ECONOMIC RESEARCH FORUM
منتدى البحوث الاقتصادية
2015

working paper series

GROWING WITHOUT CHANGING: A TALE OF EGYPT'S WEAK PRODUCTIVITY GROWTH

Hanan Morsy, Antoine Levy and Clara Sanchez

Working Paper No. 940

GROWING WITHOUT CHANGING:
A TALE OF EGYPT'S WEAK PRODUCTIVITY GROWTH

Hanan Morsy, Antoine Levy and Clara Sanchez

Working Paper 940

September 2015

Send correspondence to:
Hanan Morsy
European Bank for Reconstruction and Development
morsyh@ebrd.com

First published in 2015 by
The Economic Research Forum (ERF)
21 Al-Sad Al-Aaly Street
Dokki, Giza
Egypt
www.erf.org.eg

Abstract

This paper aims to identify the reasons why economic growth in Egypt, although comparable to its peers, failed to significantly reduce unemployment, lower poverty levels or raise overall productivity. We use cross-country comparisons, counterfactual scenarios and regression analysis to demonstrate that Egypt, even during the high growth period of 2000-2010, did not experience a reallocation of excess labor towards modern, productive sectors similar to that which occurred in other emerging markets, notably in South East Asia. The results show that, while there is large potential for productivity gains in the Egyptian economy, a limited openness to trade, a low diversification of exports and deficient access to finance prevented the country from witnessing structural shift of its labor force towards manufacturing and private services, locking Egypt instead within a "low value trap." The paper then suggests some policy implications of these findings, relating to overcoming the main impediments to preventing an efficient sectoral reallocation of workers.

JEL Classification: D24, O47, O5

Keywords: productivity growth; job creation; structural change; sectoral productivity

ملخص

تهدف هذه الورقة إلى التعرف على أسباب فشل النمو الاقتصادي في مصر، وعلى الرغم من أن مصر مقارنة بنظيراتها فشلت في خفض البطالة، ومستويات الفقر أو رفع الإنتاجية العامة. نقوم بمقارنة بين البلدان، وسيناريوهات مغايرة للواقع وتحليل الانحدار لإثبات أن مصر، حتى خلال فترة النمو العالية من 2000-2010، لم تشهد إعادة لتوزيع العمالة الزائدة نحو القطاعات الحديثة والمنتجة مماثلة لتلك التي وقعت في غيرها من الأسواق الناشئة، لا سيما في جنوب شرق آسيا. أظهرت النتائج أنه في حين أن هناك إمكانية كبيرة لتحقيق مكاسب الإنتاجية في الاقتصاد المصري، والانفتاح المحدود للتجارة، وتنويع انخفاض الصادرات الا أنها تعاني من نقص في التمويل منع البلاد من يشهد تحولا هيكليا من قوتها العاملة نحو التصنيع والخدمات الخاصة، وتأمين مصر بدلا ضمن "فخ القيمة المنخفضة." تشير الورقة الى بعض الآثار السياسية المترتبة على هذه النتائج، وتتعلق بالتغلب على العوائق الرئيسية لمنع حدوث إعادة توزيع قطاعي للعاملين.

1. Introduction

Many analysts[1] have stressed the underlying economic roots of the popular uprisings that toppled autocratic leaders in the Middle East and North Africa. Egypt's 2011 revolution highlighted the public demands for higher welfare and social justice. A puzzling feature for observers, however, was that the uprisings occurred after a decade of relatively strong growth performance in the region. In Egypt in particular, growth rates surpassed 5 percent between 2004 and 2011. Why, then, did the revolution of 2011, and popular unrest demanding higher living standards for the middle class, occur at the moment when Egypt's economy, from a bird's eye perspective, appeared to be taking off?

A closer look at Egypt's growth performance shows that both labor productivity and income per capita increased at a much slower pace than real GDP (Figure1). Moreover, despite high output growth, unemployment remained above 8 per cent throughout the decade.

Furthermore, growth dividends in Egypt did not trickle down to workers, with the share of wages in GDP decreasing persistently so that workers were "getting an increasingly smaller slice of a growing pie"[2] (Figure2). Such a feature helps to explain why the Egyptian middle class felt it was not reaping the benefits of improved economic performance, despite high overall economic growth.

The share of output going to workers' wages has been declining more rapidly in Egypt than in peer countries, standing close to 25 percent of the value added in 2009 (Figure 3), a strikingly low share by international standards, even among emerging countries.

These specificities of Egypt's growth model (stubbornly high unemployment, and a low and declining share of wages in GDP) suggest a common cause: the inability of Egypt's economy to deliver jobs in high-labor productivity industries. Indeed, this failure to provide enough "good quality" jobs that match the qualifications of its labor force could explain both the high unemployment rate, even among educated workers, and the low share of wages, as workers concentrate in low-productivity industries.

This belief is consistent with another striking element of Egypt's economic growth in the years 2000-2010. While growth in emerging markets has often been associated with structural change in the sector mix[3], the sectoral distribution of Egypt's GDP has remained broadly unchanged throughout the decade (Figure4).

This paper therefore attempts to solve the puzzle of Egypt's "lost decade of productivity," using a sectoral approach to understand why overall economic growth was not matched by a corresponding increase in income per capita. Understanding the constraints on structural change in Egypt is especially urgent, at a time when income per capita has been stagnating in the years following the revolution, and unemployment stands close to 13 percent. The ability of Egypt's economy to deliver jobs in "modern" sectors to its growing working-age population is not only a matter of economic efficiency, but also of social justice and socio-political stability.

The rest of this paper is organized as follows. We show how our study contributes to the field of quantitative analysis of the determinants of structural change and provides a sectoral approach to growth that had not yet been applied to Egypt (section 2). After providing a brief summary of the methodology and data used (section 3), we document the extent to which, in spite of impressive output growth on paper, the Egyptian economy did not witness a degree of

[1] See for example Omar S. Dahi, "Understanding the Political Economy of the Arab Revolts", Middle East Report 259 (2011), or Hisham H. Abdelbaki, "The Arab Spring: Do We Need a New Theory?" (2013).

[2] "Only Fair", Nada al-Nashif and Zafiris Tzannatos, Finance & Development, International Monetary Fund, March 2013, Volume 50.

[3] Commonly defined as the process of reallocation of excess labour from traditional industries towards more productive sectors.

structural change comparable to peers, by decomposing the sources of productivity growth (section 4). This comparative approach is used to explain various stylized facts characterizing growth in Egypt from 2000 to 2010, namely the absence of significant improvements in job creation, sector diversification and poverty reduction (section 5). To account for the specificities of Egypt's case, we then turn to cross-country analysis to assess the relative importance of several factors in igniting a structural reallocation of labor towards modern sectors (section 6).Based on such findings and taking into account the reversal of structural change in the years after the revolution, we suggest policy recommendations that could be more conducive to sustained structural change in Egypt (section 7).

