacturing productivity _ could produce growth-enhancing structural change. As labor moves from a low-productivity agricultural sector to a high-productivity manufacturing sector, overall labor productivity increases. This is what happened in China, with the development of manufacturing exports. This is also what happened in India, with the development of service exports (e.g., in the information and communications technology sector). The fact that labor productivity is relatively lower across all sectors _ and not just in the traditional agricultural sector _ in Ghana compared to the rest of the world indicates that there is no economic dualism (see Table 1). Ghanaian manufacturing is 19.4 times less productive than in the rest of the world, while Ghanaian agriculture is only 7.7 times less productive!

According to McKinsey (2011), Ghana now belongs to the group of Africa's transition economies, which also includes countries like Senegal, Kenya and Mozambique. Although its GDP is lower than the diversified North African economies and the African oil and gas exporters, its economy is growing rapidly. It is increasingly exporting manufactured goods which could enable it to soon compete with low-cost emerging economies in Asia. Does the data support this analysis? The answer is yes. Labor productivity continuously increased after the second SAP in 1987-1989. In 1992-2000, the country was transitioning into a more efficient and formalized economy. The goal of the SAP was to reform the economical structure of Ghana. The more formal sectors were "rationalized" in 1984-1992, as firms of the private, parastatal and public sectors got rid of excess labor. Productivity mechanically increased, as firms kept their best workers. In 1992-2000, these same sectors expanded and hired new workers, which mechanically decreased productivity.[8] That is why the within component was negative during that period when using a decomposition of 15 sectors (-1.00, see Table 3). But the structural component of productivity was positive (+2.03, see Table 3), which indicated a reallocation of labor towards the newly booming sectors, namely tourism and forestry. Similarly, the within and structural components of formalization were positive when using a decomposition of 9 sectors (+15.1 and +2.9 respectively, see Table 8). In 2000-

[8]If marginal labor productivity is decreasing within a sector, increasing the number of workers reduces average productivity in that sector. It would be different if there were external returns to scale, as marginal labor productivity would then increase within a sector.

2006 and 2006-2010, the economy further consolidated. The within component was very high in 2000-2006 (+5.08, see Table 3), while both the within and structural change components were positive in 2006-2010 (+1.56 and +1.17 respectively, see Table 3). Another positive evolution is that the economy has diversified in terms of exports. While cocoa, timber and mining accounted for almost 100% of exports in 1960, Ghana now also exports crude oil, tourism services and manufactured goods. The improvement in the quality of institutions probably accounts for the positive long-term effects of the SAPs.

5 Conclusion

The results of this case study on Ghana suggest that: (i) structural change, i.e. the decline in agricultural employment, is both a factor and a consequence of development, as episodes of negative economic growth are associated with structural change in the wrong direction; (ii) there has not been much structural change in the past 50 years, which explains why Ghana's economy remains significantly agricultural and relatively poor; (iii) evolutions in economy-wide labor productivity have been mostly driven by its within component, the fact that all sectors were either becoming more productive or less productive, (iv) the decrease in GDP and employment shares of agriculture over time was not the result of successful industrialization but of a rise of the service economy; (v) development and structural change accentuate spatial inequality in line with the Kuznets inverse-U hypothesis; (vi) economic development in Ghana has not been associated with a formalization of employment; and (vii) since 1992, Ghana has been transitioning into a more efficient and formalized economy, which explains why per capita income has been continuously rising. It is however difficult to say whether the achievements of the last 20 years will have long-lasting effects. First, Ghana is still highly specialized in natural resource exports, and is highly subject to the volatility of commodity prices. Second, there are fears that the recent oil boom could lead to a worsening of institutions. In other words, will Ghana repeat the errors of the 1960s when the cocoa boom led to detrimental economic policies that had enduring effects until the 1990s? Or will the fact that Ghana is one of the most democratic African countries protect it against the resource curse?

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Data Appendix

This appendix describes in detail the data we used in our analysis. The methodology is inspired by Timmer and De Vries (2007) and McMillan and Rodrik (2011).

