Structural transformation in Africa

Vries, Gaaitzen J. de; Timmer, Marcel P.; Vries, Klaas de

GGDC RESEARCH MEMORANDUM *136*

Structural transformation in Africa: Static gains, dynamic losses

Gaaitzen de Vries, Marcel Timmer and Klaas de vries

October 2013

university of groningen / groningen growth and development centre

Structural transformation in Africa: Static gains, dynamic losses

Gaaitzen de Vries[a], Marcel Timmer[a], Klaas de Vries[b]
[a] Groningen Growth and Development Centre, Faculty of Economics and Business, University of Groningen
[b] The Conference Board, Brussels

October 2013

Corresponding author:

Gaaitzen J. de Vries
Groningen Growth and Development Centre
Faculty of Economics and Business
University of Groningen
The Netherlands
e-mail: g.j.de.vries@rug.nl

Acknowledgements
The research on which this paper is based is part of the 'Structural Change and Productivity Growth in Africa' project. This project is financed by the Economic and Social Research Council (ESRC) and the UK government's Department for International Development (DFID) as part of the DFID/ESRC Growth program, grant agreement ES/J00960/1. We thank seminar participants at the University of Groningen and Wageningen University for comments and discussions.

Abstract

This paper studies structural transformation in Africa and its implications for productivity growth during the past fifty years, extending the work by McMillan and Rodrik (2011). We present the Africa Sector Database including time series of value added and employment by sector for eleven Sub-Saharan African countries during the period 1960 to 2010. It is based on an in-depth country-by-country study of available statistics and linking procedures that aim to ensure consistency over time and across countries. We use this novel database to put recent African growth in historical and international perspective. The expansion of manufacturing activities during the early post-independence period led to a growth-enhancing reallocation of resources. This process of structural change stalled in the mid-1970s and 80s. When growth rebounded in the 1990s, workers mainly relocated to market services industries. Market services activities had above-average productivity levels, but productivity growth was low 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.

***JEL classification**:* C80; N10; O10

***keywords**:* Structural Change, Shift-share decomposition, Productivity, Sector Database, Sub-Saharan Africa

1. Introduction

An important insight in development economics is that development entails structural change (Lewis, 1954; Kuznets, 1966). As labour and other resources move from traditional into modern economic activities, overall productivity rises and incomes expand. Structural change, defined here as the relocation of labour across sectors, features prominently in the debate on growth in Africa. McMillan and Rodrik (2011) argue that workers have started to move out of highly productive sectors such as manufacturing since the early 1990s. These employment shifts imply that structural change has been growth reducing in Africa.[1]

This paper puts the recent African growth experience in a long-run and international perspective. We extend existing analyses by considering the period 1960 to 2010. This allows us to compare the recent period to the golden age of Africa's growth performance, which occurred in most African countries roughly from 1960 to 1975 (Ellis, 2002). We find that although the pace of structural change in the recent period is comparable to that of the early period, its effects on aggregate growth have been rather different. We find that in the first period workers who left agriculture were gainfully absorbed in manufacturing. As productivity is higher in the latter sector, this boosted aggregate growth. Thereafter, during the mid-1970s, many African countries were affected by the oil crisis, currency instability, and related events resulting in limited structural change and stagnating growth. After 1990, growth rebounded and the structural change process resumed, but with a different development pattern. In particular, workers have been moving out of agriculture and manufacturing into market services such as retail trade and distribution. We find evidence that suggests the marginal productivity of these new services workers is particularly low. In contrast to the early period, recent reallocation of resources does not contribute to aggregate growth in most African economies. We find a similar historical pattern for many Latin-American countries, but not for Asia.

Our findings are based on a new dataset with annual time series of value added and persons employed for the ten main sectors of the economy for eleven countries, called the Africa Sector Database. It extends McMillan and Rodrik (2011) covering eleven countries in Sub-Saharan Africa during the period 1960 to 2010. Data on the number of workers is based on the broadest employment concept, including self-employed, family-workers and other informal workers. The dataset is based on a critical assessment of the coverage and consistency of concepts and definitions used in various primary data sources. Consistent long-run time series on output and inputs by sector in Africa are largely absent in current databases. For example, in the World Development Indicators there is only data on agricultural employment for Ethiopia for 1994, and 2004-2006 (WDI, 2011). According to

[1] The limited role of structural change in Africa since 1990 has been confirmed in subsequent studies by Badiane et al. (2012), Garcia-Verdu et al. (2012) and the OECD (2013). The OECD (2013) argues that there has been a turnaround in Africa from growth-reducing structural change during the 1990s to growth-enhancing structural change since 2000.

the WDI, employment in agriculture is 22 million in 1994, then radically drops to 3 million in 2004, rises again to 28 million in 2005, and is suddenly 3 million again in 2006. McMillan and Rodrik (2011) present a first attempt to address these shortcomings by developing a sector database for Africa. Yet, their dataset is confined to the post 1990 period. The Africa Sector Database is a new step forward, providing long-run output and employment data for African countries since 1960.

To analyse the drivers of aggregate growth, we also present some novel variants of the canonical structural decomposition method in which aggregate labour productivity growth is decomposed into growth at the sector level (the within effect) and a reallocation effect. The size of the reallocation effect depends on the differences in productivity growth and levels across sectors within an economy. We find that in Africa sectors with above-average productivity levels typically show below-average productivity growth. This effect was particularly strong after 1990. To account for this difference in static and dynamic effects, we introduce a simple and intuitive variant of the standard shift-share decomposition method. In this method we split the reallocation effect into a static and a dynamic part: the contribution from the reallocation of workers to sectors with above average productivity *levels* (static reallocation effects) and the contribution from the reallocation to sectors with above average productivity *growth* (dynamic reallocation effects). Aggregate growth based on the latter is more desirable as it indicates that resources are shifted towards those sectors were they have a higher marginal productivity.

In previous research for Asia and Europe, it was found that static and dynamic reallocation effects were relatively small, but this is not the case for recent growth patterns in Africa.[2] Driven by increasing incomes, a relatively larger share of domestic demand is shifting towards consumption of services. For example, Jedwab (2013) has argued that the expansion of natural resource exports, such as cacao in Ghana, has resulted in 'consumption cities' increasing demand for urban services. We find indeed that workers relocated to market services sectors, in particular distribution services (wholesale and retail trade, hotels and restaurants, and transport services). In 2010, on average 20 per cent of the African workforce was employed in distribution services, up from 11 per cent in 1990. The relative productivity level of these services has been above the total economy average throughout the period considered, suggesting static gains. But the productivity growth rate has been low in this sector and sometimes even negative as it has been absorbing workers faster than increasing output, resulting in dynamic losses. This rapid expansion of market services stands in sharp contrast to the expansion of manufacturing during the period 1960 to 1975. During that period, structural change was growth enhancing as dynamic losses were small.

[2] See e.g. van Ark (1996) for Europe, and Timmer (2000) for Asia. The findings in this paper suggest that the distinction between static and dynamic reallocation effects is also relevant for Latin America.

To put the productivity performance in Africa in a comparative perspective, we use sector-specific Purchasing Power Parities (PPPs) to examine relative productivity levels across Africa. This allows us to examine the performance of sectors such as manufacturing and markets services in an international perspective. Sector-specific PPPs were recently estimated using the 2005 International Comparisons Program (Inklaar and Timmer, 2013). We examine the distance of African productivity levels to those in other regions in the developing world. Our results suggest that manufacturing and market services are falling behind the global technology frontier. The productivity level in manufacturing fell from 20 per cent of the U.S. level in 1960 to 7 per cent in 2010. These results suggest that there is no worldwide unconditional convergence for manufacturing industries. Rodrik (2013a) found evidence suggesting unconditional convergence but he focused only on the formal part of manufacturing. The productivity estimates in this paper include activities in the informal sector, which forms an increasing part of economic activities in African countries (Schneider, 2005).

We compare patterns of structural change and relative productivity performance in Africa to those in Asia and Latin America using an update of the GGDC sector database (Timmer and de Vries, 2013). Our findings suggest that Africa's long-run development pattern is comparable to that observed in Latin America, but differs from that in Asia. For Latin America, we also find static reallocation gains and dynamic losses since the 1990s. Furthermore, productivity levels in manufacturing and market services have been falling behind the frontier, a trend that accelerated after 1980. In Asia, dynamic losses are largely absent and we observe productivity convergence to the frontier in manufacturing and market services.

The remainder of this paper is structured as follows. Section two describes the Africa Sector Database and assesses its overall reliability. Key stylized facts and productivity trends are presented in section three. Section four discusses our preferred decomposition method and the findings for Africa in comparison to those in Asia and Latin America. Section five extends the decomposition method to quantify the contribution of reallocation effects from sectors such as manufacturing and market services. Section six provides concluding remarks.

2. The Africa Sector Database

So far, theoretical and empirical analysis of economic transformation in Africa is hampered by the reliability and availability of data on output and productivity trends by sector. Although, the United Nations National Accounts Statistics provide long run data on value added by sector from 1970 onwards, companion employment data is missing. Alternative data sources, such as the World Development Indicators provide limited and disperse

employment data for Sub-Saharan African countries.[3]

Table 1 gives an overview of the contents of the Africa Sector Database. The data set consists of eleven African countries. It includes annual data on gross value added at nominal, real, and international prices from 1960 to 2010. It also includes data on persons employed, which allows the derivation of labour productivity (value added per worker) trends. The database covers the ten main sectors of the economy as defined in the International Standard Industrial Classification, Revision 3 (ISIC rev. 3). Together these ten sectors cover the total economy. Data and detailed documentation of sources and methods are publicly and freely available at www.ggdc.net. In this section we briefly discuss the methods and sources as well as the reliability of the data.

Table 1. Overview of the Africa Sector Database

Economic activities distinguished (ISIC rev. 3.1 code):	Agriculture, hunting, forestry and fishing (AtB); Mining and quarrying (C); Manufacturing (D); Electricity, gas and water supply (E); Construction (F); Wholesale and retail trade, hotels and restaurants (GtH); Transport, storage, and communication (I); Finance, insurance, real estate and business services (JtK); Government services (LtN); Community, social and personal services (OtP)
Variables included:	Persons engaged; Female labour share; Gross value added at current national prices; Gross value added at constant 2005 national prices; Gross value added at international 2005 prices (PPPs)
Countries included:	Botswana, Ethiopia, Ghana, Kenya, Malawi, Mauritius, Nigeria, Senegal, South Africa, Tanzania, and Zambia
Time period:	1960 – 2010 (starting date of the time series varies across variables and countries depending on data availability, see appendix A)

2.1 Construction of the variables

Gross value added in current and constant prices is taken from the National Accounts of the various countries. As these have all been compiled according to the UN System of National

[3] See de Vries et al. (2013) for a comparison to existing international datasets. In appendix B we discuss and compare the Africa Sector Database with the data presented in McMillan and Rodrik (2011).

Accounts, international comparability is high, in principle (Gollin et al., 2012). However, national statistical institutes frequently change their methodologies. In the National Accounts, GDP series are periodically revised which includes changes in the coverage of activities (for example after a full economic census has been carried out and "new" activities have been discovered), changes in the methods of calculation (for example the inclusion of software expenditures as investment rather than intermediate consumption), and changes in base year of the prices used for calculating volume growth rates.[4] For sectoral GDP our general approach is to start with GDP levels for the most recent available benchmark year, expressed in that year's prices, from the National Accounts provided by the National Statistical Institute or Central Bank. Historical national accounts series were subsequently linked to this benchmark year.[5] This linking procedure ensures that growth rates of individual series are retained although absolute levels are adjusted according to the most recent information and methods.

Employment in our data set is defined as 'all persons employed', thus including all paid employees, but also self-employed and family workers of 15 year and older.[6] Ideally, hours worked should be collected as well, but this data is irregular and sparse and typically only covers the formal sector. Labour input is often not available from a country's national accounts as they are not part of the System of National Accounts. Three different primary sources of employment exist, namely population and housing censuses, labour force surveys (LFS) with data collected at the household level, and business surveys which are based on firm-level questionnaires. All three sources have their advantages and disadvantages as a source for annual sectoral employment trends.

The LFS is a comprehensive and well-established source with substantive international harmonization of concepts as it uses definitions set out by the International Labour Organization (ILO), although sampling size and techniques may still differ substantially between countries. They cover employees as well as self-employed and family-labour. The main problem of labour force surveys is the limited consistency with output data from the national accounts, especially at the sectoral level due to the relatively small sample size. In addition, the sample is sometimes restricted to particular regional areas, such as urban areas. Finally, few labour force surveys were held in the early post-colonial period. Only in the 1980s did African countries start to implement household survey programs.

Information from business surveys is often more consistent with value added measures in the national accounts, as output series for the national accounts are also based on this source. However, while the coverage by business surveys is reasonably accurate for

[4] In most developing countries a fixed-base Laspeyres volume index is used.

[5] Because of the application of fixed-base Laspeyres volume indexes by most statistical offices, additive consistency is lost and linked sectoral GDP therefore do not add up to total GDP for earlier periods.

[6] The preferred age boundary is 15 years and older, however for some countries the age boundary differs, see appendix table A2.

goods producing industries, it is not always for services. Moreover business surveys typically only cover firms who surpass a certain threshold (for example, >20 employees or above a certain turnover level). This excludes smaller firms, which are especially abundant in Sub-Sahara Africa. Another limitation is that data on self-employed and unpaid family members are usually not collected. This is problematic for sectors like agriculture and informal parts of the economy, where these categories make up a significant share of total employment. Business surveys are therefore not well suited to provide employment statistics by sectors that cover the total economy.

Therefore we often use an alternative source based on household questionnaires but with a much larger coverage than the samples of the LFS: the population census. This ensures full coverage of the working population and a much more reliable sector breakdown than from the LFS. However, typically population censuses are quinquennial or decennial and cannot be used to derive annual trends. Therefore we use the population census to indicate absolute levels of employment, and use LFS and business surveys to indicate trends in between. This is the general strategy followed for most countries, except for Nigeria and Senegal (see de Vries et al. (2013a) for a detailed discussion of the sources and methods).

2.2 Consistency

In constructing the database, we paid careful attention to three checks on consistency, namely intertemporal consistency, international consistency, and internal consistency. Our time series of gross value added and employment are consistent over time (intertemporal consistent). Through our linking procedure as described above, major breaks in the series have been repaired. International consistency of the cross-country sector data is ensured through the system of national accounts for value added, the employment concept of persons engaged and the use of a harmonized sectoral classification. We classify activities into ten sectors, using the International Standard Industrial Classification (ISIC), Revision 3. The industrial classification used in the national primary data sources is based on this classification or is directly related to it.

For the derivation of meaningful productivity measures, the labour input and output measures should cover the same activities (internally consistent). As we use persons employed as our employment concept rather than employees, and base our employment numbers on large-scale surveys, overlap in coverage of the employment statistics and value added from the National Accounts is maximized. However, a notable exception is the own-account production of housing services by owner-occupiers. For this an imputation of rent is made and added to GDP in many countries, according to the System of National Accounts. This imputed production does not have an employment equivalent and should preferably not be included in output for the purposes of labour productivity comparisons. Typically, imputed rents are included in the output of the financial and business services sector and

frequently increase output in this sector by 50 per cent or more without any labour input equivalent. Worse, this percentage varies over time and across countries. Therefore, the Africa sector database presents separate series for imputed rents. In our analysis below, we exclude imputed rents.

2.3 Reliability issues

African statistics are often considered unreliable. Recently, various scholars have pointed out anew that the statistical foundations underlying GDP and employment estimates in Africa are subject to large measurement error, and have referred to these weak fundamentals for growth and productivity analysis as 'Africa's statistical tragedy' (Devarajan, 2013; Jerven, 2013). The low quality of statistics is related to a weak capacity to collect, manage, and disseminate the data; inadequate funding of statistical offices; diffuse responsibilities on who is collecting what; and fragmentation in surveys and gathering exercises (Devarajan, 2013). Young (2012) has argued that many African countries do not have a well-established statistical system, not even reporting national accounts data on a consistent basis. He therefore explores alternative sources of information on national income using demographic and health survey data. However, most countries considered in the Africa Sector Database do have a considerable history of collecting national accounts data and in conducting labour and household surveys. We therefore take an in-depth country-by-country approach to study available statistics and use linking procedures that aim to ensure internal, intertemporal, and international consistency.