2. Literature Review

A major concern in recent years has been how to reconcile strong economic performance in developing countries with the persistence of widespread poverty, low standards of living and income inequality. Many studies find that the benefits of economic growth are often unevenly distributed across the population, and that a country's pattern of development may be just as important as the level of per capita GDP attained (see Ravallion, 2001; Bourguignon, 2003; Essama-Nssah and Lambert, 2009). In other words, the issue is not merely to grow aggregate output, but to grow "in D.E.P.T.H.:" *Diversifying* production, increasing *Exports*, enhancing *Productivity* of farms, firms and government offices, and upgrading *Technology*, to improve *Human development* (see African Center for Economic Transformation, 2014).

In advanced economies, growth results mainly from higher productivity, through a process of creative destruction within existing industries: new and more efficient technologies emerge, and less productive firms are forced to exit markets (see, for example, Aghion, Howitt, 1992). In emerging and developing economies, a more relevant paradigm for growth is the "structural change" dimension: not productivity growth *within* each sector, but the reallocation of labor *across* industries, from traditional low-productivity sectors to more dynamic (higher-productivity) economic activities (see Timmer and Akkus, 2008). This structural change has been a major contributor to the rise in standards of living, the reduction in poverty, and the provision of better jobs that accompany economic development.

Theoretically, the phenomenon of structural change was first modeled through a "dual-economy" approach (Lewis, 1954; Kuznets, 1955), where workers gradually move from subsistence agriculture towards the production of manufactured goods in capital-intensive sectors. As the initial excess labor is reallocated to more technologically advanced – or more effectively organized – industries, the country's living standards improve. Theoretical studies associating "modern" sectors, such as manufacturing and utilities, with increasing returns to scale (Hirschman, 1958; Arthur, 1989; Krugman, 1991) also showcase how reallocation of labor from constant returns activities (notably agriculture or construction) to more productive sectors plays an instrumental role in fostering sustainable growth.

Moving towards higher value-added activities has concrete consequences on the level of development and standard of living. From a historical standpoint, Addison's *Millennial Perspective on the World Economy* (2001) shows how the lack of such a reallocation affects long-term income growth. For centuries leading up to the industrial revolution in Europe, GDP per capita failed to increase, as most of the working age population remained employed in agriculture: growth in output due to technological changes was matched almost immediately by a rise in the population headcount, a phenomenon labeled the "Malthusian trap" (Clark, 2005). Similar patterns were observed in Egypt in recent years, as GDP per capita failed to increase in line with peer countries before the revolution, and remained flat afterwards. Empirical evidence has also confirmed that the "structural change" element has major consequences on how economic growth in emerging countries translates into job creation and

poverty reduction (Ocampo, Rada and Taylor, 2009; McMillan and Rodrik, 2011; UNIDO, 2012).

Given the fundamental role of structural change in achieving a higher level of development, it is essential to understand the determinants of this evolution and what favors or hampers it. Some studies have attempted to identify binding constraints on the efficient reallocation of labor in the economy. Several contributions focus on specific determinants of structural change, including the role of aid (Page, 2012), trade (Balassa, 1979), or institutions (Rodrik, 2007), but only a few studies have taken a quantitative view on a variety of factors from a cross-section perspective to explain the degree of structural change – or lack thereof– within a particular country.[4] Cross-country studies on structural change have focused on descriptive aspects of the decomposition of labor productivity growth (see Roncolato and Kucera, 2013, or Eberhardt and Teal, 2013), but have not emphasized explanatory factors driving the variation of the structural change component among countries, with the exception of McMillan and Rodrik (2011), who looked at the role of employment rigidity or exchange rate undervaluation, and Barbier and Bugas (2014), who monitored the impact of available arable land. Our study therefore attempts to provide a cross-country perspective, not only on the degree, but also and more importantly on the determinants of structural change, by using a longer timeframe and a new set of countries, notably including Egypt.

Despite the potential importance of structural transformation in driving more sustainable and inclusive growth in Egypt, the subject has not been examined in the literature. Existing studies on Egypt's economic sectors have focused on the issue of diversification (Herrera et al., 2010), allocative efficiency in the labor market (Hassan and Sassanpour, 2008; Yassine, 2013), and the comparative impact of the 2011 revolution across sectors (Hosny et al., 2013). We contribute to the literature by adopting a sector-level approach to economic growth in Egypt, relating it to the issue of structural change. The paper documents and explains the relatively low importance of the structural change component of growth in Egypt, compared with peers. It then examines the determinants of this structural transformation from a cross-country perspective using data for 28 countries over two decades, in order to determine the main factors affecting the degree and pace of structural change.

3. Data and Stylized Facts

Our objective is to examine the extent of structural transformation in Egypt over the last decade and to put it in international context. We use sectoral data from a number of sources, regrouping them into nine key sectors. After carrying out a number of transformations to obtain consistent data series across time for each country, we obtain observations for value added by sector, employment by sector and price level by sector, which enable us to compute comparable PPP labor productivity levels by country for each of these nine sectors, across two decades (see the Data Appendix for more details on data transformation). For Egypt, we use employment data from Egypt's annual Labor Force Survey (LFS) carried out by the Central Agency for Public Mobilization and Statistics (CAPMAS), and real GDP data from the Ministry of Planning and International Cooperation (MPIC).

Data for employment and value added by sector for other countries are obtained from the Groningen Growth and Development Centre (GGDC) 10-Sector Database, the GGDC's African Sector Database for sub-Saharan African countries, as well as the Socio-Economic Accounts from the World Input-Output Database (WIOD SEA) in order to extend the existing time series for different countries to 2010. Other control variables are extracted from a number of sources, including the International Monetary Fund's World Economic Outlook, the Penn World Tables, the World Bank's World Development Indicators, the UN COMTRADE

[4]See Marouani and Mouelhi (2013) for an application to Tunisia, Achy (2013) for Morocco, Martins (2014) for the case of Ethiopia, and World Bank (2013) for a brief application to three MENA countries, including Egypt.

database, the Cohen-Soto database, and the External Wealth of Nations database(see Data Appendix for more details on control variables).