GDP data:
We used various sources to obtain per capita GDP (in constant 2000 $, PPP) for Ghana and Sub-Saharan Africa between 1960 and 2010: Maddison (2008) and World Bank (2010). Sectoral GDP shares were reconstructed annually from 1960 to 2010 using GDP data for 9 sectors (at current prices) from various sources: *Economic Survey of Ghana* 1961-1982, Singal and Nartey (1971), Androe (1981), Ewusi (1986), *Quaterly Digest of Statistics* 1981-1997, GSS (2010). We used these GDP shares to estimate sectoral GDP (in constant 2000 $, PPP). We used the same sources to recreate GDP data for 15 sectors. GDP data for the formal manufacturing sector in 1960, 1965, 1968, 1970, 1974, 1978, 1984, 1992, 2000, 2003, and GDP data for 20 formal manufacturing subsectors in 1960, 1970, 1984 and 2000 was recreated using the following sources: *Economic Survey of Ghana* 1961-1982, *Statistical Yearbook* 1961 and 1969-1970, *Statistical Handbook of Ghana* 1970, Singal and Nartey (1971), *Industrial Statistics* 1982-1984 and *2003 National Industrial Census Report*. The list of manufacturing subsectors changed over time and we had to reaggregate various subsectors to obtain a consistent decomposition.

Total Employment data:
Employment data was reconstructed in 1960, 1970, 1984, 1992, 2000, 2006 and 2010 from various sources: *Population and Housing Censuses* 1960, 1970, 1984, 2000 and 2010 and *Ghana Living Standard Survey* (GLSS) in 1991-92 and 2005-2006. We obtained data for 9 and 15 aggregate sectors. The same sources were used to recreate provincial employment data for each province for various years using the decomposition of 9 aggregate sectors. As the number of provinces increased over time, from 7 in 1960 to 10 in 2000, we had to reaggregate the data to obtain the same spatial boundaries across the whole period. The Central province belonged to the Western province in 1960, while the Upper West and Upper East belonged to the Northern province.

Formal and Informal Employment Data:
Formal and informal employment data was reconstructed for the 9 aggregate sectors in 1960, 1970, 1984, 1992, 2000 and 2006 from various sources: *Statistical Yearbook of Ghana* 1961, 1965-66, 1967-68, 1969-1970, *Statistical Handbook of Ghana* 1970, *Quarterly Digest of Statistics* 1981-1997, the 2000 *Population and Housing Census* and the 2005-06 *Ghana Living Standard Survey* (GLSS). We also distinguished formal employment in the public sector and the private sector for the same sectors and the same years. Employment data for 40 formal and informal manufacturing subsectors in 1960, 1970, 1984 and 2000 was recreated using the following sources: *Economic Survey of Ghana* 1961-1982, *Statistical Yearbook* 1961 and 1969-1970, *Statistical Handbook of Ghana* 1970, Singal and Nartey (1971), *Industrial Statistics* 1982-1984 and *2003 National Industrial*

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Democracy Data:
Data on political regimes in Ghana and Sub-Saharan African countries was obtained from the Polity IV Project, a well-known database on political regime characteristics and transitions. We used the Combined Polity Score which ranges in value from -10 (hereditary monarchy) to +10 (consolidated democracy). Polity IV recommends using the following classification: autocracies (-10 to -6), anocracies (-5 to +5) and democracies (+6 to +10). The average combined policy score for Sub-Saharan Africa was calculated using individual polity scores and the population of each country as weights (obtained from World Bank 2010).

Macroeconomic Data:
Investment rates _ the share of "gross fixed capital formation" in GDP (%)_ for the whole economy, the public sector and the private sector were reconstructed for the period 1960-2010 using data from various sources: *Statistical Yearbook of Ghana* 1961, 1965-66, 1967-68, 1969-1970, *Statistical Handbook of Ghana* 1970, Ewusi (1986), Aryeetey and Fosu (2002), and WDI (2010). The same sources were used to calculate the respective shares of total government expenditure, government consumption only and government investment only in GDP (%) for the same period.

Trade Data:
Data on the composition of exports (cocoa, mining and timber) in 1960-2010 comes from the following sources: Ewusi (1986), Aryeetey, Osei and Twerefou (2004), GSS (2008) and FAO (2010). Mining includes gold, manganese, bauxite (and alumina) and diamonds.

Urban Data:
GIS data on the spatial allocation of towns and cities in 2000 was collected from the 2000 *Population and Housing Census* report (see Jedwab 2011 for a description of the data set). Any locality with more than 5,000 inhabitants is defined as a town or city.