The quality of statistics in Africa varies over time. Broadly speaking, statistical quality went through three major waves (Lehohla, 2008). During the first wave, roughly the 1960s to the 1970s, many African statistical offices developed national accounts based on the UN system of national accounts using skills inherited from their former colonial masters. In addition, population censuses and household surveys were implemented. Thereafter, during the second wave from the 1980s to 2000, the quality of statistics deteriorated. The 1970s oil crises, currency instability, and related political events created a comprehensive change in the prospects for African states (Ellis, 2002). Due to an increase in informal activities, the quality and scope of available data gradually deteriorated. More recently, however, there is a revival in the quality of statistics for Africa. Various statistical offices have implemented surveys and censuses to obtain a more accurate measure of economic activities within their national borders. Ironically, discussion by scholars on the quality of statistics for Africa follows these waves. The early wave saw notable discussions from Bondestam (1973) and Blades (1980) and an issue on national accounts data in the Review of Income and Wealth in 1962. During the second wave, when data quality rapidly deteriorated, there was also limited attention from academics. After 2000, when many statistical offices started to improve statistical practice, we observe a revival in attention by

researchers (see the recent special issue in the Review of Income and Wealth with articles on the quality of Africa socio-economic data (vol.59:2, 2013).

In general we note that growth rate comparisons are probably more reliable than comparisons of absolute levels. The error in the change from year to year is likely to be less compared to the absolute values if the national accountant only considers the probable change from the previous year (Blades, 1980; Jerven, 2013). Also, real growth rates are more reliable than nominal growth rates because many surveys measure changes in production and not values. Finally, using 5 to 10 year averages of real growth rates is likely to suffer from less bias still.

We are unable to satisfactorily solve all quality issues with the data. Instead, we aim to come up with the best possible estimates from obtaining as much available statistical information as possible and analysing these before deciding whether to include these numbers or not. Frequently this involved obtaining hard copies from libraries across Europe and digitizing these, in particular for data in the 1960s and 70s. In appendix A, we review the availability and reliability of data on gross domestic product and estimates of employment by economic activity in more detail.

3. Structural change in Africa: stylized facts and trends

In this section we start by using the Africa Sector Database to document the main stylized facts and trends in output, employment, and labour productivity across sectors in Sub-Saharan Africa from 1960 onwards. Section 3.2 uses sector-specific PPPs to examine the productivity of sectors in Sub-Saharan Africa from an international perspective.

3.1 Sector shares of GDP and employment

A first stylized fact observed in the Africa Sector Database is that manufacturing expanded during the early period of African economic development, roughly from 1960 to 1975. The relative employment share of manufacturing increased from 4.7 percent in 1960 to 7.8 percent in 1975 (see table 2). The manufacturing value added share also increased substantially during that period, from 9.2 to 14.7 percent. This development pattern reflects the classis Lewis-type dual economy model, where workers move out of (subsistence or traditional) agriculture and are absorbed in modern manufacturing (Lewis, 1954). Differences in relative wages between traditional and modern sectors are a central feature in accounting for these reallocation dynamics.

The last columns in table 2 show average productivity levels, where comparisons of average productivity in a sector might approximate these differences in relative wages (marginal products) across sectors.[7] We measure labour productivity as value added

[7] In this paper we do not directly observe marginal productivity, but measure average productivity across sectors and over time. If a production function is Cobb Douglas, the marginal productivity of labour is average productivity times the labour share in value added. If labour shares differ across sectors, an analysis based on average

divided by persons engaged. The relative productivity level is calculated here as the ratio of the sector productivity level to the total economy productivity level. For example, a relative productivity level of 0.5 for agriculture in 1960 suggests that the average productivity level in agriculture is halve that of the total economy. In 1960, manufacturing was about 2.5 times the average productivity of the total economy (which is mainly determined by agriculture). Despite the rapid employment expansion in manufacturing activities until 1975, productivity held up well and was 2.8 times average productivity. This suggest that the reallocation of workers to manufacturing has substantially contributed to growth in Africa during its initial post-independence period.

After this golden age of African growth performance, the region got caught up in political and economic turmoil. The oil crises in the 1970s, currency instability, and related events resulted in a long period of stagnation (Gunning and Collier, 1999). Between 1975 and 1990, growth was low or negative across Africa. The employment share in agriculture changed from 66 percent in 1975 to 61.6 percent in 1990, suggesting that reallocation was slow as well, especially when compared to the period after 1990.

Table 2. GDP, employment, and relative productivity levels across countries and sectors, 1960 -2010

	Value added				**Employment**				**Relative productivity levels**			
	1960	1975	1990	2010	1960	1975	1990	2010	1960	1975	1990	2010
Agriculture	**37.6**	**29.2**	**24.9**	**22.4**	**72.7**	**66.0**	**61.6**	**49.8**	**0.5**	**0.4**	**0.4**	**0.4**
Industry	**24.3**	**30.0**	**32.6**	**27.8**	**9.3**	**13.1**	**14.3**	**13.4**	**4.4**	**3.7**	**3.5**	**2.6**
Mining	8.1	6.2	11.2	8.9	1.7	1.5	1.5	0.9	15.7	22.4	23.3	19.5
Manufacturing	9.2	14.7	14.0	10.1	4.7	7.8	8.9	8.3	2.5	2.8	2.4	1.6
Other industry	7.1	9.2	7.3	8.9	3.0	3.8	3.9	4.2	8.5	5.8	5.3	2.9
Services	**38.1**	**40.7**	**42.6**	**49.8**	**18.0**	**20.9**	**24.1**	**36.8**	**2.7**	**2.5**	**2.4**	**1.6**
Market services	24.5	25.5	28.1	34.0	8.8	10.3	12.9	23.5	4.5	3.4	3.0	1.8
Distribution services	*21.5*	*20.8*	*22.7*	*25.4*	*8.2*	*9.5*	*11.4*	*20.1*	*4.6*	*3.2*	*2.7*	*1.5*
Fin. and bus. ser.	*3.0*	*4.7*	*5.4*	*8.6*	*0.6*	*0.8*	*1.5*	*3.4*	*6.1*	*8.9*	*10.4*	*8.1*
Non-market services	13.6	15.2	14.4	15.8	9.2	10.6	11.2	13.3	1.8	1.7	1.8	1.3
Government services	*10.5*	*11.7*	*11.5*	*12.2*	*4.2*	*5.0*	*6.4*	*8.7*	*2.8*	*2.5*	*2.5*	*1.7*
Other services	*3.1*	*3.5*	*2.9*	*3.5*	*5.4*	*6.1*	*5.3*	*5.4*	*0.9*	*0.9*	*1.0*	*1.0*
Total economy	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**1.0**	**1.0**	**1.0**	**1.0**

Notes: For some countries time series do not start in the 1960s. For these countries we took the share from the most nearby year (BWA: 1964; ETH: 1961; KEN: 1969; MWI: 1966; MUS:1970; SEN: 1970; TZA: 1961; ZMB:1965). Figures are unweighted averages across eleven African countries. Other industry includes construction and public utilities. Distribution includes transport services and distributive trade as well as hotels and restaurants. Finance and business services excludes real estate activities. Other services includes other community, personal and household services. Numbers may not sum due to rounding.
Source: Authors' calculations using the Africa Sector Database.

productivity may be misleading. For example, high average productivity in a capital-intensive sector may simply reflect a low labour share. We assume that marginal and average productivities have a strong positive correlation. Gollin et al. (2012) found that differences in average productivity in agriculture and manufacturing are related to large gaps in marginal productivity, giving some credibility to the approach adopted here. However, there is a clear need for further research in this area.

When growth rebounded during the 1990s, we observe rapid relocation of workers across sectors. The agricultural employment share fell from 61.6 percent in 1990 to 49.8 percent in 2010. What is striking, however, is that manufacturing did not expand during this period. The manufacturing employment share fell from 8.9 percent in 1990 to 8.3 percent in 2010. Page (2012) argues that deindustrialization after 1990 was not only characterized by a declining share of manufacturing output and employment, but also by a declining diversity and sophistication of the region's manufacturing sectors. Workers who were moving out of agriculture and industry were absorbed in market services sectors, in particular distribution services (see also Rodrik, 2013b).[8] Table 2 shows that the share of distribution services almost doubled to 20.1 percent in 2010. Nowadays, one fifth of Africa's labour force is employed in the distribution sector, which is comparable to levels observed in OECD countries (Jorgenson and Timmer, 2011).

In appendix tables C1 to C11 the same set of information as in table 2 is considered separately for each country. Individual country experiences sometimes do differ from the general patterns discussed here. For example, manufacturing employment shares increased in Botswana and Tanzania. However, in the fast majority of countries considered, the manufacturing employment share fell. Also, for all countries included in the Africa Sector Database, market services employment shares rose after 1990.

Thus, a second stylized fact emerging from the data is that workers moved largely to market services instead of moving to industry after 1990. The final columns in table 2 suggest that the marginal productivity of additional workers in market services was below that of existing activities. This is reflected in the relative productivity level, which fell from 3.0 times the total economy average in 1990 to 1.8 in 2010. Multi-sector models might be able to incorporate these reallocation trends since initial average productivity (and hence average wages) in market services was higher compared to manufacturing (3.0 versus 2.4 times the economy average) stimulating reallocation. However, the reallocation of workers to market services with below average productivity growth suggest that the dynamic implications of structural change were negative after 1990.

The tables in appendix C give the same information as table 2, but these tables show output, employment and productivity by country. The reallocation patterns discussed in this section hold for most Sub-Saharan African countries. For example, in Ghana the share of workers in market services expanded from 20.5 percent in 1990 to 30.2 percent in 2010. In Zambia, market services almost doubled from 6.8 percent to 13.2 percent of the labour force. These finding are in line with country-case studies for Ghana and Zambia (reviewed in Rodrik, 2013b). In the next sections, we will seek to quantify the implications of these stylized reallocation patterns across different periods for Africa. We first examine Africa's productivity performance from an international perspective.

[8] Distribution services includes wholesale and retail trade, hotels and restaurants, and transport services.

3.2 An international perspective on Africa's productivity performance

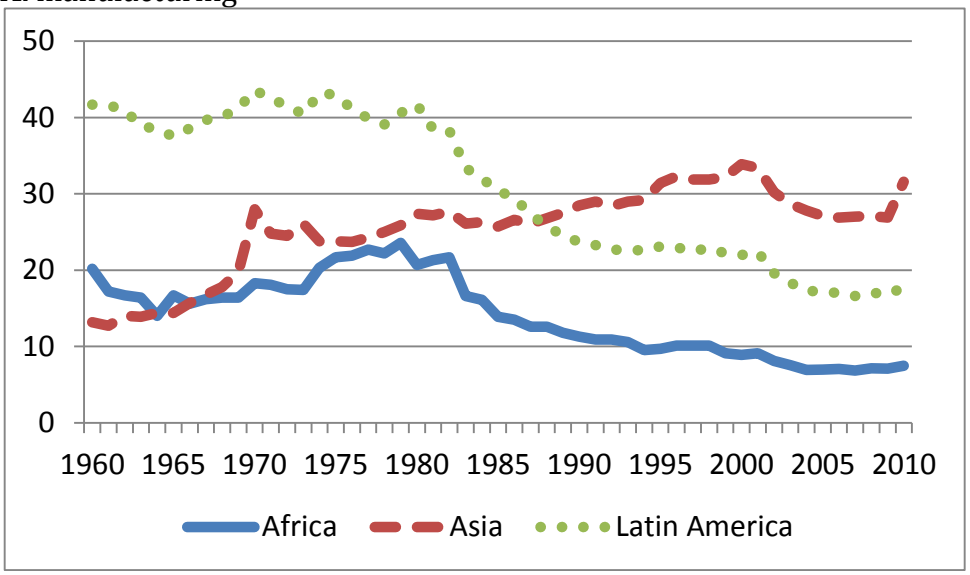
This section extends the national perspective on the performance of sectors in the previous section towards comparing it to the technology frontier. The use of the SNA framework allows us to compare output across countries, in principle (Gollin et al., 2012). Yet, to compare productivity across countries and sectors, a key issue is how to convert real value added into common currency units. Conceptually, the appropriate rate of exchange is to use a PPP. In addition, by now it is well known that relative prices vary substantially across tradable and non-tradable sectors, such that the use of aggregate PPPs is not appropriate. Therefore, we use sector-specific PPPs provided by Inklaar and Timmer (2013) in the GGDC productivity level database (see www.ggdc.net). Relative prices across sectors are based on price data collected by the World Bank in the 2005 International Comparison Program (ICP) round except for agriculture, which is based on unit value information from the Food and Agriculture Organization (FAO). Basic headings from the ICP round are matched to sectors that are the main producers of the good or service and PPPs are estimated using the EKS method (see Inklaar and Timmer (2013) for details).

We define the United States as the frontier country and measure labour productivity relative to the frontier using sector-specific PPPs. This approached is followed for each sector and country at each moment in time. Figure 1 panel A, shows the average productivity level across Africa, Asia, and Latin America for manufacturing. Values of the mean closer to the frontier correspond to a higher level of relative labour productivity. Clearly, the mean level in Africa lies substantially below the US productivity level. For manufacturing the sample mean is about 7 per cent in Africa, taking 2010 for comparison. This implies labour productivity of an average African manufacturing worker is about 1/14th that of an average American worker. Africa's current manufacturing productivity level is poor in an international perspective, also when compared to Asia and Latin America

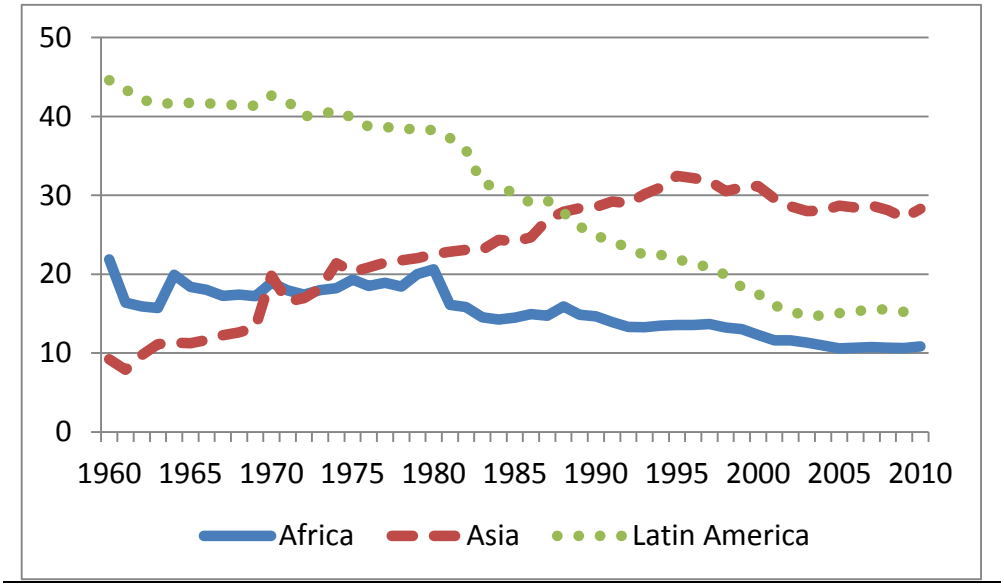
However, during the first period (1960 to 1975), average productivity in Africa's manufacturing was about 20 percent of the US level, which compares to 13 percent on average for Asia. Also up until the late 1970s, productivity trends were in line with growth at the US frontier as manufacturing productivity was not falling behind. This suggest that during the period 1960 to 1975 the expansion of manufacturing activity in Africa was also a positive development when viewed from an international perspective.