While the Egyptian economy seems to be broadly diversified across sectors in terms of output, with six sectors out of nine each accounting for more than 10 percent of GDP, employment is highly concentrated in a few less productive sectors. Jobs in agriculture and the public sector (including health and education services) together account for more than half of total employment, but their share in output is only 30 percent. Although a series of earlier reforms aimed to curb the proportion of public sector jobs, their importance has remained largely unchanged in recent years. Moreover, moves by post-revolution governments to boost army and civil servant salaries by 15 per cent and to convert temporary positions into permanent ones are expected to contribute to the large share of employment in the public sector.

Productivity across sectors displays large variations, as shown in Table 1, with some of the least productive sectors employing a particularly large share of the population, notably construction and agriculture. These two sectors, in particular, with productivity below 50 percent of the economy-wide average, did not see a significant decline in employment over the past decade. Highly productive sectors (notably mining, an outlier for labor productivity given the very low share of labor employed in the sector, and financial services) employ a low proportion of the overall labor force, which stagnated in terms of overall employment share over the last decade.

Indeed, Egypt's productivity gaps across sectors are high, with the coefficient of variation of labor productivity between sectors among the largest in our sample of countries (Figure 5). Large variations in labor productivity across sectors (that is, productivity gaps) characterize lower income and lower productivity countries. Egypt's performance on this measure therefore re-emphasizes the need for a structural transformation to raise productivity growth through a redistribution of labor across sectors where wide cross-sectoral variations in labor productivity exist.

Egypt's sectoral productivity levels lie in the lower half of our sample for most sectors, with the notable exception of mining, where average labor productivity stands at high levels even compared with international standards, given the low share of labor employed in the industry and its high capital intensity (Table 2). Several sectors such as public utilities, construction, and finance, insurance and real estate perform particularly poorly by international comparisons, reflecting poor efficiency and business climate in these sectors. In the case of financial and real estate services, despite its relatively high productivity compared with other sectors in Egypt, it significantly lags behind international comparators, highlighting the extent of the potential gains in expanding and modernizing the services sectors in Egypt.

4. Decomposition of Productivity Growth

Growth in labor productivity can be attributed to two distinct components, which are often but not always complementary: a *within-sector* effect, where technological improvements increase productivity in a given economic activity, holding the capital-labor ratio in that sector constant, and a *between-sector* effect, where more labor is allocated to productive economic activities.[5] The following function captures the decomposition of aggregate labor productivity growth over the given period ($t-k$ to t) into these two components respectively, where $\theta_{i,t}$ represents the sectoral share of employment in sector i at time t for the n sectors, Y_t is overall productivity at time t, $y_{i,t}$ represents productivity in sector i at time t, and Δ captures the change in a given variable from $t-k$ to t:

[5] See McMillan and Rodrik (2011) and Kucera and Roncolato (2012) for further discussion.

$$\Delta Y_t / Y_{t-k} = \frac{\sum_i^n \theta_{i,t} y_{i,t}}{Y_{t-k}} - \frac{\sum_i^n \theta_{i,t-k} y_{i,t-k}}{Y_{t-k}}$$

$$= \frac{\sum_i^n \theta_{i,t-k} \Delta y_{i,t}}{Y_{t-k}} + \frac{\sum_i^n y_{i,t} \Delta \theta_{i,t}}{Y_{t-k}} \quad (1)$$

The first term of the sum represents the growth of productivity within each sector, weighted by the labor share of each sector in the beginning time period. The second term of the sum captures the increase in overall productivity resulting from labor reallocation between sectors. This "structural change" term is positive when labor is reallocated towards sectors with higher relative productivity, and negative in the opposite case. The key rationale is that higher productivity growth within a given sector can have ambiguous effects on overall productivity, depending on whether redundant workers are then reallocated to lower productivity activities.

For Egypt, the decomposition of labor productivity growth at a sectoral level shows large disparities between the contributions to productivity growth within sectors, and an overall negative impact of reallocation (Figure 6) mainly attributable to mining, where employment decreased despite a sector productivity level well above average.

The analysis uncovers a negative labor reallocation effect in construction, a relatively unproductive sector which has expanded its share of employment in the last decade. Moreover, although a decrease in the employment share of agriculture and an increase in that of manufacturing did occur, both were limited and did not result in a strong positive reallocation effect. Finally, the decrease in mining employment has a high impact on overall productivity growth given the high level of productivity per worker in this sector, but is also less significant given the very low share of overall employment represented by the mining sector.

We also analyze changes in labor productivity at a sector level (Figure 7), and find that within-sector improvements were responsible for the bulk of productivity growth across time, notably in the mining and extractive industries, in private services and in manufacturing.

5. Analysis of Structural Change in Egypt

A crucial way that lower income countries can raise their growth prospects is by increasing the productivity of the labor force as workers move from traditional lower-productivity sectors to higher productivity modern service and manufacturing jobs. For a labor-abundant country such as Egypt, this is even more vital. A boost in overall labor productivity from this type of structural transformation would raise Egypt's economic growth potential while expanding opportunities for better jobs in productive sectors.

To gain insights on the extent of structural transformation in Egypt over the last decade, we examine the correlation between changes in labor share across sectors, and productivity levels. We plot the (end-of-period) relative productivity of sectors against the change in their employment share over a decade. The relative size of each sector (measured by initial employment share) is indicated by the area of the circle around each sector's label in the scatter plots. The "ideal" path of development of a typical middle-income economy would follow a process where advanced sectors (those with the highest relative productivity) would witness an increase of their share in the labor force. By contrast, sectors with the largest initial employment, and lower than average productivity, would see their share of employment shrink rapidly (see Figure 8).

We demonstrate that such a process did not occur in Egypt and that structural change was almost flat or negative (see Figure 10) in the decade prior to the historic revolution that took place in January 2011. Not only did labor fail to significantly shift from agriculture towards higher value added sectors in Egypt, as might be expected in the case of a lower-middle income economy, but it also remained concentrated in activities with relatively low productivity, such

as construction and the public sector. This contrasts with the experience of many emerging market economies, which have boosted per capita income and high-quality job creation by reallocating labor to more productive sectors at a faster pace.[6]

To better illustrate the lost opportunity for structural change in the course of Egypt's economic development, we compare the country's experience with Turkey and Thailand. The choice of these countries as comparators for Egypt stems from two main reasons: on the one hand, they have similar population levels (18th and 20th respectively in terms of world population ranking, close to Egypt's 15th place) and similar initial distribution of employment across sectors; on the other hand, these countries, while initially comparable to Egypt, experienced a significant structural shift of labor towards modern industries, to such an extent that they outpaced Egypt's growth rate and development levels in a decade. Since the decade of high-paced economic development occurred between 1990 and 2000 in these peer countries, data for this decade are used in order to start from levels of GDP and GDP per capita comparable to Egypt during 2000-2010.