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Appendix Tables and Figures

Appendix Table A.1: List of Sectors for the Main Analysis.

SECTORS (9)	**SECTORS (15)**	**SECTORS (20)**
AGRICULTURE		
-Agriculture, hunting, forestry and fishing (agr)	- Agriculture and hunting - Cocoa - Forestry and logging - Fishing	
INDUSTRY		
- Mining and quarrying (min)	- Mining and quarrying	
- Manufacturing (man)	- Manufacturing	- Food manufacturing - Beverages - Tobacco - Textiles - Clothing - Footwear - Wood and cork - Furniture and fixtures - Paper and paper products - Printing and publishing - Leather and fur - Rubber - Chemicals - Petroleum - Non-metallic mineral prod. - Basic metal industries - Metal products, machinery - Transport equipment - Electrical machinery - Miscellaneous
- Public Utilities (pu)	- Public Utilities	
- Construction (con)	- Construction	
SERVICES		
- Wholesale and Retail Trade, Hotels and Restaurants (wrt)	- Wholesale and Retail Trade - Hotels and Restaurants	
- Transport, Storage and Communications (tsc)	- Transport, Storage - Communications	
- Finance, Insurance, Real Estate and Business Services (fire)	- Finance, Insurance, Real Estate and Business Services	
- Community, Social, Personal and Government Services (cspgs)	- Community, Social - and Personal Services Government Services	

Notes: This table displays the decomposition of the 3 aggregate sectors and 9 main sectors into 15 sectors and 20 manufacturing subsectors. See Data Appendix for data sources.

Appendix Table A.2: Formalization Rates (%) for 20 Manufacturing Subsectors.

Subsector:	Formal (%)	Subsector:	Formal (%)
Basic metal industries	30.2	Beverages	12.0
Petroleum	21.5	Printing and publishing	11.1
Rubber	21.2	Non-metallic mineral prod.	10.7
Tobacco	21.0	Metal products, machinery	4.5
Paper and paper products	20.8	Transport equipment	4.2
Chemicals	19.5	Leather and fur	4.0
Wood and cork	19.0	Miscellaneous	3.5
Electrical machinery	15.5	Furniture and fixtures	3.4
Textiles	15.2	Footwear	2.7
Food	12.4	Clothing	1.2

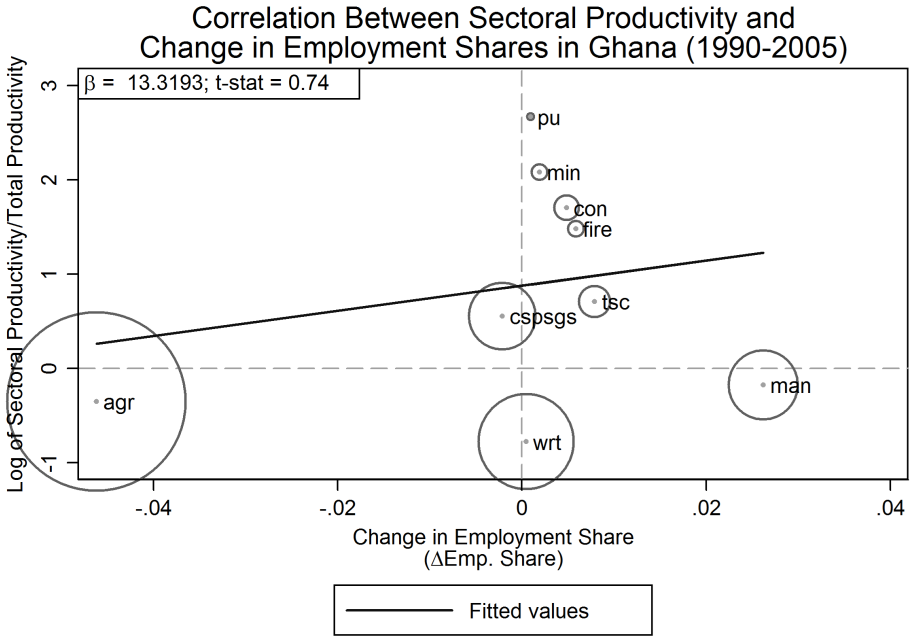
Notes: This table indicates the share of formal employment in total employment for the 20 manufacturing subsectors in 2000. See Data Appendix for data sources.