Figure 1. An international perspective on productivity (USA = 100)

A. manufacturing



B. market services



Notes: unweighted averages across regions.
Sources: Authors' calculations using the Africa sector database and the updated GGDC 10-sector database for Asia and Latin America (Timmer and de Vries, 2013), as well as sector-specific PPPs from Inklaar and Timmer (2013).

Panel B shows average productivity in market services. In the previous section we observed that market services expanded rapidly after 1990. Productivity growth was below the average of the total economy during that period. When viewed from an international perspective, the productivity performance of Africa's market services sectors

was also not holding up to that at the frontier since the 1990s.[9] Panel B in figure 1 suggest that productivity in market services fell further behind the frontier during a period in which its employment expanded rapidly. In the next sections we will seek to quantify the contribution of structural change in accounting for Africa's productivity performance.

4. Structural change in Africa: decomposition results

To measure the contribution to growth from the reallocation of workers across sectors of the economy, researchers typically use the canonical decomposition originating from Fabricant (1942). It decomposes the change in aggregate productivity into a within and a between effect. The within effect captures productivity growth within sectors, whereas the between effect measures the productivity effect of labour reallocation across different sectors. This method was used for Africa by McMillan and Rodrik (2011) and subsequently by Badiane et al. (2012), Garcia-Verdu et al. (2012), the OECD (2013) and country studies reviewed in Rodrik (2013b). The shift-share decomposition can be performed in various ways depending on the choice of base and end year of the periods, which has important ramifications for the measurement and interpretation of structural change.

One alternative is to use base period employment shares and final period productivity levels as in McMillan and Rodrik (2011) to decompose the change in aggregate productivity

$$\Delta P = \sum_i (P_i^T - P_i^0)\, S_i^0 + \sum_i \left(S_i^T - S_i^0\right) P_i^T. \qquad (1)$$

where S_i is the share of sector *i* in overall employment, P_i the labour productivity level of sector *i*, and superscript 0 and T refer to initial and final period. In equation (1), the change in aggregate productivity is decomposed into within-sector productivity changes (the first term on the right-hand side which we call the "within-effect" (also known as "intra-effect"), and the effect of changes in the sectoral allocation of labour which we call the "reallocation-effect", (the second term, also known as the "shift-effect" or "structural-change effect"). The within-effect is positive when the weighted change in labour productivity levels in sectors is positive. The reallocation-effect measures the contribution of labour reallocation across sectors, being positive when labour moves from less to more productive sectors.

It is well known that using base period employment levels as in equation (1), will increase the relative contribution from within-sector productivity growth at the expense of the contribution from reallocation (Haltiwanger, 2000). As an alternative, opposite weights

[9] Faster productivity growth in U.S. market services is partly related to differences in accounting for price changes in retail output (Inklaar and Timmer, 2008). The U.S. statistical office uses a quality-adjusted price deflator, especially for the consumption of information and communication technology goods. Measured sales volumes are smaller in most African countries, partly because they do not make use of hedonic price deflators.

of equation (1) can also be considered thus using final period employment shares and base period productivity levels

$$\Delta P = \sum_i (P_i^T - P_i^0)\, S_i^T + \sum_i \left(S_i^T - S_i^0\right) P_i^0. \qquad (2)$$

The decomposition of equation (2) will typically result in a relatively larger contribution from resource reallocation. Timmer and de Vries (2009) use period averages

$$\Delta P = \sum_i (P_i^T - P_i^0)\bar{S}_i + \sum_i (S_i^T - S_i^0)\bar{P}_i \qquad (3)$$

with $\bar{S}_i$ the average share of sector *i* in overall employment, and $\bar{P}_i$ the average labour productivity level of sector *i*. This decomposition takes a middle ground between equation (1) and (2) with respect to the contribution of structural change.

Note that the reallocation term presented in equations (1) to (3) is only a static measure of the reallocation effect as it depends on differences in productivity levels across sectors, not growth rates. McMillan and Rodrik (2011) argue that workers move to low-productivity growth sectors, but they use a decomposition that measures productivity levels. For sectors that absorb additional workers, the marginal productivity of these additional workers might be low, depressing productivity growth rates.

An alternative decomposition method accounts for the possibility that growth and levels across sectors are negatively correlated. It uses base periods for both the employment shares and the productivity levels. Importantly, this introduces a third term in the decomposition that can we written as follows

$$\Delta P = \sum_i (P_i^T - P_i^0)\, S_i^0 + \sum_i \left(S_i^T - S_i^0\right) P_i^0 + \sum_i (P_i^T - P_i^0) * (S_i^T - S_i^0). \qquad (4)$$

The first term is the within effect, similar to that in equation (1). The second term in equation (4) measures whether workers move to above-average productivity *level* sectors (static reallocation effect, which we will call the between-static effect). The third term in equation (4) is known as the cross term or interaction term (van Ark, 1996; Timmer, 2000). It represents the joint effect of changes in employment shares and sectoral productivity. It is positive (negative) if workers are moving to sectors that are experiencing positive (negative) productivity growth. Hence, the reallocation term of equation (1) is split into two terms: whether workers move to above-average productivity *level* sectors (static reallocation effect) and whether productivity *growth* is higher in sectors that expand in terms of employment shares (dynamic reallocation effect).[10]

[10] One might argue that the interaction term does not fully reflect structural change, as it interacts changing employment shares with productivity changes. However, the structural change term in equation (1), used by McMillan and Rodrik (2011) can be split into the second and third term of equation (4). Hence, their discussion of

The decomposition results of productivity growth across African countries during the period from 1960 to 2010 are presented in table 4. The rows show decomposition results from using equations (1), (2), (3) and (4). If final productivity levels are used as weights as in equation (1), the between effect is positive, but accounts for about 0.6 percentage points of average annual productivity growth in Africa.[11] Results from equation (2) suggest a much more positive contribution from structural change, whereas equation (3) takes middle ground between equation (1) and (2).

Equation (4) sheds further light on structural change in Africa. The static between effect suggests that labour has been moving to sectors with above-average productivity levels. This positive static reallocation effect is in accordance with the decomposition results for the other decomposition methods. However, the decomposition using equation (4) additionally shows that sectors that expanded in terms of employment shares experienced negative productivity growth. This is reflected in the negative dynamic between effect. The dynamic contribution of -0.8 per cent suggests that the marginal productivity of additional workers in expanding sectors has been below that of existing activities.

Table 4. Decomposition of productivity growth using various equations, total economy level results, 1960-2010

Decomposition equation used:	Labour productivity growth	Component due to:		
		Within	Between	
			Static	Dynamic
(1)	1.4	0.8	0.6	
(2)	1.4	-0.1	1.5	
(3)	1.4	0.3	1.1	
(4)	1.4	0.8	1.5	-0.8

Notes: For some countries value added and/or employment data for 1960 is missing, therefore we took the most nearby year for which data is available (BWA: 1964; ETH: 1961; KEN: 1969; MWI: 1966; MUS:1970; SEN: 1970; TZA: 1961; ZMB:1965). Unweighted average across 11 African countries. Numbers may not sum due to rounding.
Source: Authors' calculations using Africa Sector Database and equations (1) – (4).

Our decomposition results suggest that it is important to distinguish between static and dynamic reallocation effects. We therefore prefer decomposition equation (4), which

structural change combines the static and dynamic reallocation effect. We will show that it is important to make this distinction in order to understand differences in the role of structural change for growth between the period 1960 to 1975 and the period 1990 to 2010.

[11] Using equation (1) and the Africa Sector Database we find a positive static reallocation contribution. This finding differs from McMillan and Rodrik (2011) who use the same decomposition and (almost the same) time period but find a negative contribution from structural change. In appendix B we show that recent improvements in GDP and employment data for various African countries, which we were able to account for but they could not, explain this difference.

will be used in the remainder of the paper.

In the top panel of figure 2 we consider decomposition results for the different periods in African economic development. During the golden age of Africa's growth performance, roughly 1960-1975, static reallocation gains were substantial, while dynamic losses were small. We discussed in the previous section that workers moved out of agriculture and were absorbed in manufacturing. Productivity levels in manufacturing were much higher compared to agriculture, and did not decline a lot during this period. This is reflected in the positive static reallocation effect and the small negative dynamic reallocation effect.[12] Overall, it translates into high annual labour productivity growth in which structural change had a positive role to play during the period from 1960 to 1975.

During the crisis years, from about 1975 to 1990 in most countries, growth stagnated and so did structural change. Workers continued to move to higher productivity level sectors resulting in static reallocation gains, but labour flows were small.

After 1990, the movement of workers out of agriculture (and to some extent industry, see table 2) started to accelerate. This time, services activities expanded. The share of market services workers rose by more than 12 percentage points, from 12.8 in 1990 to 23.4 in 2010. The productivity level in market services was above the average of the total economy. As a result, static reallocation gains account for a substantial part of aggregate productivity growth. However, the marginal productivity of additional workers was low resulting in a negative dynamic reallocation effect. Overall, the combined reallocation effect was small, in line with McMillan and Rodrik (2011). However, the decomposition results presented here indicate why the reallocation effect during 1990 to 2010 is small and shows how it differs from the period 1960 to 1975.

In appendix figure C1, decomposition results are presented separately for each country included in the Africa Sector Database. Decomposition results do vary by country. For example, within-sector productivity growth is substantial in Ghana and South Africa, but not in Kenya. However, in most countries the dynamic reallocation effect is small during the period from 1960 to 1975 resulting in a positive contribution from structural change to growth. For all countries considered, the dynamic reallocation effect is negative after 1990. Although individual country experience do vary, the main results discussed in this section do not appear to be driven by individual country results.

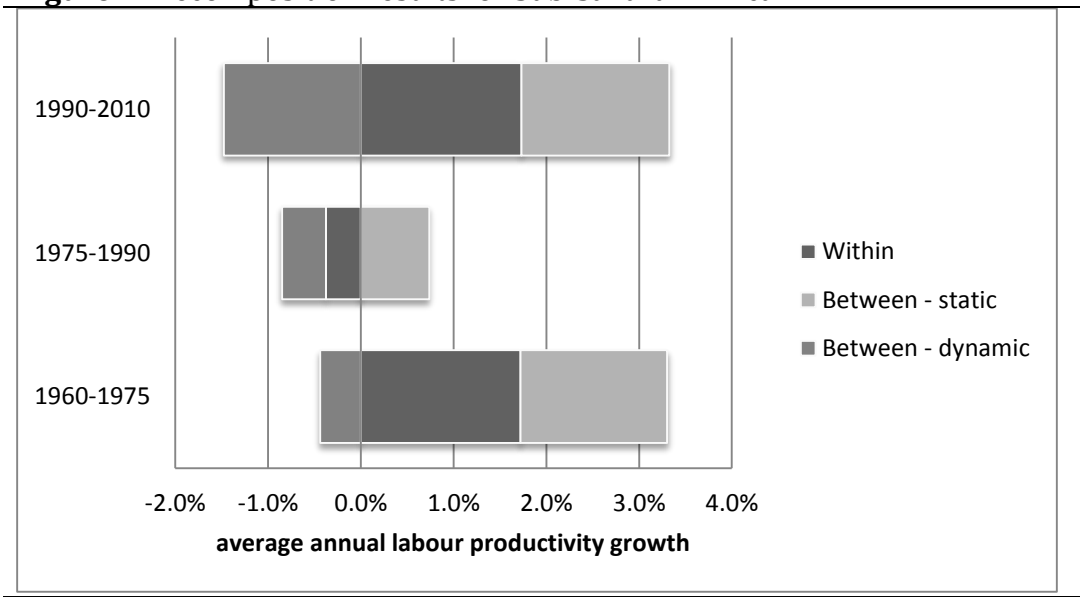
For comparison, we provide decomposition results across a set of Asian and Latin American countries using the updated GGDC 10-sector database (Timmer and de Vries, 2013) in figure 3. The dynamic reallocation term is much smaller for Asia, which suggests that workers in Asia did move to above-average productivity growth sectors (see also

[12] Typically the dynamic reallocation effect is often negative (but typically small) as it is difficult to absorb additional labourers at the same rate of marginal productivity, for example due to adjustment frictions or organizational restructuring (see van Ark (1996) for Europe, and Timmer (2000) for Asia).

Timmer, 2000). In particular during the period from 1960 to 1975 we find a positive dynamic reallocation effect for Asia.

Patterns of structural change in Africa appear much more comparable to those observed in Latin America. For Latin America we also observe static reallocation gains, but dynamic losses, consistent with findings by the Inter-American Development Bank (IDB, 2010). Indeed, also in Latin America we observe an expansion of market services after 1990. The expansion of market services with above-average productivity levels but below-average productivity growth results in static gains and dynamic losses for Latin America as well.

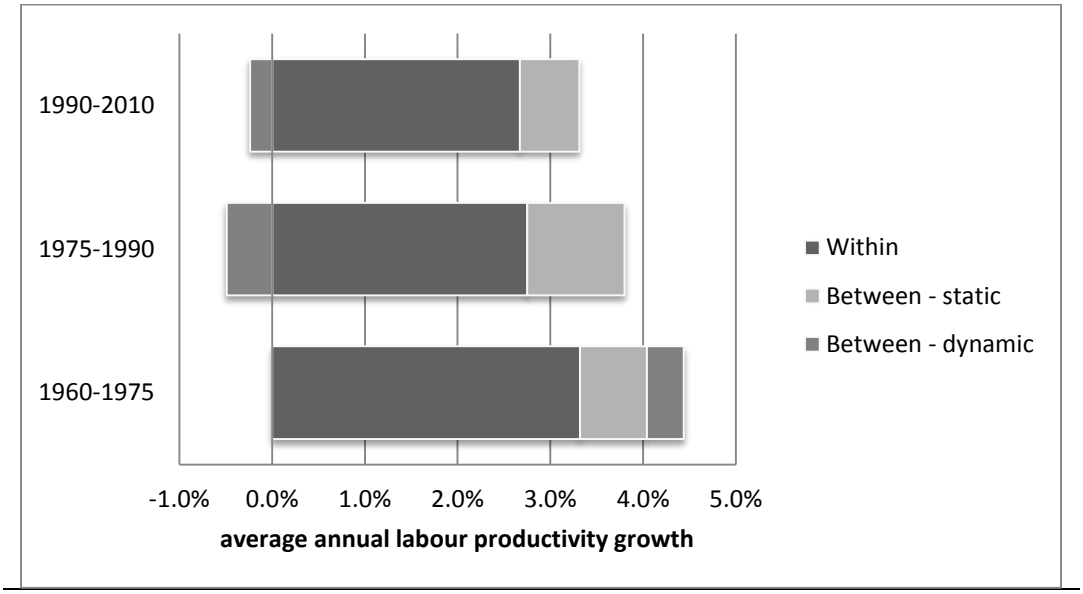
Figure 2. Decomposition results for Sub-Saharan Africa



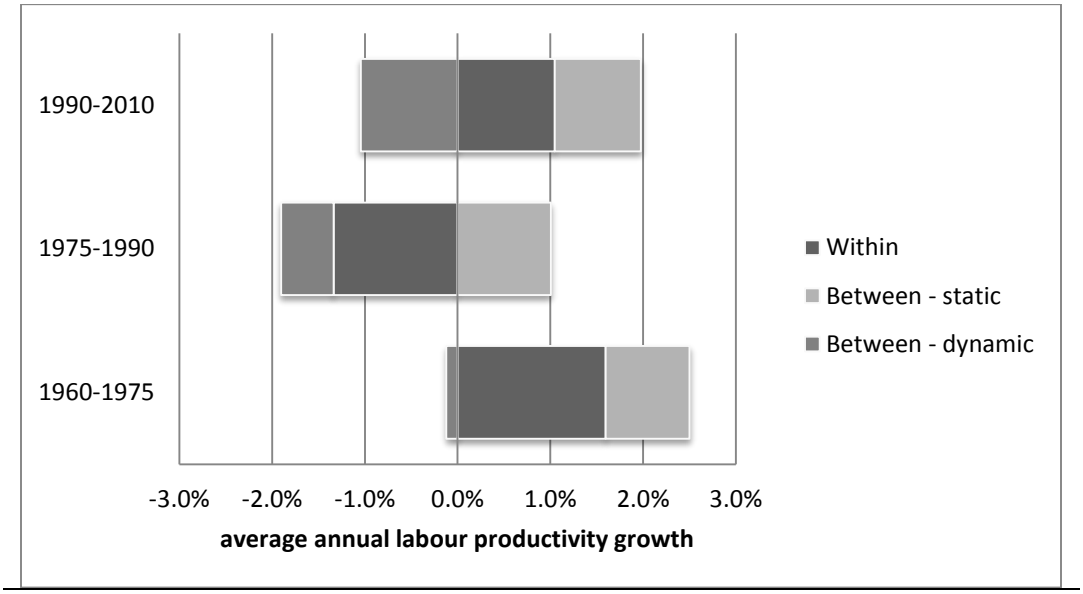
Notes: decomposition results using equation (4).
Sources: Africa Sector Database.