All three economies had a similar share of employment in "modern" sectors (namely industry and productive services) at the beginning of the decade (2000 for Egypt, and 1990 for comparators).The overall distribution of sectors by relative productivity (rather than by nature of output) shows a similar pattern between these countries (Figure 9), with the three sectors with the lowest productivity representing a similar share of employment. However, while the most productive sectors represent a comparable share of the labor force in Egypt as in peer countries, its least productive sectors (construction and agriculture) do represent a lower share than their counterparts in Thailand and Turkey, thus leaving less room for reallocation towards more productive sectors.

Figures 11and 12 contrast Egypt's economic transformation with that of Thailand and Turkey, in which the level of PPP-adjusted per capita GDP in the 1990s was similar to Egypt in the 2000s. These countries experienced large increases in the employment share of relatively productive sectors – in particular, manufacturing and tourism – which offset a large contraction of employment in agriculture. Better reallocation of labor allowed for a rise in both wages and value added.

Clearly, the decline in the employment share of low-productivity sectors in Egypt has been slow. Over 50 percent of employed Egyptians still worked in agriculture or in the public sector in 2010. The largest rise in the share of jobs over the decade was in construction, an unproductive sector already burdened by a lack of modernization and an abundance of unskilled workers, but supported by large energy subsidies reducing the cost of building materials, notably cement. Meanwhile, the employment share of private sector services and industrial manufacturing had almost stagnated, sharply contrasting with other emerging economies.

5.1 A counterfactual scenario

Comparing Egypt with Turkey demonstrates how significant this transformation in employment structure can be. A recent study of the growth elasticity of employment in Turkey and Egypt (Abdel-Khalek, 2010) demonstrated how Egypt's productivity growth mainly arose from extractive industries, representing low overall employment, and the informal sector, while in Turkey it stemmed from manufacturing and export-oriented sectors. We construct a counterfactual scenario where Egypt's relative sectoral productivities are unchanged (that is, they stay exactly as they were over the decade 2000-10), but modify the share of employment

6See Bustoset al (2012) and McMillan and Rodrik (2011).

in each sector at the end of the decade. Instead of using the actual sectoral share of employment in Egypt, we apply Turkey's structure of employment as of 2009.[7]

We measure the lost opportunity by evaluating the additional overall productivity ($Y_{potential} - Y_{actual}$) that could be gained if Egypt had a similar sector mix $\theta_{Other,t}$ to Turkey, under the following form:

$$Y_{potential} - Y_{actual} = \sum_i^n \theta_i^{Turkey} y_{i,EGP} - \sum_i^n \theta_i^{EGP} y_{i,EGP} \quad (2)$$

Although Turkey had a higher PPP-adjusted per capita GDP in 2009 than Egypt, it remains a good comparator and is especially relevant in terms of similar employment and population size, and cultural and historical similarities. Its labor share in agriculture is about 4 percent lower, its share in industry is almost the same, but the starkest difference comes in private sector services, which together make up almost 33 per cent of Turkey's jobs (versus 24 percent in Egypt), and its somewhat lower share in the public sector.

What we find is that, applying equation (2), that is, assuming no changes in Egypt's *within-sector* productivity, a *between-sector* reallocation of jobs to services could have a dramatic impact. The structural change alone would translate into a 17 percent increase in the economy's labor productivity (Table 3).

5.2 Trends after the revolution

Although it is still early to forecast how Egypt's economy will be transformed in the wake of the revolution and recent political instability, it is clear that some sectors will take longer to recover than others. In fact, using the same approach as in the cross-country comparison, we find that over the last two years the share of public sector jobs has risen at the expense of jobs in higher-productivity sectors like mining and manufacturing, tourism and finance (see Figure 13). Although the time period is not long enough to draw conclusions, it signals a potentially alarming outcome if the trend continues and no action is taken. If this were the case, advances that increase within-sector productivity would be partly counteracted down by labor movements between sectors that are productivity reducing.

Based on these data for the years 2010-12, we project the same trends over a decade and find that the sectors with the lowest relative productivity (construction and the public sector) would see a dramatic *increase* in their share of the labor force, while sectors with the highest productivity (notably manufacturing) would see their share *decrease*, further maintaining the pattern of growth-reducing structural change (see Figure 14).Using 2010 relative labor productivities (beginning of period, given that end of period data are obviously not available), we observe the extent of such a growth-reducing path for the structural component of productivity growth, measured by the downwards-sloping relationship between relative productivity and projected change in employment in Figure 14 below.

6. Cross-country Analysis of the Determinants of Structural Change

We investigate the determinants of structural change in a cross-country panel using a new data set, which expands the McMillan and Rodrik figures, for 28 countries from 1990 and up to 2010, thus providing us with two decades of sectoral data for value added and employment per country. We compute the level of overall productivity growth attributable to structural change and to *within* productivity growth for each country in the database, for both decades, using equation (1).The exercise yields the following country ranking for the structural component of productivity growth (Table 4).

[7] We use the structure as of 2009 because this is the most recent year available in the McMillan and Rodrik dataset, and the sectors represented match the breakdown we have chosen for our analysis in Egypt.

It is evident that growth-enhancing structural change was a key determinant of the good economic performance of East Asian countries over the period, an outcome of their growth model orientation towards exports and the tradable, high-productivity sector, notably for China, India or Thailand. In contrast, structural change played a negligible role in high-income countries, where productivity variation among sectors is lower, and gains mainly come from improvements *within* productivity. These findings are consistent with the empirical literature on the geographic variation of structural change, including Roncolato and Kucera (2013) and McMillan and Rodrik (2011). We also observe that the best performers did so mainly in the second decade of our sample, while structural change was less impressive during the first decade. However, Egypt comes out as an outlier, with structural change flat or negative from 2000 to 2010 despite its lower middle-income status.

We use regression analysis to identify the main factors explaining the level of structural change across countries. The dependent variable SC_i is the structural change term over a decade, measured as the cumulative labour productivity growth over a decade attributable to the reallocation of labour. The impact of exogenous parameters on the level of the structural change is examined using the following specification:

$$SC_i = \alpha + \beta_1 {Agri_i^{t-1}}/{L_i^{t-1}} + \beta_2 \times {X_i^{raw}}/{X_i} + \beta_3 \times \Delta {X_i + M_i}/{GDP_i} + \beta_4 \times \Delta Credit_i + \beta_5 \times Credit_i{}^{t-1}\gamma_i + HI(i) + AF(i) + ASI(i) + \varepsilon$$

with SC_i the structural change term in a given country i, X_i the exports of country i, M_i the imports of country i, X_i^{raw} the raw material exports, ${Agriculture_i^{t-1}}/{L_i}$ the share of agriculture in total employment, ${X_i + M_i}/{GDP_i}$ the openness of the economy of country i measured as the ratio of the GDP of country i, ${Credit_i}/{GDP_i}$ the share of credit to private sector in GDP of country i, γ_i a regional dummy capturing fixed regional effects, HI, AF and ASI regional dummies for high-income countries, Africa and Asia, and an error term ε.