Appendix Table A.3: Formalization Rates (%) for 9 Aggregate Sectors.

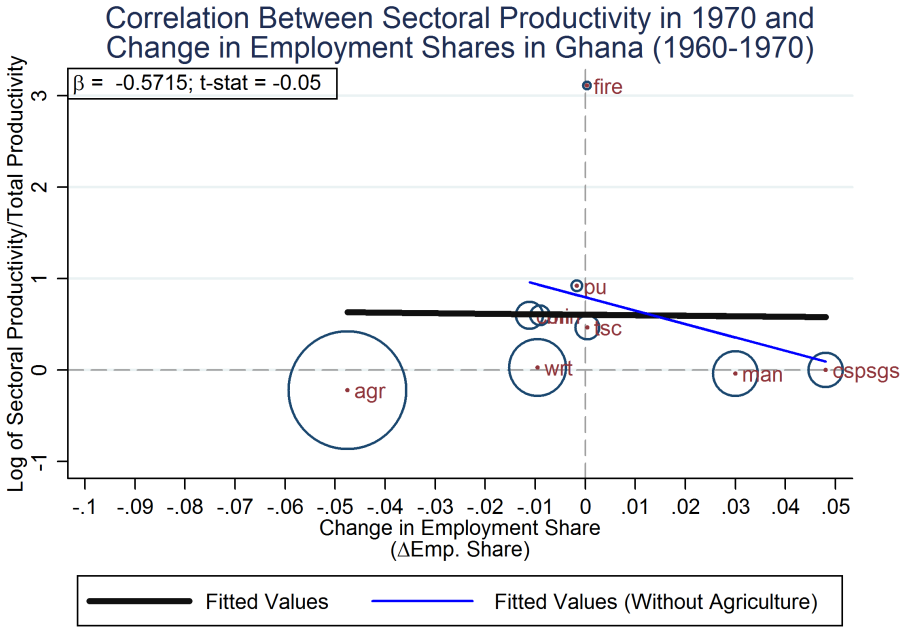
Sector:	Formal Empl. (%)	
		Public
- Community, Social, Personal and Government Services (cspgs)	52.6	42
- Finance, Insurance, Real Estate and Business Services (fire)	45.6	27.7
- Public Utilities (pu)	32.4	21.8
- Mining and Quarrying (min)	28.4	15.9
- Transport, Storage and Communications (tsc)	23.7	12.8
- Construction (con)	17.6	7.5
- Manufacturing (man)	10.1	4.1
- Wholesale and Retail Trade, Hotels and Restaurants (wrt)	5.9	2.7
- Agriculture, Hunting, Forestry and Fishing (agr)	2.2	1.4
- Economy-wide	10.9	6.6

Notes: This table indicates the shares of formal employment and formal public employment in total employment for the 9 main sectors in 2000. See Data Appendix for data sources.

Appendix Figures A.1-A.7: Correlation Between Sectoral Productivity and Changes in Employment Shares in Ghana, 1960-2010

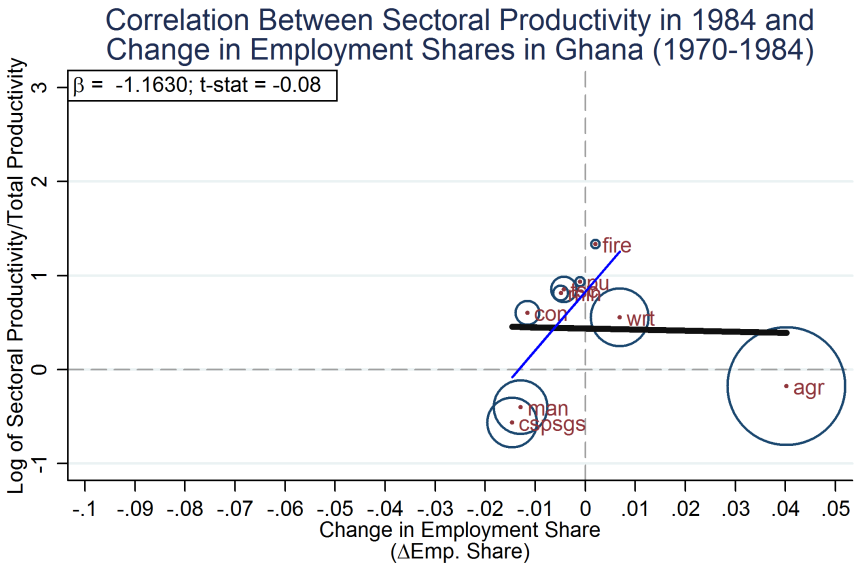


*Note: Size of circle represents employment share in 1990
**Note: β denotes coeff. of independent variable in regression equation:
ln(p/P) = α + βΔEmp. Share
Source: Authors' calculations with data from Ghana Statistical Service and WDI 2010