Figure 3. Decomposition results for Asia and Latin America

A. Asia



B. Latin America



Notes: decomposition results using equation (4)
Sources: Africa Sector Database; updated GGDC 10-sector database (Timmer and de Vries et al, 2013)

So far we have focused on aggregate effects. However, typically one is also interested in the role of sectors that account for these effects. For example, which sectors are responsible for the negative dynamic effects in accounting for growth in Africa? We explore this in the next section.

5. Structural change in Africa: the role of sectors

To properly measure the role of sectors in accounting for growth in Africa, we first have to adjust the decomposition presented in equation (4). The rationale for this adjustment is as follows. In the decomposition method presented in the previous section, all expanding sectors contribute positively to aggregate productivity, even when they have below-average productivity levels or growth rates (this holds across all methods presented so far). Consider, for example, the expansion of employment in market services at the expense of manufacturing. If productivity growth in market services is below average, while manufacturing productivity growth is above average, the shift in employment shares will result in lower aggregate productivity growth. Nevertheless, as measured in the traditional method, the contribution to structural change from the expansion of market services is positive. Thus, traditional decomposition methods are not well suited to measure the contribution of sectors to productivity growth.

In the modified method we adjust the static and dynamic reallocation effect of an expanding sector to take into account its relative productivity level and its relative productivity change. To this end, we divide sectors into expanding and shrinking ones based on their changes in employment shares and calculate the static between-effect relative to the average productivity *level* of the shrinking sectors and the dynamic between-effect relative to the average productivity *change* of the shrinking sectors. The decomposition in equation (4) is modified as follows[13]

$$P^T - P^0 = \sum_i^I (P_i^T - P_i^0) S_i^0 + \sum_j^J (S_j^T - S_j^0)(P_j^0 - P^{0*}) + \sum_j^J \left((P_j^T - P_j^0) - (P^{T*} - P^{0*})\right)(S_j^T - S_j^0) \quad (5)$$

where J is the set of expanding sectors, and K is the set of shrinking sectors, and average labour productivity of shrinking sectors at time 0 and T is given by

$$P^{0*} = \sum_k^K (S_k^T - S_k^0) P_k^0 \Big/ \sum_k^K (S_k^T - S_k^0) \quad (6)$$

$$P^{T*} = \sum_k^K (S_k^T - S_k^0) P_k^T \Big/ \sum_k^K (S_k^T - S_k^0) \quad (7)$$

Table 5 shows the decomposition results from using equation (5). We decompose labour productivity growth for each of the eleven African countries included in the Africa Sector Database, and report the unweighted average for the period from 1990 to 2010. This adjusted decomposition does not affect the aggregate contributions from the within and

[13] See Timmer and de Vries (2009) for a similar modification of the decomposition method presented in equation (3). Here we extend the modification to adjust for the dynamic between-effect as well.

between effects. However, using equation (5) we are better able to examine the contribution of sectors in accounting for productivity growth.

Table 5 suggests that an important contribution to productivity growth is accounted for by the shift of workers to above-average productivity level sectors. Across Africa this was the services sector. In particular, market services, which accounted for 0.96 percentage points of labour productivity growth.

Table 5. Decomposition of labour productivity growth,1990-2010

	Labour productivity growth	Component due to:		
			Between	
		Within	Static	Dynamic
Agriculture		**0.65**	**0.00**	**0.00**
Industry		**0.81**	**0.43**	**-0.34**
Mining		0.17	0.02	-0.01
Manufacturing		0.19	0.12	-0.12
Other industry		0.44	0.29	-0.21
Services		**0.38**	**0.96**	**-1.00**
Market services		0.15	0.82	-0.82
Distribution services		0.06	0.65	-0.70
Financial services		0.09	0.18	-0.12
Non-market services		0.23	0.14	-0.18
Governmental services		0.06	0.14	-0.15
Other services		0.17	0.00	-0.03
Total economy	**1.89**	**1.83**	**1.40**	**-1.34**

Notes: Figures are unweighted averages across eleven African countries.
Sources: Africa Sector Database and authors' calculations using equation (5).

Positive static reallocation gains are put into perspective in the light of the dynamic between effect in the decomposition method. The last column in table 5 suggests sectors that expanded in employment shares had productivity growth rates below those of shrinking sectors. Again, in particular the market services sector appears to account for a large part of these dynamics. The negative cross term for market services (-1.0 percentage points) suggests that productivity growth was well below those observed in shrinking sectors. A large part of these between effects are accounted for by distribution services. The negative dynamic between-effect is slightly larger than the positive static between-effect. The combined contribution from distribution services to structural change is negligible as a result.

6. Concluding remarks

The nature and speed of structural transformation is a key factor in accounting for economic growth across countries (Lin, 2011). As a result, the role of structural change in accounting for differences in growth across developing countries is receiving renewed attention (Rodrik, 2013b). So far, research for Africa has been confined to the post 1990 period. For this more recent period, McMillan and Rodrik (2011) argue that structural change did not contribute to growth in Africa, despite Africa's high growth performance.

This paper extended the debate on structural transformation in Africa by comparing current patterns of structural change to patterns observed in earlier periods of African economic development. We show that current development patterns in Africa differ markedly from that in earlier periods. In particular, we show that during the period from 1960 to 1975 in which Africa also recorded high growth, Africa took a step forward by expanding its manufacturing activities. This was related to growth enhancing structural change. In contrast, after 1990 market services activities expanded. Although productivity levels in market services were above the economy average, productivity growth was not. Therefore, we observe static reallocation gains but dynamic losses. The overall effect was a limited role for structural change post 1990, which compares unfavourably to Africa's earlier period of high growth. We show that these patterns are also observed in Latin America, but not in Asia.

This paper introduced the Africa Sector Database. The dataset includes annual time series of value added and persons employed for the ten main sectors of the economy. It extends McMillan and Rodrik (2011) covering eleven countries in Sub-Saharan Africa during the period 1960 to 2010. We have taken recent improvements in national account statistics in various countries into account, although the revisions to Nigeria's national accounts are still pending. The quality of Africa's national account and employment statistics certainly lacks behind those of most OECD countries (Jerven, 2013). However, we believe the Africa Sector Database provides a good starting point for economic analysis. Full documentation of the publicly and freely available database is available online at www.ggdc.net.

A full understanding of the driving forces in recent high GDP growth in Africa requires a decomposition of GDP per capita. Now we decompose GDP per worker, which leaves out changes in labour force participation and unemployment. Changes in female labour force participation and the demographic dividend may be important factors underlying recent GDP growth. In the next version we will extend the decomposition analysis presented in this paper to examine changes in GDP per capita.

References

Adeyinka,. A., S. Salau and D. Vollrath (2012), "Structural Change in. Nigeria", Mimeo University of Houston.

Ady, P. (1962). "Uses of National Accounts in Africa". *Review of Income and Wealth*, 1962(1), pp. 52-65.

Amiti, M. and S. J. Wei (2005). "Fear of Services Outsourcing: is it justified? *Economic Policy*, vol. 20(42), pp. 308-347.

Ark, B. van (1996). "Sectoral Growth Accounting and Structural Change in Post-war Europe." Chapter 3 in B. van Ark and N. Crafts (1996), Quantitative Aspects of Post-war European Economic Growth. Cambridge University Press.

Badiane, O., Ulimwengu, J., & Badibanga, T. (2012). "Structural Transformation Among African Economies: Patterns and performance". *Development*, vol. 55(4), pp. 463-476.

Blades, D. 1980. "What Do We Know About Levels and Growth of Output in Developing Countries? A Critical Analysis With Special Reference to Africa". *Economic Growth and Resources: Proceedings of the Fifth World Congress, International Economic Association, Tokyo*, Vol. 2, pp. 68–75.

Bondestam, L. (1973). *Some notes on African statistics: collection, reliability and interpretation*. Research report Nordiska Afrikainstitutet, Uppsala.

Bosworth, B. and Collins, S. (2008). "Accounting for growth: comparing China and India". *Journal of Economic Perspectives*, 22 (1), pp. 45–66.

Braun, J. von, & Kennedy, E. (1986). *Commercialization of Subsistence Agriculture: Income and Nutritional Effects in Developing Countries*. Washington, CDC: International Food Policy Research Institute.

Braun, J. von, & Kennedy, E. (1994). *Agricultural Commercialization, Economic Development, and Nutrition.* Johns Hopkins University Press.

CSO Ethiopia (1996). *The 1994 Population and Housing Census of Ethiopia: Statistical report.* Published by the Central Statistical Office of Ethiopia.

CSO Zambia (1995). *Census of Population, Housing and Agriculture 1990. Volume 10. Zambia Analytical Report*. Lusaka: Central Statistical Office.

CSO Zambia (2003). *2000 Census of Population and Housing. Zambia Analytical Report. Volume 10*. Lusaka: Central Statistical Office.

Devarajan, S. (2013). "Africa's Statistical Tragedy". *Review of Income and Wealth*, vol.59 (2), pp. 1-7.

Egerö, B., & Henin, R. A. (1973). *The Population of Tanzania. An Analysis of the 1967 Population Census.* Dar es Salaam: Bralup.

Ellis, S. (2002). "Writing Histories of Contemporary Africa". *Journal of African history*, vol. 43 (1), pp. 1-26.

Fabricant, S. (1942). *Employment in Manufacturing, 1899-1939.* NBER, New York.

Fox, L., & Pimhidzai, O. (2013). "Different dreams, same bed: collecting, using, and interpreting employment statistics in Sub-Saharan Africa--the case of Uganda". World Bank Policy Research Working Paper, (6436).

Garcia-Verdu, R., Thomas, A., & Wakeman-Linn, J. (2012). "Structural Transformation in sub-Saharan Africa". *Regional Economic Outlook: Sub-Saharan Africa. Maintaining Growth in an Uncertain World*. Washington D.C.: International Monetary Fund, pp. 51-71.

Ghana Statistical Service (2010). "News Brief. New Series of the Gross Domestic Product Estimates". Ghana Statistical Service.

Gollin, D., D. Lagakos, M. E. Waugh (2012). "The Agricultural Productivity Gap in Developing Countries," mimeo Oxford University.

Griliches, Z., & Regev, H. (1995). "Firm productivity in Israeli industry 1979–1988". *Journal of Econometrics*, 65(1), pp. 175-203.

Gunning, J. W., and P. Collier (1999). "Explaining African Performance," *Journal of Economic Literature*, vol. 37(1), pp. 64-111.
Haltiwanger, J. C. (2000). *Aggregate Growth: What Have We Learned From Microeconomic Evidence?* (Vol. 8, No. 78). Paris: OECD.
Hsieh, C. T., & Klenow, P. J. (2009). "Misallocation and Manufacturing TFP in China and India". *The Quarterly Journal of Economics*, 124(4), pp. 1403-1448.
Inklaar, R. C. and M. P. Timmer (2008). "Accounting for growth in retail trade: an international productivity comparison". *Journal of Productivity Analysis*, vol. 29, pp. 23-31.
Inklaar, R. C. and M. P. Timmer (2013). "The Relative Price of Services". Forthcoming *Review of Income and Wealth*.
IDB (2010). *The Age of Productivity: Transforming Economies from the Bottom Up*. Palgrave Macmillan, New York.
Jedwab, R. (2013). "Urbanization without Structural Transformation: Evidence from Consumption Cities in Africa." Mimeo George Washington University.
Jerven, M. (2013). *Poor Numbers: How We are Misled by African Development Statistics and what to Do about it.* Cornell University Press.
Jorgenson, D. W., and M. P. Timmer (2011). "Structural Change in Advanced Nations: A New Set of Stylised Facts", *Scandinavian Journal of Economics*, 113(1), pp. 1-29.
Kpedekpo, G. M., & Arya, P. L. (1981). *Social and Economic Statistics for Africa: Their Sources, Collection, Uses and Reliability.* London: Allen & Unwin.
Kuznets, S. (1966). *Modern Economic Growth: Rate, Structure and Spread*. Yale University Press, London.
Lin, J. (2011). New structural economics: a framework for rethinking development. *The World Bank Research Observer* 26 (2), 193‐221.
Lehohla, P. (2008). "Statistical Development in Africa in the Context of the Global Statistical System". *Statistical Journal of the IAOS: Journal of the International Association for Official Statistics*, 25(1), pp. 27-45.
Lewis, W.A. (1954). "Economic Development With Unlimited Supplies of Labour". *Manchester School of Economic and Social studies*, vol. 22, pp.139-191.
McMillan, M. S., & Rodrik, D. (2011). "Globalization, structural change and productivity growth (No. w17143)". NBER, New York.
Ministry of Finance and Economic Development Ethiopia (2013), National Economic Accounts Statistics of Ethiopia. Estimates of the 2010/11 base year series (2003 Ethiopian Fiscal Year). Retrieved from: http://www.mofed.gov.et/English/Resources/Documents/ESTIMATES%20OF%20THE%202010-2011%20BASE%20YEAR%20SERIES%20(2003%20ETHIOPIAN%20FISCAL%20YEAR).pdf [accessed 29-4-2013).
Morgenstern, O. (1965). *On the Accuracy of Economic Observations. Second Edition*. Princeton University Press, Princeton.
OECD (2013). "Structural Transformation and Natural Resources in Africa". *African Economic Outlook 2013: Structural Transformation and Natural Resources.* OECD Publishing, pp.111-189.
Page, J. (2012). "Can Africa Industrialise?" *Journal of African Economies*, 21(suppl 2), pp. 86-124.
Posel, D., & Casale, D. (2001). "Gender Aggregates: Women Subsistence Farmers Affect The Unemployment Count". *Agenda*, 16(49), pp. 82-88.
Poulton, C., Tyler, G., Hazell, P., Dorward, A., Kydd, J., & Stockbridge, M. (2008). "All-Africa Review of Experiences with Commercial Agriculture: Lesson from Success and Failure. Background paper for the Competitive Commercial Agriculture in Sub-Saharan Africa (CCAA) Study". Washington, DC: World Bank.

Prasada Rao, D. S. (2005). "On The Equivalence Of Weighted Country-Product-Dummy (CPD) Method And The Rao-System For Multilateral Price Comparisons," *Review of Income and Wealth*, vol. 51(4), pp. 571-580.

Rakotoarisoa, M. A., Massimo. Iafrate, & Marianna. Paschali. (2011). *Why has Africa Become a Net Food Importer*. Trade and Markets Division, Food and Agriculture Organization of the United Nations.

Rodrik (2013a), "Unconditional Convergence in Manufacturing." *Quarterly Journal of Economics*, vol. 128 (1), pp. 165-204.

Rodrik (2013b), "Structural Change, Fundamentals, and Growth: An Overview" mimeo Princeton University.

Schneider, F. (2005), "Shadow economies around the world: what do we really know?" *European Journal of Political Economy*, vol. 21 (3), pp. 598-642.