Control variables are extracted from a number of sources, including UN Comtrade for data on the share of primary commodities in exports or trade openness, the External Wealth of Nations database for foreign assets and liabilities, the Penn World Tables for capital per worker, and the World Bank's World Development Indicators for domestic credit to the private sector.

The choice of this specification reflects existing expectations in the literature (notably, that a large untapped workforce in agriculture constitutes a favorable environment to structural change, as shown in McMillan and Rodrik (2011), or that initial specialization in commodity exports is likely to slow down any such reallocation process). However, we also include important determinants that have been overlooked in previous studies. In particular, we study whether factors often associated with a rise in total factor productivity (for example, an increased openness to trade and better access to credit) were likely to increase productivity not only through access to capital and technology within sectors, but specifically by encouraging the shift of labor towards modern sectors.

A reasonable expectation is that initially having a large share of employment in agriculture increases the potential for structural change, since more room is available for growth-augmenting labor reallocation. This is consistent with McMillan and Rodrik's findings that an initial larger share of labor in agriculture provides an opportunity for low- and middle-income countries. We use the share of agriculture in employment at the beginning of the decade to examine the impact of surplus labor in agriculture on the potential for structural change, and find a positive and statistically significant coefficient.

Specialization in primary commodities, however, can trigger a form of Dutch disease, whereby labor concentrates in sectors with an existing comparative advantage, at the expense of sectors with higher potential for economies of scale and learning externalities, such as manufacturing. We then test for the importance of a revealed comparative advantage in agriculture or primary commodities, using the share of primary commodities in exports as a proxy. Results indicate that the degree of structural change is negatively correlated with a higher share of primary commodities in a country's exports, suggesting that a specialization in commodities is likely to slow down the process of structural change. This is in line with the insights of Barbier and Bugas (2014) for Latin America that if available arable land for cultivation is large, it absorbs displaced unskilled labor from elsewhere in the economy, therefore limiting productivity gains and generating a "Dutch disease."

Higher openness to trade can increase foreign competition for domestically produced goods, and therefore provide incentives to countries to make better use of surplus labor in order to improve efficiency. A greater openness to trade is also associated with an increase in total factor productivity.[8] We obtain a strong, positive and statistically significant coefficient of an increased openness to trade on the structural change term, even when controlling for initial conditions (share of agriculture in employment) and comparative advantage in primary commodities. Such results are consistent with the McCaig and Pavcnik (2013) study of structural change in Vietnam, in which they find that trade expansion and liberalization policies in the "Doi Moi" period (unification and devaluation of the exchange rate, relaxations on import and export quotas, eliminating all budget subsidies for exports starting in1989) were instrumental in triggering structural change in the economy and a focus on manufacturing at the expense of agriculture and other low productivity sectors.

Higher external capital can act as a substitute or a complement to domestic capital and thus help finance the adoption of new technologies or increase the production of the best-performing firms. It can also serve as a channel to "import" frontier technologies and organizations, and could therefore be expected to enhance structural change. To proxy for financial openness, we use the sum of the foreign assets and liabilities of a country divided by its GDP, and then estimate the change in this ratio over a decade. We find that the change in financial openness by itself has a positive impact on the structural change term, similar in magnitude to the change in trade openness. However, the coefficient associated with the change in financial openness is not statistically significant.

Using *Model 1* among the regressions in Table 5 yields a negative predicted value of structural change for Egypt, which matches the actual result. This is mainly due to the low growth in credit to the private sector, and the large share of primary commodities in Egypt's exports. However, the actual magnitude of this growth-reducing structural change (-7.3 per cent productivity growth in the decade) is much wider than predicted by the regression (-0.3 per cent), essentially because Egypt's increased trade openness failed to trigger the expected increase in structural change: based only on its increased trade openness, Egypt could have expected a positive (growth-enhancing) structural change. This shows that other binding constraints to the efficient reallocation of labor must have been at play in Egypt's disappointing performance.

6.1 Robustness checks

We conducted several robustness checks, including dropping one country at a time and one variable at time, and the findings were broadly unchanged. In order to check for multicollinearity, we regress each predictor on the others and compute the variance inflation factor. All variance inflation factors for predictors in model (1) are below 6, well below the

[8]See for example S. Edwards (1998), "Openness, productivity and growth: what do we really know?", *The Economic Journal*, vol. 108, No. 447.

commonly accepted threshold of 10 (see Table 6): this warrants an absence of any significant issue of multicollinearity.

A number of additional specifications were examined. We add the initial level of capital per worker, obtained from the Penn World Table, along with the change of this variable over a decade, to control for initial sophistication of production and its development and depth. However, this variable has neither a significant nor large effect on overall structural change.

We also test for the impact of the change in average years of schooling of the working-age population over the decade. As higher education standards could lead to both higher productivity within sectors and to incentives for workers to move across sectors, we expect the effect on structural change to be positive but small. However, we do not find a significant impact of a change in the average level of education over the period on the degree of structural change.

In addition, we ran regressions testing for the importance of the change in the real effective exchange rate over the decade (using an index of base 100 in 2007, computed by Bruegel for 178 countries (Darvas, 2012), and the average share of public fixed capital formation in total fixed capital formation during the decade (computed from the International Monetary Fund's World Economic Outlook database). We observe that both variables do not seem to have a significant effect on the structural growth term.

7. Conclusion and Policy Implications

Despite their apparent success in liberalizing key segments of the economy in the decade from 2000 to 2010, with increased openness to trade, foreign investments and financial flows, Egypt's economic policies over the last decade have failed to ignite significant structural change. No large-scale reallocation of labor from low to high productivity industries occurred, and some low value added sectors even expanded at the expense of more efficient ones, leading to a drag on aggregate productivity growth.

If such a trend were to continue, Egypt's inability to provide quality jobs to its growing middle class and a huge number of new entrants to the labor market every year is likely to endanger socio-political stability and increase the likelihood of reform reversals.