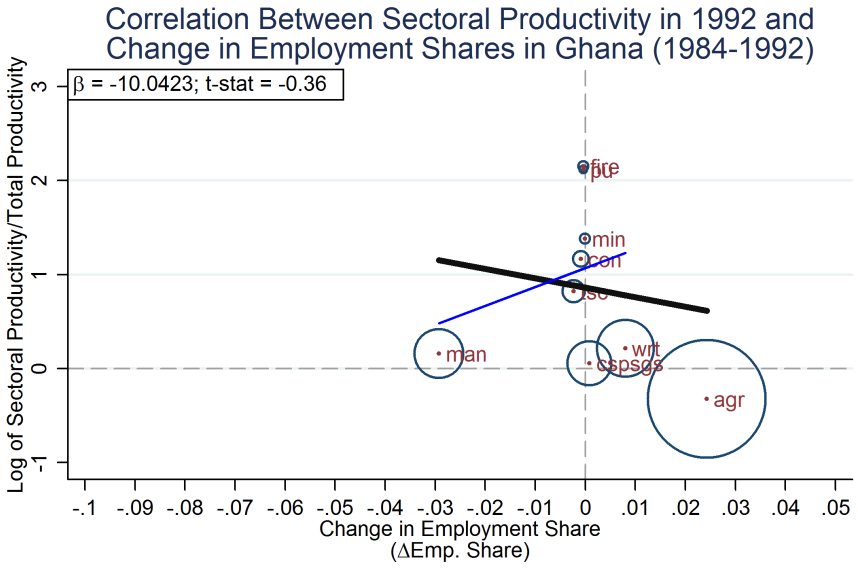
*Note: Size of circle represents employment share at time 1960
**Note: β denotes coeff. of independent variable in regression equation:
ln(p/P) = α + βΔEmp. Share

Notes: Authors' calculations. See Data Appendix for sources.



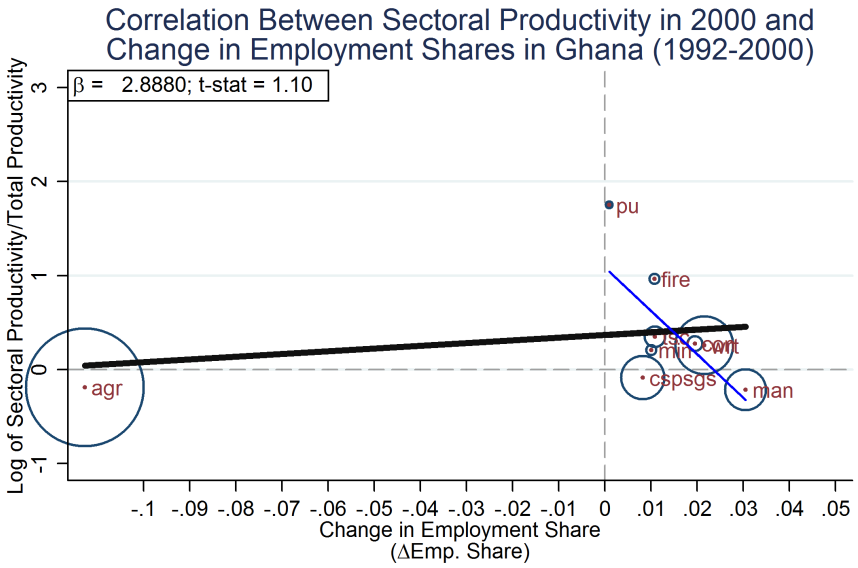
*Note: Size of circle represents employment share at time 1970
**Note: β denotes coeff. of independent variable in regression equation:
ln(p/P) = α + βΔEmp. Share

Notes: Authors' calculations. See Data Appendix for sources.