Saito, K. A., Mekonnen, H., & Spurling, D. (1994). *Raising the productivity of women farmers in Sub-Saharan Africa* (Vol. 230). World Bank Publications.

Timmer, M. P. (2000). *The Dynamics of Asian Manufacturing. A Comparison in the late Twentieth Century*. Edward Elgar Publishers, Cheltenham.

Timmer, M. P. and G. J. de Vries (2009), "Structural Change and Growth Accelerations in Asia and Latin America: A New Sectoral Data Set" *Cliometrica*, vol 3 (2) pages 165-190.

Timmer, M. P. and G. J. de Vries (2013). Patterns of Structural Change Across Developing Countries. Mimeo Groningen Growth and Development Centre.

Veen, R. J., & Smeets, I. (2004). *Afrika: van de Koude Oorlog Naar de 21ste eeuw*. KIT Publishers.

Vries, G.J. de, A. A. Erumban, M. P. Timmer, I. Voskoboynikov, H. X. Wu (2012). "Deconstructing the BRICs: Structural Transformation and Aggregate Productivity Growth". *Journal of Comparative Economics*, vol. 40(2), pp. 211-227.

Vries, K. de, R. Gouma, G. J. de Vries, M. P. Timmer (2013). The Africa Sector Database: Sources and Methods. Mimeo Groningen Growth and Development Centre.

WDI (2011). World Development Indicators 2011. World Bank, Washington D.C.

Young, A. (2012). "The African Growth Miracle". Mimeo London School of Economics.

Appendix A. The Quality of the African National Accounts and Employment Data

The official compilation of national accounts rapidly expanded in Africa during the 1950s (Ady, 1962). Many countries started to publish estimates of GDP. These statistics were almost invariably obtained as the summation of value added by economic activity (Blades, 1980). That is, estimates of GDP are compiled in first instance from a production approach, which provides the data we need for sectoral GDP estimates. Most National Statistical Institutes (NSIs) started to use the UN System of National Accounts (UN SNA).

By the late 1950s, many countries started to publish national accounts on a regular basis. Ady (1962) argues that rapid improvements in the estimates took place during the early years. We therefore start with time series for South Africa, Ghana, Kenya, Tanganyika (Tanzania) and Nigeria in 1960. Column (1) in appendix table A1 shows the initial year in which national accounts data are published, whereas column (2) shows when the time series start. Blades (1980) uses the qualitative assessments of the reported numbers by the NSIs to estimate the error ranges of GDP by sector. Typically, the error range of the GDP estimate is large for traditional activities within sectors, especially for subsistence agriculture. In column (3) of appendix table A1 we present the error range for aggregate GDP presented in Blades (1980), which is two times the standard deviation of the estimate. That is, the 95 per cent confidence interval of the GDP estimate is ±per cent the error range. The average of the error range for the five African countries is ±20 per cent. This suggests that the GDP estimates for Africa in the 1970s are about twice the US error in the 1940s (Blades, 1980). Although the error is substantial, it was probably not much worse compared to estimates for Asia and Latin America (Blades, 1980). At least many surveys tracked a large part of economic activity. And in principle, the UN SNA provides an excellent framework for the measurement of economic activities and various firm and household surveys were put in place to track economic activity.

Our approach is to link the most recent revision of GDP levels to past series using annual growth rates. Therefore, errors in estimates of growth rates are more relevant. Typically it is assumed that the same error in GDP levels applies to annual changes (Morgenstern, 1965). However, the absolute error in the change from year to year is likely to be less compared to the absolute values if the national accountant only considers the probable change from the previous year. This implies that annual changes might have different and lower errors. Unfortunately, GDP growth rates are typically not systematically examined for their reliability. Blades (1980) suggests that African GDP growth rates may have a (two sigma standard) error of 3 percentage points in the 1970s, which is sizeable. However, Blades (1980) also notes that growth rates averaged over five to ten year periods are more accurate compared to annual changes. We will return to this issue later when we discuss prudent use of the database.

Appendix table A1. Reliability of GDP estimates

Country	First estimate of GDP (in current prices)	Start of time series	Error margin (1970)*	Statistical capacity level (2010)**	Latest revision of the base year	SNA currently used
	(1)	(2)	(3)	(4)	(5)	(6)
Botswana	1964	1964	17%	57	2006	SNA93
Ethiopia	1961	1961		77	2011	SNA93
Ghana	1960	1960		66	2006	SNA93
Kenya	1947	1947	15%	62	2001	SNA93
Malawi	1955	1955	22%	79	2007	SNA08
Mauritius	1950	1950		77	2006	SNA93
Nigeria	1950	1951	27%	69	1990	SNA68
Senegal	1959	1969		74	1999	SNA93
South Africa	1946	1946		80	2005	SNA93
Tanzania	1952	1954	19%	68	2001	SNA93
Zambia	1955	1955		59	1994	SNA93

* Error margin is the mid-point estimate presented in Blades (1980). This number (± per cent) gives the 95 per cent confidence interval of the GDP estimate.
** Figures taken from The World Bank's Bulletin Board on Statistical Capacity.

As time moved on, economic realities changed. The inherited set of surveys and inquiries were less capable of accurately capturing the rising share of informal economic activities. Also, capabilities by statisticians deteriorated, partly due to limited funding. In a nutshell, the main weaknesses relate to tracing agricultural output over time, and measuring services sectors value added and unorganized activities. Overall, this implies that GDP estimates in the 1980s were increasingly unrepresentative of the total economy.

In recent years, many NSIs have undertaken a substantial revision of their GDP estimates. New surveys were conducted that aimed to get a better hold on economic activity within the territory. This has led to substantial revisions in GDP levels. For example, Ghanaian GDP was revised upwards by 62 per cent in 2010. Similarly, Malawi revised its GDP upward by 30 per cent. A revision for Nigeria is still pending. The most recent revision of GDP is for Ethiopia. Ethiopia changed its base year from 2000 to 2011 (Ministry of Finance and Economic Development 2013). This revision amounted to a minor 1 per cent change in GDP. In column (5) of appendix table A1 we show the latest revision of the base year. Outdated base years signal lower reliability of the statistics. In support of the recent improvements in statistical quality, many African countries included in the dataset have a recent base year.

The size of the recent revisions to GDP might be related to the statistical capacity of the NSI. The World Bank's Bulletin Board on Statistical Capacity measures the capacity in countries to collect, manage and disseminate data. This measure is based on various indicators, such as the frequency of updating the base year and the most recent SNA

manual that is used. The statistical capacity levels for 2010 are shown in column 4. The level ranges from 0 to 100. For comparison, the average level in Europe and Central Asia is 81. The average level for Sub-Saharan countries combined is 58. This suggests that most countries included in the dataset rank relatively favourable in terms of statistical capacity compared to the average for Sub-Saharan African countries.

Many scholars have noted that various (modern) concepts used in measuring the labour force are not aligned with economic reality in Africa, especially during the early post-colonial period (Kpedekpo and Arya, 1981). For example, Egerö and Henin (1973) noted that in Tanzania there is no adequate translation in Swahili to distinguish between occupation and industry, and people were used to associate being employed with wage employment. This implies that cross-classifying workers by sector and work status is difficult for Tanzania and probably other countries as well. Another important issue is with respect to measures of underemployment. Many African workers are neither fully employed nor wholly unemployed. Especially in agriculture, the entire family works on the farm. As a result, there will be substantial differences in unemployment rates between rural and urban areas. Employment in our data set is defined as 'all persons employed', thus including all paid employees, but also self-employed and family workers of 15 year and older (although in some cases it is 10 or 12 years and older). Due to substantial underemployment, employment measures based on hours work would be preferable, but these are not available.

Appendix table A2. Employment data

Country	Main source employment numbers (1)	Main benchmark years (2)	Lower age limit (used in SCAD)
Botswana	Census	1964, 1971, 1981, 1991, 2001, 2006	12+
Ethiopia	Census and Survey	1970, 1984, 2007	10+
Ghana	Census	1960, 1970, 1984, 2000, 2010	15+
Kenya	Census and Survey	1969, 1979, 1989, 1999, 2006	15+
Malawi	Census	1966, 1977, 1987, 1998, 2008	15+
Mauritius	Census and Survey	1962, 1972, 1983, 1990, 2000, 2011	12+
Nigeria	Survey	1960, 1967, 1975, 2009	15+
Senegal	Survey	1971, 1991, 2005	15+
South Africa	Census and Survey	1960, 1970, 1980, 1985, 1991, 1996, 2000-2011	15+
Tanzania	Census	1967, 1978, 1988, 2002	15+
Zambia	Census	1969, 1980, 1990, 2000, 2008	12+

Questions in the census that relate to employment may vary over time and across countries. We tried to harmonize the data as far as possible, thus using the preferred time reference of 12 months and the age limit of 15 years and over. Some censuses were not

used because of missing questions pertaining to the industry of the employed. Other census results were heavily contested, like the ones held in Nigeria in 1963, 1973 and 1991, which forced us to rely on surveys. Historically, there have been inconsistencies in the way African statistics has treated those engaged in small-scale farming. There has been a tendency to classify small-scale farmers as inactive rather than as employed, and particularly in the case of women, whose farming activities may have been seen as an extension of their household work (Posel and Casale, 2001). This practice differs across countries and is partially related to religion and culture. In our sample of countries, Senegal appears to exclude women from agricultural employment in early post-colonial census, whereas they are included in the labour force in later censuses. Similar observations are apparent for Tanzania and Zambia. We adjusted employment numbers to include female workers in the labour force when there was a clear bias in reporting females as household workers only. Sometimes this involved the use of additional labour force surveys, such as in the case of Senegal and Zambia.

A final issues concerns the fact that a population census is usually undertaken once every 10 years (see column 2 in appendix table A2 for the census years included). As a result, we miss important dynamics for years in between. In some cases we could use annual labour force statistics to interpolate sectoral trends between census years. Often we interpolate using average labour productivity growth rates between the censuses (see de Vries et al., 2013 for detailed approaches on a country-by-country basis). The time intervals of employment estimates aligns with the recommendations by Blades (1980) on the use of data for gross domestic product. Blades (1980) argues that 5 or 10 year averages of real growth rates are most reliable.

Appendix B. Detailed comparison of the McMillan and Rodrik (2011) dataset to the Africa Sector Database

In this appendix we show how recent improvements to GDP and employment statistics alter the estimates for Africa presented in McMillan and Rodrik (2011).

In table B1 we compare the decomposition results from McMillan and Rodrik (2011) to ours. The dataset used by MR is available online, and we were able to replicate their results using the same decomposition method (equation 1) and time period (1990-2005) as used by MR. For comparison, we applied the same method, country coverage, and time period to the dataset that we constructed. As a result, any differences in decomposition results must be due to differences in the data. Table B1 suggests that the datasets do differ and give substantially different results with respect to the effect of structural change. Below we explore the main differences in the datasets that underlie these findings.

Table B1. Decomposition of productivity growth in MR and ASD database, 1990-2005

	Labour productivity growth	Component due to: Within	Structural change
MR (2011)	0.86	2.13	-1.27
Ours	1.55	1.04	0.51

Sources: Dataset McMillan and Rodrik (2011) downloaded from http://www.hks.harvard.edu/fs/drodrik/research.html, December 2012. Our dataset available at www.ggdc.net. 9 countries: ETH, GHA, KEN, MWI, MUS, NGA, SEN, ZAF, ZMB. Authors' calculations using equation (1).

At the country-level, the main difference in the decomposition results between MR and ours is for Zambia. The MR dataset suggests that for Zambia there is a 7.6 percentage points within contribution and a -8.0 percentage points structural change contribution to economic growth.[14] This result is mainly due to the MR dataset suggesting that workers moved back into traditional agriculture, with the agricultural employment share rising by 20 percentage points from 1990 to 2005. However, a closer look at the numbers reveals that this rise in agricultural employment is mainly due to the under coverage of female workers for earlier years in the MR dataset.

Females have been severely undercounted in Zambian post-independence censuses until the 2000 population census (CSO Zambia, 1995; CSO Zambia, 2003). The low female share in total employment mainly reflects a low female share in agricultural employment as women are often responsible for food production (Saito et al., 1994). Capturing female workers into the labour force statistics poses quite a challenge, as the meaning of 'work' in Africa differs from OECD countries where the standards in methodology are set. Fox and

[14] In fact, if Zambia is removed from the sample, the average structural change term would change from minus 1,27 to minus 0,42.

Pimhidzai (2013) point to the necessity of sufficient probing by enumerators and detailed screening questions to determine whether a female is to be categorized as a home maker or as being employed. One of the downsides of a census in this regard is the briefness of the questionnaire.

Zambia has various surveys to cross-check the census employment figures. The most important are the Labour Force Surveys (LFS), which have been held in 1986, 2005 and 2008. Another source for labour market statistics are the living conditions monitoring surveys that have been held since the 1990s. All these sources show female participation rates that are similar to the 2000 census results and hence do not signal a dramatic rise in female agricultural employment. In the LFS, extra questions were included to determine the size of subsistence farming, the most important component of agricultural employment in Zambia. We used the 1986 LFS to correct the 1990 census results (see de Vries et al. (2013a) for details). After this improvement to the employment data, the decomposition results for Zambia change considerably. The within component changes from 7.6 to 1.8 percentage points and the structural change term changes from -8.0 percentage points to 0.1.

The adjustment to the data for Zambia increases the average structural change term in MR. However, despite the adjustment, structural change is still negative in their dataset. One more improvement to the data overturns the finding of growth reducing structural change. The dataset by MR for Senegal has two odd characteristics. First, employment numbers for 1990 are set equal to those in 1991 while the value added data for 1990 is not the same as in 1991. Second, value added data for 2005 is set equal to 2004, but employment numbers show strange jumps from 2004 to 2005. For example, manufacturing employment rises by 60 per cent, mining employment declines by 140 per cent and employment in public utilities declines by 220 per cent. The decomposition of productivity growth in Senegal for the period from 1990 to 2005 suggests that structural change contributed -3.1 percentage points to growth. However, given the erroneous numbers for 1990 and 2005, it might be more appropriate to undertake the decomposition for the period from 1991 to 2004. For this time period, the contribution from structural change is 1.7 percentage points. Adjusting this caveat and the one for Zambia overturns the results by MR. The negative contribution to growth from structural change turns positive as a result.

A few more cases illustrate that structural change has been growth enhancing across most African countries. According to the MR dataset, the agricultural employment share in Nigeria has risen between 1990 and 2005. MR find that structural change reduced growth by 2.2 percentage points in Nigeria. However, the main source of information on the Nigerian labour market, the General Household Survey, suggests that the agricultural employment share has fallen. As a result, Adeyinka et al. (2012) find that structural change has positively contributed to growth in Nigeria. Our findings also suggest that workers have been moving to above-average productivity sectors. For Malawi, sector trends after

1998 differ between the MR dataset and the Africa Sector Database. In MR less productive sectors expanded after 1998. However, the Africa Sector Database incorporates the recently release 2008 census employment numbers, which suggests that above average productivity sectors expanded in terms of employment shares. As a result, we find a positive structural change effect for Malawi as well.

Below we provide a detailed country-by-country comparison of the M & R and ASD database for the period 1990-2005. Discussions will address differences with regard to employment and output estimates.

Ethiopia

For their sectoral employment estimates M & R used the 1994 census data and 1999 and 2005 labour force surveys. We question the reliability of the 1994 census results for two reasons. First the employment to population rate seems too high (over 50 per cent of the total population is employed) in comparison with other Ethiopian sources and certainly with other African countries (usually it lies between 30 and 40 per cent). In addition, the sectoral distribution derived from this census is not reconcilable with other Ethiopian sources (for example the size of the agricultural sector). We suspect that the political turmoil in Ethiopia in the beginning of the 1990s, when Eritrea seceded after a civil war, put strains on the countries statistical capacity. Indeed, the 1994 census report mentions some regions which have been excluded from the counting process, regions which are estimated to contain 20 per cent of the country's population (CSA Ethiopia 1996). Hence, the ILO simply upwardly adjusted the employment figures with 20 per cent, and this is the data M & R use (ILO Yearbook 1997). We further note that M & R froze their employment estimates for 1990-1994, where we used the 1984 census to interpolate the figures.