It is therefore of paramount importance for the country to identify the reforms most favorable to a more efficient allocation of the country's major asset, its young and large labor force. These reforms should include sector-level policies, designed to facilitate the rationalization of low value added industries, and to enable the expansion of firms operating in higher-productivity sectors. In parallel, broader, cross-cutting macroeconomic and business climate reforms are also necessary, to further open up some key sectors to domestic and foreign competition and facilitate the efficient allocation of labor.

7.1 Sector-level policies

7.1.1 Agriculture

We have observed that the share of labor employed in agriculture failed to decrease significantly over the last decade. This is partly the result of archaic regulations in the sector, which have led to high land fragmentation. As a result, a large population of individual farmers continues to work on small plots of land, with low productivity by international standards as a result of the failure to benefit from economies of scale. Land consolidation and modernization of farming practices would allow farmers to benefit from economies of scale and higher efficiency through both improvements in within-sector and across sector productivity. Better management of urbanization to preserve high quality arable land for agriculture is also important.

7.1.2 Manufacturing

In the manufacturing sector, the removal of distortive energy subsidies, which currently over-incentivize the employment of capital relative to labor, could do much to increase labor employment in the manufacturing sector. In addition, adopting more energy-efficient technologies could expand such areas as food processing, biotechnology and labor-intensive consumer electronics.

7.1.3 Private services

There is a need to expand the role of private services in the economy. Further development of the tourism sector in new areas could spur job creation in hotels, transportation and retail services. Attracting tourists from the Gulf and Eastern Europe could diversify the sources of revenue as well as destinations for visitors.

Another services sector with much potential for expansion is the information and communications technology (ICT) sector. Egypt was ranked fourth in the Global Services Location Index in 2011, a list of the world's most attractive offshoring destinations. While earlier reforms have helped develop the sector, further measures are required for the sector to deliver its potential, including better regulation to ensure fair market practices, expansion of ICT facilitating infrastructure, and meeting labor skill needs.

In other dynamic emerging markets, the expansion of the retail trade sector has been particularly notable, as distribution channels expanded geographically and socially across all ladders of society and consumption of tradable goods became more widespread. In Egypt as well, the development of such retail trade services in remote areas would increase employment opportunities far from the main industrial centers of Cairo and Alexandria.

7.2 Cross-cutting reforms

We can draw several implications for broader economic and business climate reforms from the analysis on the determinants of structural change outlined earlier on in this paper.

7.2.1 Access to finance

To facilitate the development of a healthy private sector, a number of reform measures are needed to enhance access to finance. A critical part of this would need to involve addressing the crowding out of private sector lending by the public sector. In addition, further strengthening of the financial infrastructure is critical to enhance credit information, strengthen creditor rights, improve collateral regimes, and expand asset registries. Utilizing macro-prudential policies to reduce credit concentration could contribute to increased competition and access to credit. The diversification of a heavily bank-based financial system can help expand the range of financial services, deepen financial intermediation, and promote more competition among banks and other non-bank financial actors.

7.2.2 Industrial and trade policy

A more efficient allocation of labor towards higher value-added and more productive sectors can be addressed by industrial and trade policy. Reducing barriers to trade through accelerating negotiations with the European Union on a Deep and Comprehensive Free Trade Agreement is one area worthy of attention. Another is the removal of artificial support to less efficient industries (such as construction, agriculture and public services) through subsidies, lending by state-owned banks and increases in the public wage bill that are divorced from productivity improvements.

7.2.3 Business climate

Improvements in the business climate that help the efficient allocation of resources in the economy are critical to the process of structural change. Egypt's insolvency laws and regulations, for example, make it rather costly and lengthy to close down plants and companies,

as shown by the country's consistently low *Doing Business* ranking on this matter (146th in 2014). Such barriers to the closing of inefficient businesses are likely to slow the process of moving workers towards higher-productivity industries (World Bank, 2014).

On the flip side, the creation and growth of productive firms can be facilitated by better defining property rights and easing regulations to incentivize the set-up of new firms, removing barriers to entry, fostering fair competition and reducing discretionary enforcement of laws and regulations.

7.2.4 Labor markets

The International Labor Organization's study of structural change (ILO, 2013) emphasizes the links between unemployment and under-employment on the one hand, and the absence of structural change on the other. The study identifies the low level of capital investment as one of the main reasons for this absence of structural reallocation of labor in the region, compared with South East Asia or even sub-Saharan Africa. Investment indeed provides incentives for workers to move to higher-productivity industries as wages in these sectors increase; it can also indirectly favor labor reallocation by providing better infrastructure ensuring geographic mobility and therefore the move of workers towards clusters of high-value added industries. In Egypt, in particular, the relatively low share of public investment (25 percent of total investment in 2010, after declining throughout the decade) can partly explain the lack of basic infrastructure favoring labor mobility out of rural areas and into clusters of high-productivity economic activities.

Labor mobility can also be boosted by increasing the ease of hiring and firing workers. But a pre-requisite to the efficient allocation of labor is also that workers have the right skills needed in high value-added, productive industries. Thus, addressing Egypt's well-documented skills mismatch and investing effectively in education in order to better equip graduates to enter the marketplace is a critical policy priority.

References

H. Abdelbaki (2013), "The Arab Spring: Do We Need a New Theory?", *Modern Economy*, Volume 4, 187-196.

G. Abdel-Khalek (2010), "Growth, Economic Policies and Employment Linkages in Mediterranean Countries. The cases of Egypt, Israel, Morocco and Turkey", OECD Employment Working Paper No.63.

D. Acemoglu, U. Akcigit, N. Bloom and W. Kerr (2013), "Innovation, Reallocation and Growth",PIER Working Paper Archive 13-018, Penn Institute for Economic Research, Department of Economics, University of Pennsylvania.

African Center for Economic Transformation, "Growth with Depth", *2014 African Transformation Report.*

P. Aghion and P. Howitt (1992), "A Model of Growth Through Creative Destruction", *Econometrica*, Vol. 60, No. 2 (March), pp. 323-351.

N. Al-Nashif and Z. Tzannatos (2013), "Only Fair", *Finance & Development*, International Monetary Fund, March 2013, Volume 50.

F. Arias-Vazquez,J. Lee and D. Newhouse (2012), "The role of sectoral growth patterns in labor market development",Policy Research Working Paper Series 6250, The World Bank.

W. Arthur (1989), "Competing Technologies, Increasing Returns, and Lock-In by Historical Events", *The Economic Journal*, Vol. 99, No. 394, pp. 116-131.

B. Balassa (1979), "The 'Stages' Approach to Comparative Advantage", in *Economic Growth and Resources*, Volume 4: National and International Issues.

E. Barbier E and S. Bugas (2014), "Structural Change, Marginal Land and Economic Development in Latin America and the Caribbean", *Latin American Economic Review*, February, 23:3.