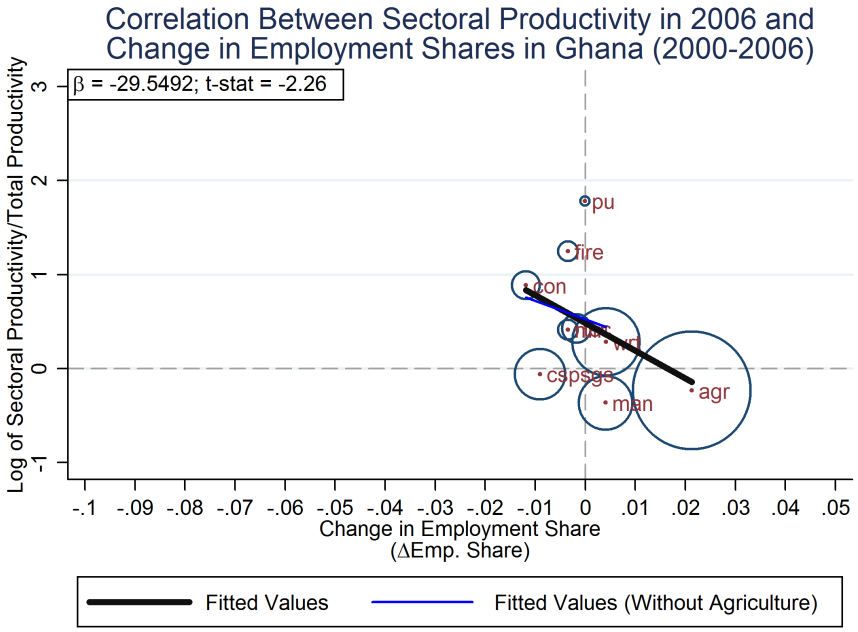
*Note: Size of circle represents employment share at time 1984
**Note: β denotes coeff. of independent variable in regression equation:
ln(p/P) = α + βΔEmp. Share

Notes: Authors' calculations. See Data Appendix for sources.



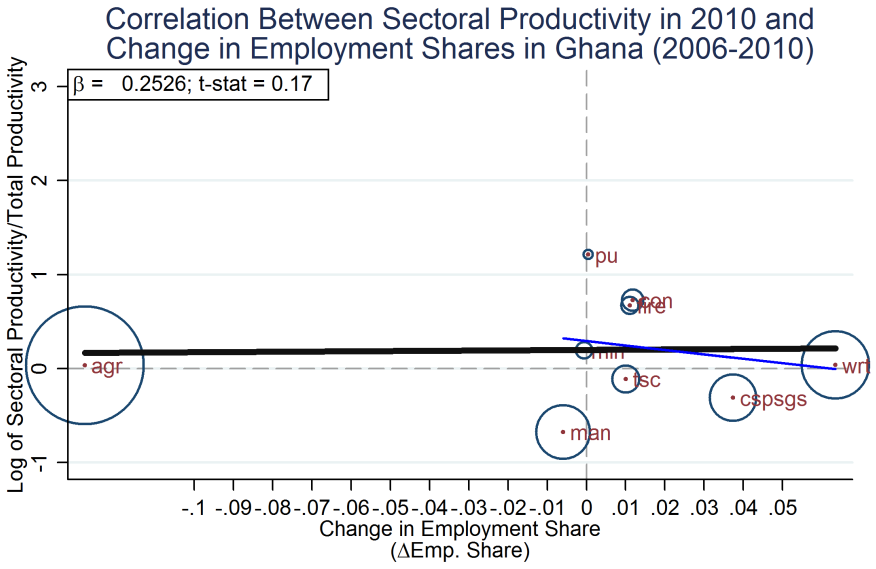
*Note: Size of circle represents employment share at time 1992
**Note: β denotes coeff. of independent variable in regression equation:
ln(p/P) = α + βΔEmp. Share

Notes: Authors' calculations. See Data Appendix for sources.



*Note: Size of circle represents employment share at time 2000
**Note: β denotes coeff. of independent variable in regression equation:
ln(p/P) = α + βΔEmp. Share

Notes: Authors' calculations. See Data Appendix for sources.



*Note: Size of circle represents employment share at time 2006
**Note: β denotes coeff. of independent variable in regression equation:
ln(p/P) = α + βΔEmp. Share

Notes: Authors' calculations. See Data Appendix for sources.