Consistent with their employment estimates M & R also froze their output estimates for Ethiopia for the years 1990-1994. In the absence of official statistics UNECA statistical yearbook made their own sectoral estimates for these years, which we have used. However the 1994-1995 M& R data shows some strange breaks, for example the non-market services share in value added declines from 22 to 9 per cent while agriculture's share rises from 45 to 55 per cent. Another major difference between the two sets is that M & R systematically reported identical sectoral growth rates for the period 1996-2005 one year ahead of ASD. This could be due to the fact that the Ethiopian fiscal calendar runs from July 8 year t=0 to July 7 year t=1. Following the UN statistics we date the figures according to the latest mentioned year, thus 2010/2011 would be 2011.

Ghana

In general there is not much discrepancy between the employment estimates for Ghana, although differences are substantial for smaller, less important sectors. What should be noted however is that the data for the years 1990 and 1991 are frozen in M & R, while this

is not the case for value added data for these years, which causes an unnecessary distortion in the productivity analysis.

We found a larger discrepancy in the value added data. In 2010 Ghana statistical service overhauled the base year of their output statistics from 1993 to 2006, which led to a 60 per cent upward revision of GDP in 2006. When the World Bank gave the revision its official stamp Ghana's status was changed from low-income to middle-income. The perception of the structure of the economy was altered along with the upward revision. The share of services in the total economy rose (from 32,9% to 48,8%) at the expense of agriculture (38,8 to 30,4) and industry (from 28,3 to 20,8). As a result, Agriculture, which had the largest share in the old series, was overtaken by the services sector (Ghana Statistical Service, 2010). With this revision the Ghanaian economy also turned out to be much more productive. In M & R's dataset, who used the 'old' GDP estimates, the within term contributed 0,5%, while in the ASD database it is 2,5%, the contribution of structural change being more or less even. Lastly we mention the existence of growth rates around or above 100 per cent for the years 1992-1993 in M & R. Official data national accounts between 1987 and 1992 was discontinued, as was in the case with Ethiopia also for Ghana we used the sectoral growth rates produced by UNECA.

Kenya

There are large differences in employment estimates between the two datasets. Especially the evolution of the manufacturing (D) and wholesale, retail trade and hotels and restaurants (G+H) industries differs very much. Over the period 1990-2005 M & R report strong growth in shares of industry D (5 per cent) and G+H (18 per cent) while ASD numbers suggest a stagnating share for industry D and less pronounced rise for industry G+H (7 per cent). Both sets used sectoral trends from the establishment survey which include an informal sector module. We however use this data to interpolate benchmark data from the 1999 and 2005 Labour Force Survey's. We further note that data for 1990-1992 is frozen in M & R's dataset, while this is not the case for the value added data for these years.

Both datasets used value added series rebased in 2001 prices, which only go back to 1996. For the ASD pre-1996 sectoral growth rates were taken from older series, while M & R seem to use a different source. The growth rates in M & R for the years 1995-1996 seem questionable, with sectoral growth rates ranging from -42 to 77 per cent.

Mauritius

Data for this country in both sets is highly similar and thus not discussed in more detail here.

Malawi

Next to the differences in employment, which are discussed in the text, there are large discrepancies in the value added data in the two datasets. First, for the years 1990-1993 aggregate growth rates have been applied for all sectors in M & R, while official data for these years is available. Next, we used data from the last revision (2007 base year) which changes the growth rates and shares of industries. Lastly in M & R growth rates for 2004-2005 are off, certainly in comparison with earlier years, with sectoral rates ranging from -20 to 59 per cent.

Nigeria

The dissimilarities in employment are already addressed in the text. The same sources have been used to compile the value added series, only in the ASD two corrections to this data have been made. These corrections relate to the anomalies in the Nigerian value added data also detected by Adeyinka et al (2012). It pertains to a large one-time spike in agriculture for 2002 and a 1300% rise in production in the electricity sector for 2001.

Senegal

The main differences in the two datasets pertaining to the Senegalese data are discussed above.

South Africa

Data series in both sets are highly comparable, except for agricultural employment. In the ASD we adjusted agricultural employment figures to include subsistence farming in order to make the data as consistent as possible with the other countries in the set.

Zambia

The main differences in the two datasets pertaining to the Senegalese data are discussed above.

Appendix C. Appendix Tables and Figures

Appendix Table C1. GDP, employment, and relative productivity levels, Botswana, 1964 -2010

	Value added				Employment				Relative productivity levels			
	1960	1975	1990	2010	1960	1975	1990	2010	1960	1975	1990	2010
Agriculture	**43.5**	**27.9**	**4.6**	**3.3**	**87.5**	**67.5**	**40.2**	**38.5**	**0.3**	**0.3**	**0.1**	**0.1**
Industry	**13.3**	**33.8**	**58.0**	**41.2**	**4.1**	**9.3**	**22.3**	**11.9**	**6.7**	**4.8**	**2.6**	**3.0**
Mining	9.3	9.9	40.8	27.9	1.1	3.4	3.3	2.0	14.0	4.1	12.4	9.3
Manufacturing	2.0	10.5	6.9	6.8	1.4	1.7	5.8	6.6	0.5	6.1	1.2	1.2
Other industry	2.0	13.4	10.4	6.5	1.6	4.2	13.2	3.3	7.0	4.8	0.8	2.8
Services	**43.2**	**38.3**	**37.4**	**55.5**	**8.4**	**23.2**	**37.5**	**49.6**	**5.4**	**1.6**	**1.0**	**1.2**
Market services	24.1	21.4	20.1	31.5	3.4	5.0	13.5	29.7	8.5	4.8	1.5	1.3
Distribution services	*21.1*	*16.2*	*14.8*	*21.4*	*2.8*	*4.0*	*9.8*	*22.7*	*10.0*	*4.9*	*1.4*	*1.2*
Fin. and bus. ser.	*3.0*	*5.2*	*5.3*	*10.1*	*0.7*	*1.0*	*3.7*	*7.1*	*2.7*	*3.9*	*1.7*	*1.7*
Non-market services	19.1	16.9	17.3	24.0	4.9	18.2	24.0	19.8	3.2	0.8	0.8	1.2
Government services	*12.9*	*12.3*	*13.4*	*17.6*	*2.6*	*9.4*	*14.4*	*17.0*	*5.2*	*1.3*	*0.9*	*0.9*
Other services	*6.2*	*4.6*	*3.9*	*6.4*	*2.3*	*8.8*	*9.6*	*2.8*	*1.0*	*0.2*	*0.5*	*2.9*
Total economy	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**1.0**	**1.0**	**1.0**	**1.0**

Notes: Other industry includes construction and public utilities. Distribution includes transport services and distributive trade as well as hotels and restaurants. Finance and business services excludes real estate activities. Other services includes other community, personal and household services. Numbers may not sum due to rounding.
Source: Authors' calculations using the Africa Sector Database.

Appendix Table C2. GDP, employment, and relative productivity levels, Ethiopia, 1961 -2010

	Value added				Employment				Relative productivity levels			
	1961	1975	1990	2010	1961	1975	1990	2010	1961	1975	1990	2010
Agriculture	**81.1**	**69.5**	**64.1**	**48.0**	**96.2**	**90.9**	**89.4**	**75.1**	**0.9**	**0.8**	**0.7**	**0.6**
Industry	**7.9**	**10.2**	**10.8**	**11.0**	**1.5**	**2.1**	**2.2**	**8.8**	**3.7**	**4.5**	**4.9**	**1.5**
Mining	0.2	0.4	0.4	0.6	0.0	0.0	0.1	0.5	24.3	9.1	2.7	1.2
Manufacturing	2.0	4.0	4.2	4.4	1.3	1.7	1.8	6.2	1.6	2.0	2.6	0.8
Other industry	5.7	5.7	6.2	5.9	0.2	0.3	0.3	2.1	16.8	16.7	17.6	3.5
Services	**11.1**	**20.3**	**25.1**	**41.0**	**2.3**	**7.1**	**8.3**	**16.0**	**4.1**	**2.9**	**3.1**	**2.8**
Market services	7.5	14.4	15.7	30.3	1.1	3.8	4.2	11.2	6.2	4.4	4.7	2.7
Distribution services	7.1	13.4	14.4	24.2	1.0	3.6	4.1	10.7	6.7	4.1	4.1	2.3
Fin. and bus. ser.	0.3	1.0	1.3	6.1	0.1	0.1	0.1	0.4	3.3	14.0	28.3	13.8
Non-market services	3.6	5.9	9.4	10.7	1.2	3.3	4.2	4.9	2.1	1.2	1.5	2.9
Government services	1.7	3.3	6.4	7.6	0.8	1.7	2.1	2.5	2.3	1.5	2.1	4.4
Other services	1.9	2.6	3.0	3.1	0.4	1.6	2.1	2.4	1.8	0.9	0.9	1.2
Total economy	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**1.0**	**1.0**	**1.0**	**1.0**

Notes: Other industry includes construction and public utilities. Distribution includes transport services and distributive trade as well as hotels and restaurants. Finance and business services excludes real estate activities. Other services includes other community, personal and household services. Numbers may not sum due to rounding.
Source: Authors' calculations using the Africa Sector Database.

Appendix Table C3. GDP, employment, and relative productivity levels, Ghana, 1960 -2010

	Value added				Employment				Relative productivity			
	1960	1975	1990	2010	1960	1975	1990	2010	1960	1975	1990	2010
Agriculture	**27.5**	**29.9**	**32.6**	**30.6**	**60.7**	**53.9**	**53.5**	**41.6**	**0.6**	**0.6**	**0.6**	**0.7**
Industry	**30.2**	**30.2**	**24.5**	**19.7**	**16.7**	**17.9**	**15.9**	**15.4**	**2.0**	**1.9**	**1.5**	**1.5**
Mining	3.9	3.0	3.4	2.4	1.9	0.8	0.9	1.1	3.5	5.2	3.2	2.7
Manufacturing	13.4	17.9	14.0	7.0	10.9	14.4	12.9	10.8	1.3	1.3	1.0	0.8
Other industry	12.9	9.3	7.2	10.3	3.9	2.7	2.0	3.5	3.4	4.1	3.8	3.1
Services	**42.3**	**39.9**	**42.9**	**49.7**	**22.6**	**28.2**	**30.6**	**43.1**	**1.3**	**1.2**	**1.5**	**1.1**
Market services	27.0	23.7	31.8	32.4	17.1	17.2	20.5	30.2	1.4	1.4	1.5	1.1
Distribution services	22.0	18.5	27.4	25.4	16.8	16.9	19.8	27.9	1.3	1.3	1.3	1.0
Fin. and bus. ser.	5.0	5.2	4.4	7.1	0.3	0.3	0.7	2.3	6.0	7.4	6.0	2.5
Non-market services	15.3	16.1	11.1	17.3	5.5	11.0	10.1	12.9	1.1	0.9	1.5	1.1
Government services	14.2	12.2	7.9	13.2	3.8	6.4	5.8	6.6	1.4	1.1	1.8	1.5
Other services	1.1	4.0	3.1	4.1	1.7	4.7	4.3	6.3	0.5	0.6	1.0	0.7
Total economy	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**1.0**	**1.0**	**1.0**	**1.0**

Notes: Other industry includes construction and public utilities. Distribution includes transport services and distributive trade as well as hotels and restaurants. Finance and business services excludes real estate activities. Other services includes other community, personal and household services. Numbers may not sum due to rounding.
Source: Authors' calculations using the Africa Sector Database.

Appendix Table C4. GDP, employment, and relative productivity levels, Kenya, 1969 -2010

	Value added				Employment				Relative productivity levels			
	1969	1975	1990	2010	1960	1975	1990	2010	1969	1975	1990	2010
Agriculture	**53.3**	**43.3**	**35.2**	**25.5**	**80.6**	**79.8**	**71.2**	**48.3**	**0.5**	**0.4**	**0.4**	**0.5**
Industry	**17.6**	**21.6**	**23.0**	**18.9**	**4.6**	**4.6**	**7.2**	**16.4**	**3.8**	**4.3**	**3.0**	**1.2**
Mining	0.6	0.8	0.8	0.8	0.1	0.2	0.1	0.6	5.4	3.0	8.3	0.9
Manufacturing	8.9	13.0	15.4	11.5	3.6	3.4	5.3	12.8	1.9	2.4	2.5	0.9
Other industry	8.1	7.8	6.8	6.6	0.9	1.0	1.7	3.0	11.2	11.3	4.5	2.5
Services	**29.0**	**35.1**	**41.8**	**55.7**	**14.7**	**15.6**	**21.6**	**35.3**	**2.9**	**2.9**	**2.2**	**1.6**
Market services	15.8	18.6	22.2	34.7	7.9	7.0	10.9	21.1	2.8	3.0	2.3	1.7
Distribution services	12.8	14.2	16.5	25.3	7.0	6.2	9.9	19.9	2.7	2.9	2.1	1.4
Fin. and bus. ser.	3.1	4.5	5.7	9.3	0.9	0.8	1.0	1.2	3.6	4.4	4.6	6.7
Non-market services	13.2	16.5	19.6	21.0	6.8	8.6	10.8	14.2	3.1	2.7	2.2	1.4
Government services	9.1	12.1	14.3	16.6	3.4	4.3	5.4	6.1	3.7	3.5	3.5	2.5
Other services	4.1	4.4	5.3	4.3	3.4	4.3	5.4	8.2	2.4	2.0	0.8	0.6
Total economy	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**1.0**	**1.0**	**1.0**	**1.0**

Notes: Other industry includes construction and public utilities. Distribution includes transport services and distributive trade as well as hotels and restaurants. Finance and business services excludes real estate activities. Other services includes other community, personal and household services. Numbers may not sum due to rounding.
Source: Authors' calculations using the Africa Sector Database.

Appendix Table C5. GDP, employment, and relative productivity levels, Malawi, 1960 - 2010

	Value added				Employment				Relative productivity levels			
	1960	1975	1990	2010	1966	1975	1990	2010	1966	1975	1990	2010
Agriculture	**52.4**	**29.0**	**24.1**	**31.5**	**84.4**	**85.0**	**86.1**	**65.2**	**0.5**	**0.3**	**0.3**	**0.5**
Industry	**12.0**	**22.3**	**23.6**	**17.5**	**5.9**	**6.5**	**4.9**	**9.4**	**2.8**	**3.0**	**3.8**	**2.2**
Mining	0.4	1.0	1.3	1.2	0.2	0.1	0.2	0.1	3.5	7.3	6.1	25.0
Manufacturing	5.6	11.8	16.0	11.2	2.8	3.9	3.0	4.4	3.2	2.9	4.0	2.4
Other industry	6.0	9.5	6.2	5.2	3.0	2.4	1.8	4.9	2.4	2.9	3.4	1.5
Services	**35.6**	**48.7**	**52.3**	**51.0**	**9.7**	**8.5**	**9.0**	**25.4**	**4.5**	**6.3**	**6.3**	**1.9**
Market services	22.7	31.7	33.9	37.7	3.3	4.6	4.6	16.0	6.8	8.0	7.4	2.3
Distribution services	22.2	28.4	28.2	29.1	3.1	4.4	4.1	15.2	6.7	7.3	6.5	1.9
Fin. and bus. ser.	0.5	3.3	5.7	8.6	0.2	0.3	0.5	0.7	9.2	20.1	14.6	11.5
Non-market services	12.9	17.1	18.4	13.3	6.4	3.8	4.4	9.4	3.4	4.3	5.2	1.3
Government services	11.0	11.8	13.9	9.0	4.2	2.5	3.3	7.2	3.9	4.8	5.3	1.1
Other services	1.9	5.3	4.5	4.3	2.2	1.4	1.1	2.3	2.4	3.4	4.7	2.1
Total economy	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**1.0**	**1.0**	**1.0**	**1.0**

Notes: Other industry includes construction and public utilities. Distribution includes transport services and distributive trade as well as hotels and restaurants. Finance and business services excludes real estate activities. Other services includes other community, personal and household services. Numbers may not sum due to rounding.
Source: Authors' calculations using the Africa Sector Database.