E. Bartelsman, J. Haltiwanger and S. Scarpetta (2006). "Cross Country Differences in Productivity: The Role of Allocative Efficiency",NBER Working Paper 15490.

F. Bourguignon (2003), The Growth Elasticity of Poverty Reduction: Explaining Heterogeneity across Countries and Time Periods, in T. Eichler and S. Turnovsky (eds.), *Growth and Inequality*.

S. Bustos, C. Gomez, R. Hausmann and CA Hidalgo (2012), "The Dynamics of Nestedness Predicts the Evolution of Industrial Ecosystems", PLoS One 7(11)

Central Agency for Public Mobilization and Statistics (CAPMAS), labor force sample surveys, various years.

G. Clark, 2005. "The Condition of the Working Class in England, 1209-2004",*Journal of Political Economy*, University of Chicago Press, vol. 113(6), p1307-1340.

J. Crespo and A. Raggl(2011), "Inclusive Growth and Employment: Conceptual and Methodological Challenges",a conference by the World Bank held in Nairobi, Kenya.

O. Dahi (2011), "Understanding the Political Economy of the Arab Revolts", Middle East Report 259.

Z. Darvas(2012)"Real Effective Exchange Rates for 178 Countries: A New Database", Working Paper 2012/06, Bruegel, March.

G. De Vries, A. Erumban, M. Timmer, I. Voskoboynikov and H.Wu (2012), "Deconstructing the BRICs: Structural transformation and aggregate productivity growth", *Journal of Comparative Economics*, Volume 40, Issue 2, May, Pages 211–227.

M. Doms and E. Bartelsman (2000), "Understanding Productivity: Lessons from Longitudinal Microdata," *Journal of Economic Literature*, American Economic Association, vol. 38(3), pages 569-594, September.

M. Eberhardt and F. Teal (2013), "Structural Change and Cross-Country Growth Empirics", World Bank Policy Research Working Paper 6335

S. Edwards (1998), "Openness, Productivity and Growth: What Do We Really Know?", *The Economic Journal*, vol. 108, No. 447.

B. Essama-Nssah and P.J. Lambert (2009), "Measuring Pro-Poorness: a Unifying Approach with New Results",*Review of Income and Wealth*, Series 55, No 3: 752-778.

M. Hassan and C. Sassanpour (2008),"Labour Market Pressures in Egypt: Why is the Unemployment Rate Stubbornly High?",international conference on the unemployment crisis in the Arab countries by the Arab Planning Institute.

S. Herrera, H. Selim, H. Youssef and C. Zaki (2011), "Egypt beyond the Crisis: Medium-Term Challenges for Sustained Growth",Economic Research Forum, Working paper No. 625.

A. Hirschman, (1958),*The Strategy of Economic Development*, New Haven, Yale University.

A. Hosny, M. Kandil and H. Mohtadi (2013), "The Egyptian Economy Post-Revolution: Sectoral Diagnosis of Potential Strengths and Binding Constraints",Economic Research Forum, Working paper No. 767.

J. Ocampo, C. Rada and L. Taylor (2009), *Growth and Policy in Developing Countries: A Structuralist Approach*, New York, Columbia University Press.

E. Ianchovichina and S. Lundstrom (2009), "Inclusive Growth Analytics: Framework and Application",Policy Research Working Paper No. 4851, the World Bank, March.

International Labour Organization (2013), Global Employment Trends: Recovering from a second jobs dip.

International Monetary Fund (2014), "Policy Paper on Long-Run Growth and Macroeconomic Stability in Low-Income Countries—The Role of Structural Transformation and Diversification".

International Monetary Fund (2013), "Anchoring Growth: The Importance of Productivity-Enhancing Reforms in Emerging Market and Developing Economies",IMF Staff Discussion Note,E. Dabla-Norris, G. Ho, K. Kochhar, A. Kyobe and R. Tchaidze, December.

P. Krugman, Paul (1991), "Increasing Returns and Economic Geography",*Journal of Political Economy*, University of Chicago Press, vol. 99(3), 483-99.

D. Kucera and L. Roncolato (2012), "Structure Matters: Sectoral Drivers of Growth and the Labour Productivity-Employment Relationship", ILO Research Paper No.3, December.

S. Kuznets (1955), "Economic Growth and Income Inequality," *American Economic Review* 45(1):1-28.

J. Laitner (2000), Structural Change and Economic Growth, *The Review of Economic Studies*, Vol. 67, No. 3 (July), pp. 545-561.

P. Laneand G-M. Milesi-Ferretti(2007) “The External Wealth of Nations Mark II”, *Journal of International Economics*, November 2007.

W.A. Lewis (1954), “Economic Development with Unlimited Supplies of Labour”, Manchester School of Economic and Social Studies, 22, 139-191.

V. Loayza and C. Raddatz (2010), “The Composition of Growth Matters for Poverty Alleviation”, *Journal of Development Economics*, Elsevier, vol. 93(1), pages 137-151, September.

B. McCaig and N. Pavcnik (2013), “Moving Out of Agriculture: Structural Change in Vietnam”, National Bureau of Economic Research Working Paper 19616.

M. McMillan and D. Rodrik (2011), “Globalization, Structural Change and Productivity Growth”, NBER Working Papers 17143, National Bureau of Economic Research.

A. Maddison (2001), *The World Economy: A Millennial Perspective*, Development Centre Studies, Paris, OECD Publishing.

P. Martins (2014), “Structural Change in Ethiopia, an Employment Perspective”, World Bank Policy Research Working Paper 6749.

M. Mariouni and R. Mouelhi (2013), “Contribution to Structural Change to Productivity Growth: Evidence from Tunisia”, Economic Research Forum 19th Annual Conference.

L.R. Ngaiand C. Pissarides (2007), “Structural Change in a Multi-sector Model of Growth”, *American Economic Review*, 97(1): 429-443.

J. Page (2012), “Aid, Structural Change and the Private Sector in Africa”, WIDER Working Paper, No. 2012/21.

M. Ravallion (2001), “Growth, Inequality and Poverty: Looking Beyond Averages”, *World Development*, 29(11): 1803-1815.

D. Rodrik (2007), *One Economics, Many Recipes*, Princeton University Press.

L. Roncolato and D. Kucera (2013), ‘‘Structural Drivers of Productivity and Employment Growth: A Decomposition Analysis for 81 Countries.’’ *Cambridge Journal of Economics*.

L. Taylor and C. Rada (2006), “Structural Change, Economic Policy, and Development”, *Nordic Journal of Political Economy*, Volume 32, pp 51-71.