Appendix Table C6. GDP, employment, and relative productivity levels, Mauritius, 1960 - 2010

	Value added				Employment				Relative productivity levels			
	1960	1975	1990	2010	1970	1975	1990	2010	1970	1975	1990	2010
Agriculture	**18.6**	**24.6**	**13.0**	**4.0**	**37.3**	**28.2**	**16.7**	**7.2**	**0.4**	**0.8**	**0.7**	**0.7**
Industry	**27.4**	**31.3**	**36.3**	**29.9**	**20.1**	**33.5**	**43.2**	**30.3**	**1.5**	**0.9**	**0.8**	**0.9**
Mining	3.9	2.9	2.6	0.5	0.1	0.1	0.2	0.2	41.7	44.6	13.8	2.0
Manufacturing	12.1	17.5	24.9	19.1	10.6	18.5	32.2	19.1	1.6	1.0	0.8	1.0
Other industry	11.4	10.9	8.8	10.2	9.4	14.9	10.9	11.0	1.0	0.5	0.7	0.8
Services	**54.0**	**44.1**	**50.7**	**66.1**	**42.6**	**38.3**	**40.1**	**62.6**	**1.3**	**1.3**	**1.3**	**1.1**
Market services	40.7	29.9	35.3	45.6	14.6	17.6	20.0	39.3	2.6	1.9	1.8	1.2
Distribution services	35.0	24.4	29.6	33.3	13.5	16.1	17.1	29.8	2.4	1.7	1.7	1.2
Fin. and bus. ser.	5.7	5.5	5.8	12.3	1.1	1.5	2.8	9.5	4.8	4.0	2.3	1.2
Non-market services	13.3	14.2	15.4	20.6	27.9	20.7	20.1	23.2	0.7	0.8	0.9	0.8
Government services	11.3	12.4	13.4	15.8	12.1	9.0	11.8	16.5	1.4	1.6	1.3	0.9
Other services	2.0	1.8	2.0	4.7	15.9	11.8	8.4	6.8	0.1	0.2	0.3	0.6
Total economy	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**1.0**	**1.0**	**1.0**	**1.0**

Notes: Other industry includes construction and public utilities. Distribution includes transport services and distributive trade as well as hotels and restaurants. Finance and business services excludes real estate activities. Other services includes other community, personal and household services. Numbers may not sum due to rounding.
Source: Authors' calculations using the Africa Sector Database.

Appendix Table C7. GDP, employment, and relative productivity levels, Nigeria, 1960 - 2010

	Value added				Employment				Relative productivity levels			
	1960	1975	1990	2010	1960	1975	1990	2010	1960	1975	1990	2010
Agriculture	**58.3**	**30.5**	**29.5**	**31.6**	**78.2**	**64.0**	**71.7**	**59.6**	**0.9**	**0.4**	**0.3**	**0.6**
Industry	**18.1**	**47.2**	**53.6**	**48.0**	**5.3**	**18.2**	**11.9**	**5.9**	**2.0**	**3.6**	**5.2**	**6.0**
Mining	0.8	18.4	36.2	44.6	0.3	0.4	0.3	0.2	27.8	153.4	183.5	151.7
Manufacturing	10.9	21.5	13.6	2.0	3.4	16.8	10.8	3.9	0.4	0.1	0.4	0.9
Other industry	6.4	7.4	3.8	1.4	1.6	1.0	0.8	1.8	1.3	2.1	1.9	1.3
Services	**23.6**	**22.2**	**16.9**	**20.3**	**16.5**	**17.8**	**16.4**	**34.5**	**1.1**	**0.7**	**1.0**	**0.8**
Market services	20.0	18.0	15.5	18.5	15.0	12.9	12.0	23.6	1.1	0.8	1.2	1.0
Distribution services	18.5	15.0	13.5	16.7	14.7	12.8	11.4	21.0	1.1	0.8	1.1	1.1
Fin. and bus. ser.	1.5	2.9	1.9	1.8	0.3	0.1	0.6	2.6	1.2	6.6	3.2	0.9
Non-market services	3.6	4.3	1.5	1.8	1.5	4.9	4.4	10.8	0.5	0.3	0.4	0.2
Government services	2.1	3.0	1.1	0.9	0.6	1.8	2.7	4.4	0.7	0.5	0.5	0.3
Other services	1.6	1.2	0.3	0.9	1.0	3.1	1.8	6.4	0.5	0.2	0.2	0.2
Total economy	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**1.0**	**1.0**	**1.0**	**1.0**

Notes: Other industry includes construction and public utilities. Distribution includes transport services and distributive trade as well as hotels and restaurants. Finance and business services excludes real estate activities. Other services includes other community, personal and household services. Numbers may not sum due to rounding.
Source: Authors' calculations using the Africa Sector Database.

Appendix Table C8. GDP, employment, and relative productivity levels, Senegal, 1960 - 2010

	Value added				Employment				Relative productivity levels			
	1960	1975	1990	2010	1960	1975	1990	2010	1960	1975	1990	2010
Agriculture	**30.5**	**32.7**	**20.8**	**18.2**	**73.3**	**72.0**	**65.8**	**51.4**	**0.4**	**0.4**	**0.3**	**0.3**
Industry	**15.4**	**20.1**	**23.0**	**24.8**	**7.4**	**7.6**	**8.2**	**13.9**	**2.7**	**2.7**	**2.8**	**1.7**
Mining	1.3	1.4	1.1	2.3	0.2	0.2	0.1	0.2	7.8	9.6	19.3	5.7
Manufacturing	9.5	14.0	15.8	14.7	5.6	5.8	5.8	9.9	2.6	2.6	2.8	1.5
Other industry	4.7	4.8	6.1	7.8	1.6	1.6	2.3	3.8	2.2	2.2	2.1	2.1
Services	**54.1**	**47.2**	**56.2**	**57.0**	**19.3**	**20.5**	**26.0**	**34.6**	**2.7**	**2.5**	**2.2**	**1.7**
Market services	32.6	28.4	35.2	41.3	9.3	10.6	15.9	25.0	3.5	3.2	2.3	1.7
Distribution services	30.6	26.0	29.5	32.6	9.1	10.4	15.7	24.5	3.4	3.0	2.0	1.4
Fin. and bus. ser.	2.0	2.4	5.7	8.6	0.2	0.2	0.2	0.5	10.3	15.7	26.7	16.1
Non-market services	21.5	18.8	20.9	15.7	10.0	9.8	10.1	9.6	1.8	1.8	1.9	1.6
Government services	19.1	16.9	18.6	13.6	5.0	4.9	5.1	5.2	3.2	3.2	3.3	2.5
Other services	2.4	1.9	2.4	2.1	5.0	4.9	5.0	4.4	0.4	0.4	0.5	0.5
Total economy	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**1.0**	**1.0**	**1.0**	**1.0**

Notes: Other industry includes construction and public utilities. Distribution includes transport services and distributive trade as well as hotels and restaurants. Finance and business services excludes real estate activities. Other services includes other community, personal and household services. Numbers may not sum due to rounding.
Source: Authors' calculations using the Africa Sector Database.

Appendix Table C9. GDP, employment, and relative productivity levels, Tanzania, 1960 - 2010

	Value added				Employment				Relative productivity levels			
	1960	1975	1990	2010	1961	1975	1990	2010	1961	1975	1990	2010
Agriculture	**26.3**	**17.1**	**31.0**	**30.1**	**89.5**	**89.1**	**86.1**	**73.4**	**0.5**	**0.4**	**0.4**	**0.4**
Industry	**22.6**	**29.2**	**20.1**	**26.4**	**1.4**	**2.8**	**2.7**	**6.0**	**16.0**	**8.6**	**8.2**	**4.4**
Mining	3.3	0.6	0.7	3.9	0.1	0.3	0.4	0.3	35.0	3.4	1.4	10.9
Manufacturing	14.6	22.3	10.0	10.6	1.1	1.6	1.4	2.7	8.2	7.1	5.7	3.8
Other industry	4.7	6.3	9.3	11.9	0.2	0.9	0.8	3.0	42.1	12.9	15.7	4.3
Services	**51.2**	**53.7**	**48.9**	**43.6**	**9.0**	**8.1**	**11.3**	**20.6**	**4.0**	**5.4**	**3.7**	**2.1**
Market services	30.1	30.9	32.8	29.8	1.9	4.4	6.5	12.2	13.5	6.9	4.2	2.5
Distribution services	25.2	23.7	27.3	25.5	1.8	4.2	6.2	12.0	13.0	6.3	3.5	2.1
Fin. and bus. ser.	5.0	7.2	5.5	4.3	0.1	0.2	0.2	0.2	22.3	18.0	22.1	23.4
Non-market services	21.0	22.8	16.1	13.7	7.2	3.6	4.8	8.4	1.5	3.6	3.0	1.6
Government services	16.6	18.1	14.5	13.0	4.5	2.3	3.3	6.2	2.2	5.3	4.1	2.1
Other services	4.5	4.6	1.6	0.7	2.7	1.3	1.5	2.2	0.2	0.5	0.6	0.3
Total economy	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**1.0**	**1.0**	**1.0**	**1.0**

Notes: Other industry includes construction and public utilities. Distribution includes transport services and distributive trade as well as hotels and restaurants. Finance and business services excludes real estate activities. Other services includes other community, personal and household services. Numbers may not sum due to rounding.
Source: Authors' calculations using the Africa Sector Database.

Appendix Table C10. GDP, employment, and relative productivity levels, South Africa, 1960 - 2010

	Value added				Employment				Relative productivity levels			
	1960	1975	1990	2010	1960	1975	1990	2010	1960	1975	1990	2010
Agriculture	**11.8**	**8.1**	**4.9**	**2.6**	**48.8**	**31.5**	**21.5**	**15.0**	**0.1**	**0.1**	**0.2**	**0.2**
Industry	**40.0**	**43.4**	**42.0**	**32.5**	**22.6**	**29.5**	**30.1**	**21.8**	**2.1**	**1.5**	**1.3**	**1.4**
Mining	13.1	11.7	9.6	10.1	8.9	7.3	8.8	2.1	3.1	2.1	1.3	3.1
Manufacturing	21.2	23.9	24.8	14.7	9.3	14.2	14.7	11.9	1.6	1.6	1.5	1.5
Other industry	5.7	7.8	7.6	7.7	4.4	7.9	6.7	7.9	1.0	0.9	0.9	0.8
Services	**48.2**	**48.5**	**53.1**	**64.9**	**28.7**	**39.0**	**48.4**	**63.1**	**1.7**	**1.3**	**1.2**	**1.1**
Market services	30.7	31.5	33.1	40.5	15.5	21.4	27.5	36.6	1.4	1.4	1.1	1.2
Distribution services	25.2	23.8	23.6	24.2	13.8	18.6	22.6	25.3	1.3	1.2	1.0	1.0
Fin. and bus. ser.	5.5	7.7	9.5	16.3	1.7	2.7	4.9	11.3	2.1	2.3	1.8	1.6
Non-market services	17.5	17.0	20.0	24.4	13.1	17.6	20.9	26.5	2.0	1.3	1.3	0.9
Government services	9.4	11.0	15.0	17.1	4.7	7.4	10.7	15.5	4.2	2.4	1.9	1.0
Other services	8.0	6.0	5.0	7.4	8.5	10.2	10.2	11.0	0.8	0.4	0.5	0.6
Total economy	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**1.0**	**1.0**	**1.0**	**1.0**

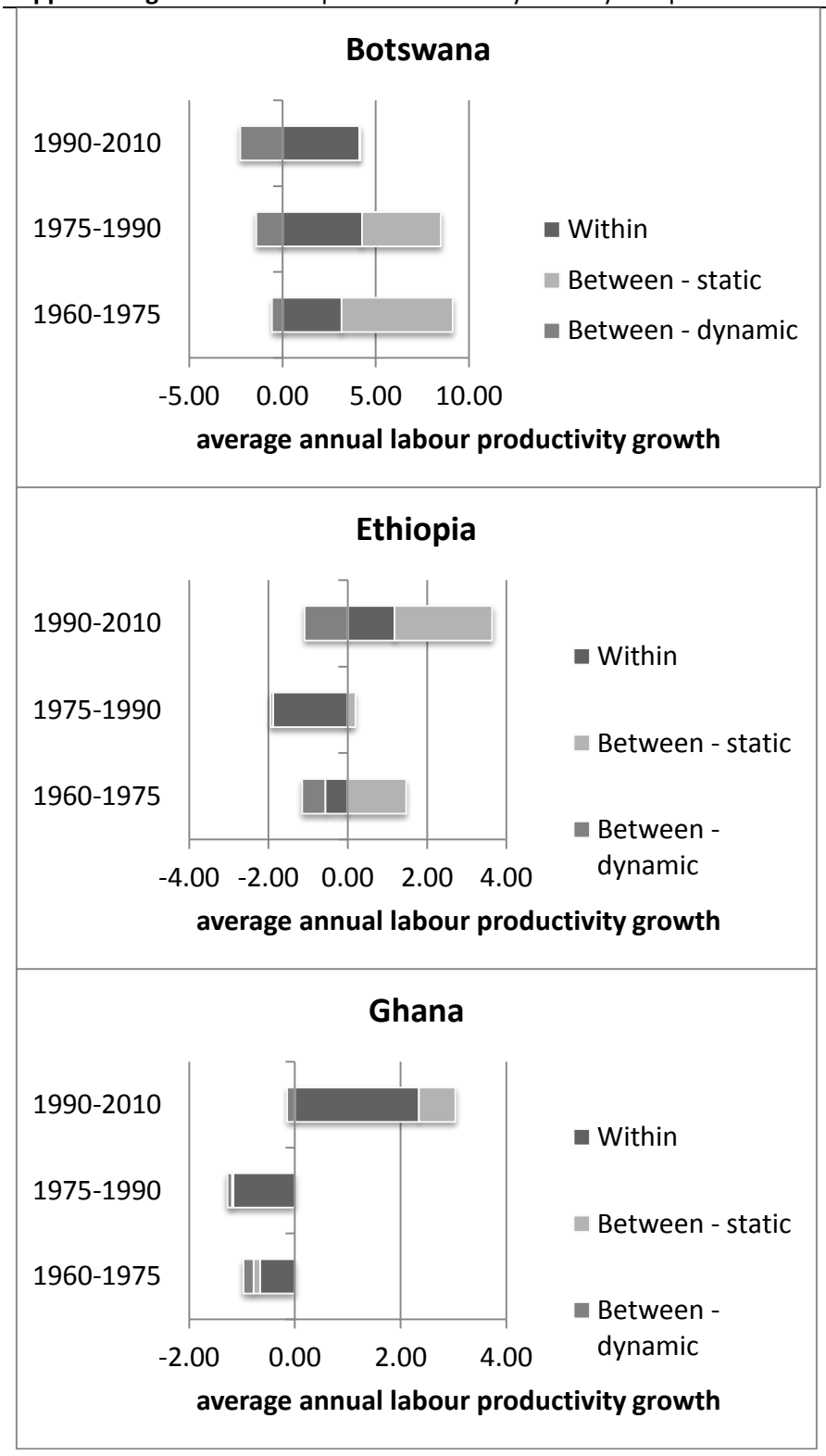
Notes: Other industry includes construction and public utilities. Distribution includes transport services and distributive trade as well as hotels and restaurants. Finance and business services excludes real estate activities. Other services includes other community, personal and household services. Numbers may not sum due to rounding.
Source: Authors' calculations using the Africa Sector Database.

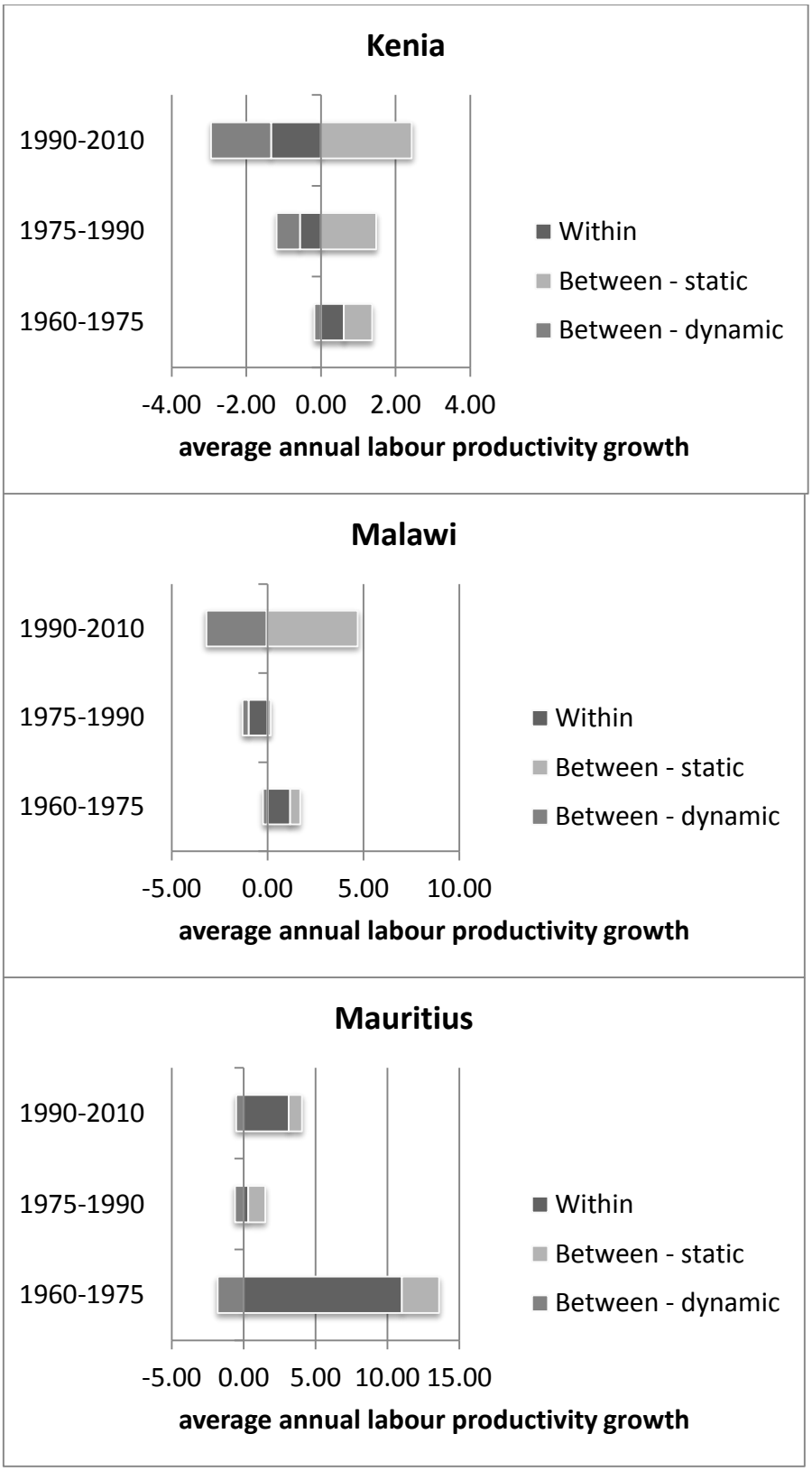
Appendix Table C11. GDP, employment, and relative productivity levels, Zambia, 1960 - 2010

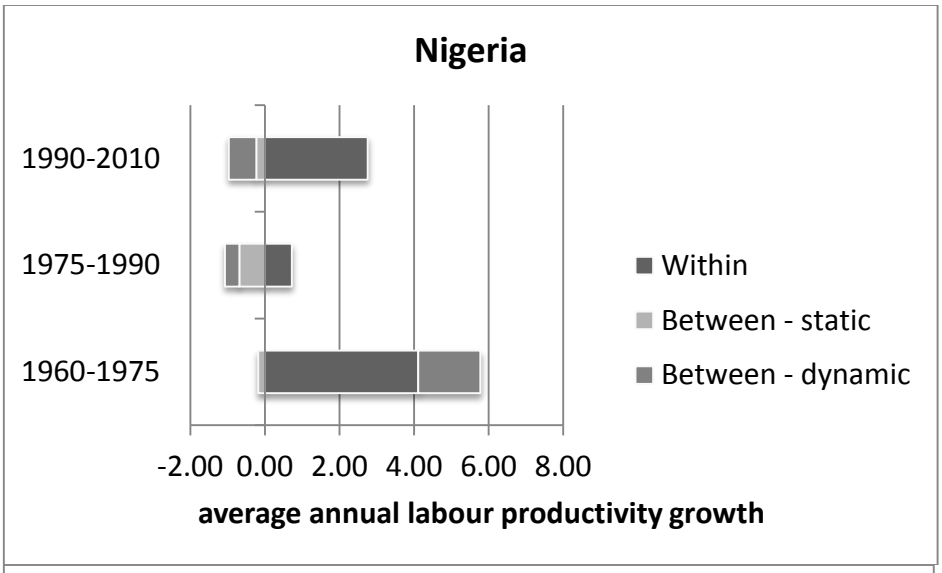
	Value added				Employment				Relative productivity levels			
	1960	1975	1990	2010	1965	1975	1990	2010	1965	1975	1990	2010
Agriculture	**9.9**	**9.1**	**13.8**	**20.8**	**63.2**	**64.5**	**75.3**	**72.8**	**0.2**	**0.3**	**0.2**	**0.3**
Industry	**63.2**	**41.0**	**43.2**	**36.5**	**12.8**	**12.0**	**8.5**	**7.5**	**5.2**	**4.6**	**4.6**	**4.1**
Mining	51.9	18.2	26.7	3.8	5.5	3.7	2.6	2.4	6.0	5.0	4.2	1.7
Manufacturing	1.2	4.7	8.3	9.0	1.7	4.0	4.0	3.3	4.6	3.6	4.0	3.0
Other industry	10.2	18.1	8.2	23.8	5.6	4.3	1.9	1.8	4.5	5.2	6.4	9.3
Services	**26.8**	**50.0**	**43.1**	**42.7**	**24.0**	**23.5**	**16.2**	**19.7**	**0.8**	**1.2**	**2.6**	**2.5**
Market services	17.8	31.9	33.9	31.9	7.5	8.5	6.8	13.2	1.9	2.1	4.6	2.8
Distribution services	16.8	25.0	25.0	21.4	6.6	7.0	5.2	12.1	2.0	2.2	5.1	2.2
Fin. and bus. ser.	0.9	7.0	8.9	10.4	0.9	1.6	1.6	1.1	1.0	1.8	3.1	10.0
Non-market services	9.0	18.0	9.2	10.8	16.5	15.0	9.4	6.5	0.3	0.6	1.1	1.8
Government services	8.2	16.1	8.3	10.2	na	na	na	na	na	na	na	na
Other services	0.9	2.0	0.8	0.6	16.5	15.0	9.4	6.5	0.3	0.6	1.1	1.8
Total economy	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**1.0**	**1.0**	**1.0**	**1.0**

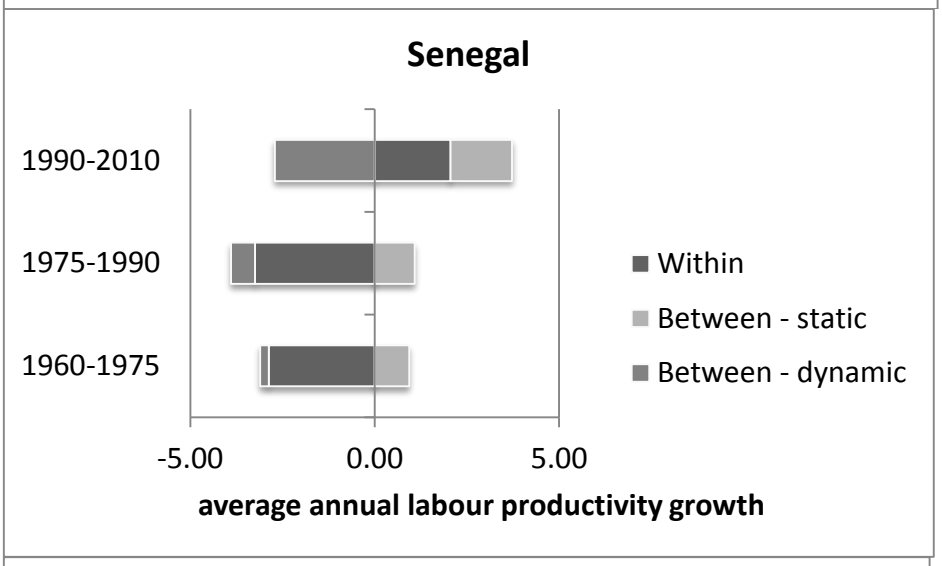
Notes: Other industry includes construction and public utilities. Distribution includes transport services and distributive trade as well as hotels and restaurants. Finance and business services excludes real estate activities. Other services includes other community, personal and household services. Numbers may not sum due to rounding.
Source: Authors' calculations using the Africa Sector Database.

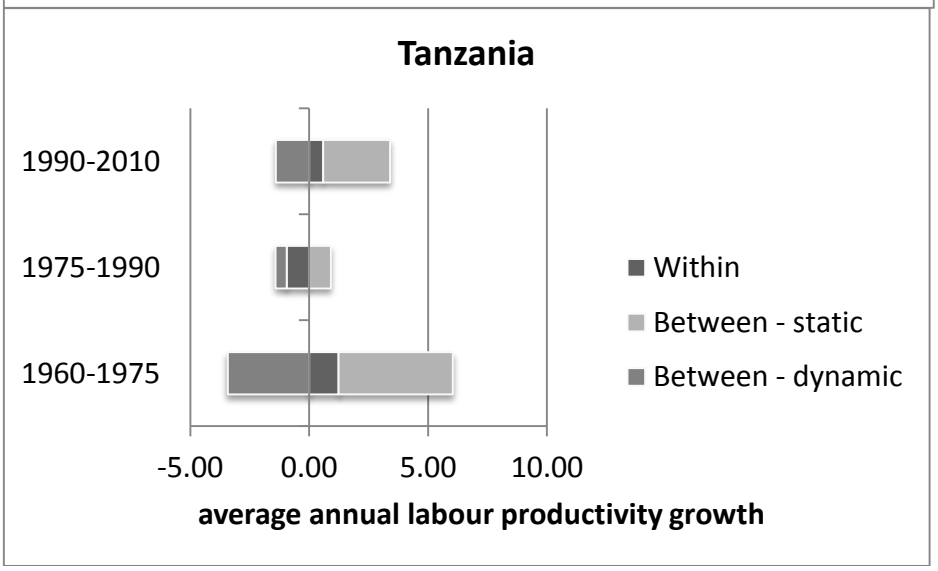
Appendix figure C1. Decomposition results by country and period.

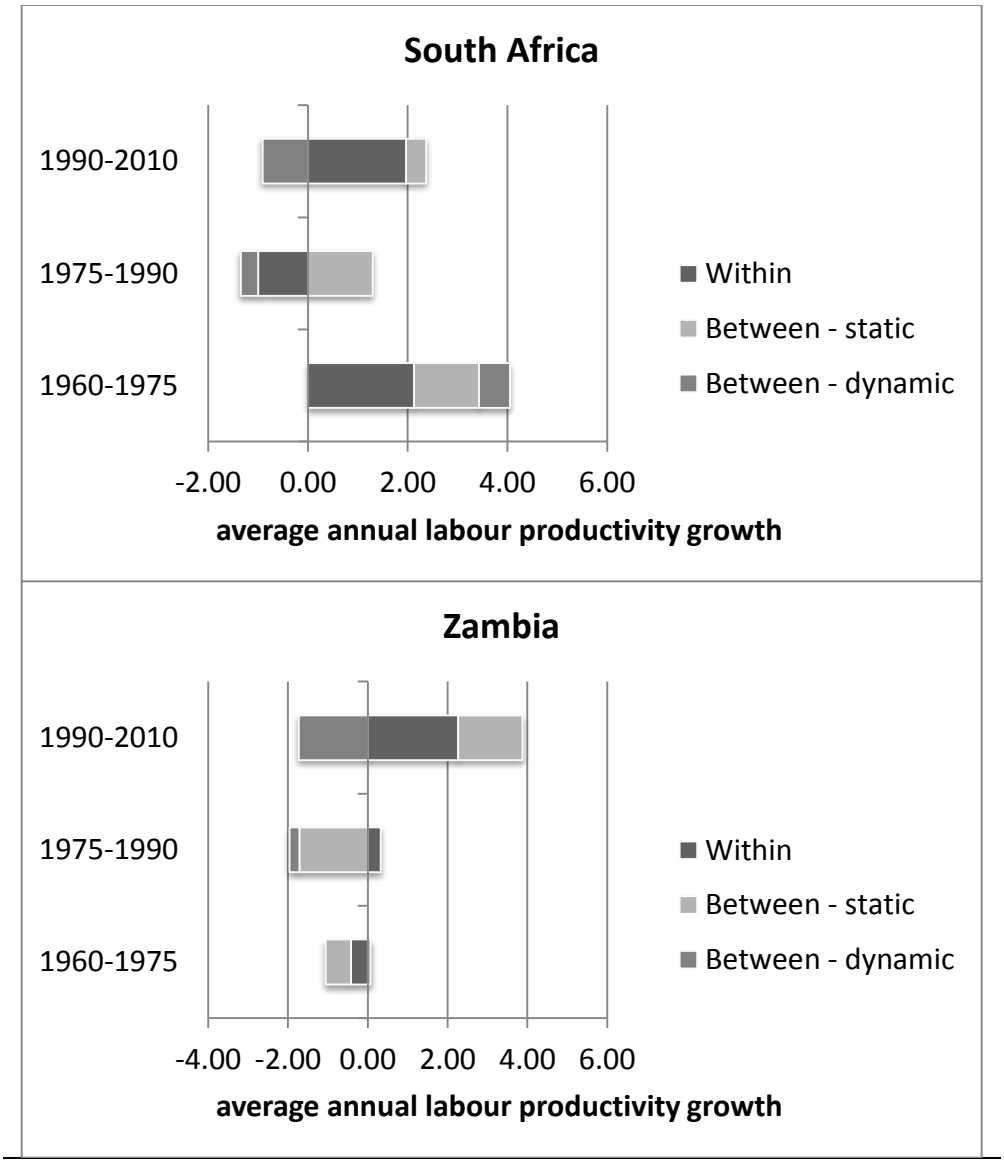



Kenia
1990-2010
1975-1990
1960-1975
Within
Between - static
Between - dynamic
-4.00 -2.00 0.00 2.00 4.00
average annual labour productivity growth
Malawi
1990-2010
1975-1990
1960-1975
Within
Between - static
Between - dynamic
-5.00 0.00 5.00 10.00
average annual labour productivity growth
Mauritius
1990-2010
1975-1990
1960-1975
Within
Between - static
Between - dynamic
-5.00 0.00 5.00 10.00 15.00
average annual labour productivity growth


Nigeria
1990-2010
1975-1990
1960-1975
Within
Between - static
Between - dynamic
-2.00 0.00 2.00 4.00 6.00 8.00
average annual labour productivity growth


Senegal
1990-2010
1975-1990
1960-1975
Within
Between - static
Between - dynamic
-5.00 0.00 5.00
average annual labour productivity growth


Tanzania
1990-2010
1975-1990
1960-1975
Within
Between - static
Between - dynamic
-5.00 0.00 5.00 10.00
average annual labour productivity growth



Notes: decomposition results using equation (4)
Sources: Africa Sector Database.