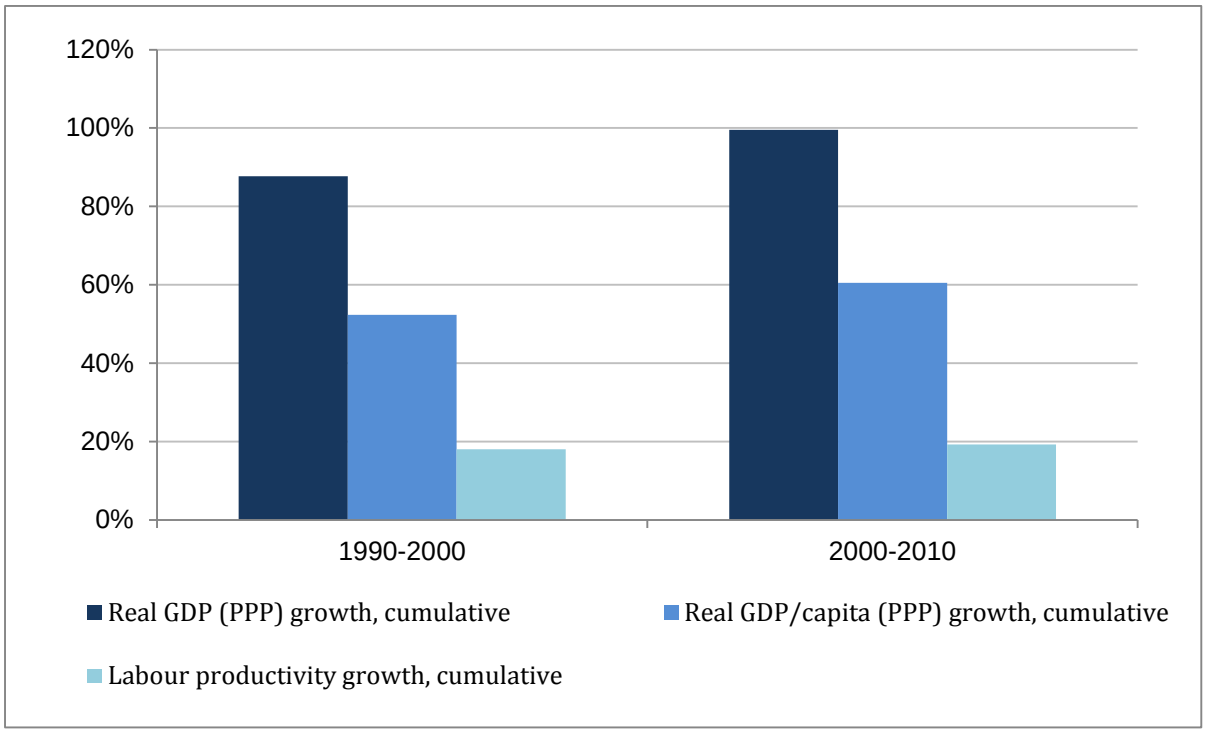
P. Timmerand S. Akkus (2008),“The Structural Transformation as a Pathway out of Poverty: Analytics, Empirics and Politics”, Center for Global Development, Working Paper 150.

TC. Sargent and R. Edgard (2000), “Labour or Total Factor Productivity: Do We Need to Choose?”, *International Productivity Monitor*, Centre for the Study of Living Standards, vol. 1, pages 41-44, Fall.

C. Yassine (2013), “Structural Labor Market Transitions and Wage Dispersion in Egypt and Jordan”, Economic Research Forum, Working paper No. 753 United Nations Industrial Development Organization (2012), *Annual Report*.

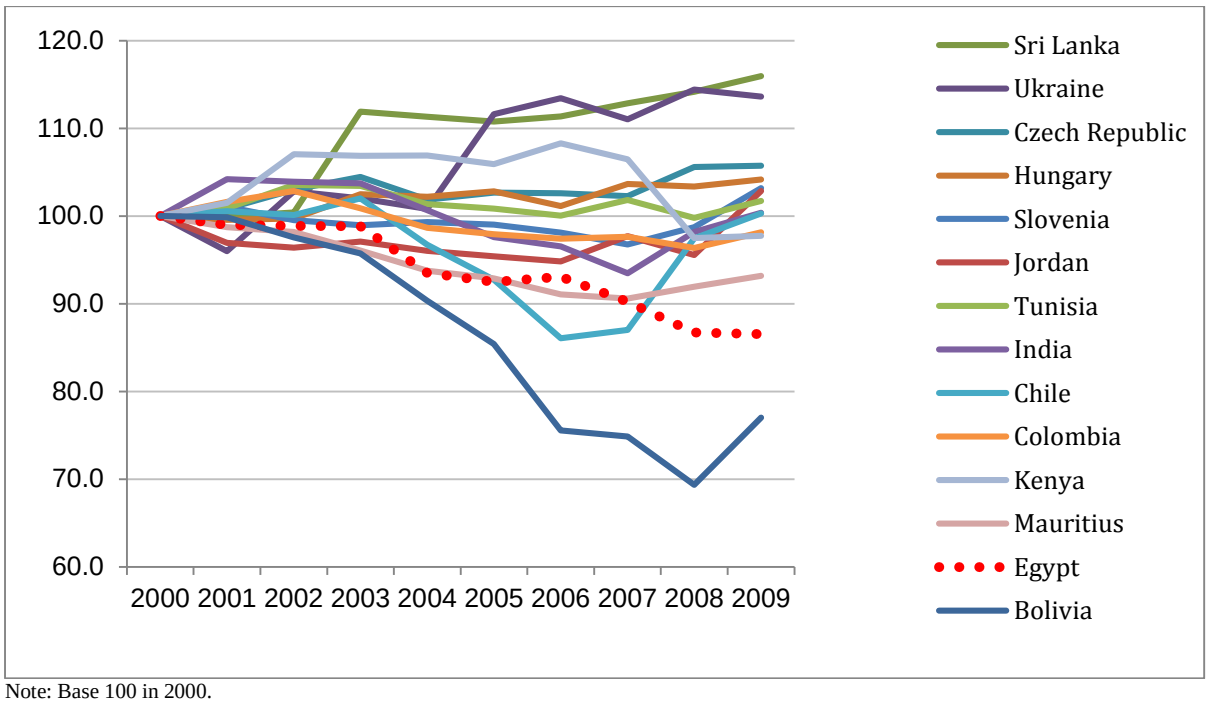
World Bank (2014), *Doing Business.*

Figure 1: Growth of real GDP, GDP/Capita and Labor Productivity in Egypt



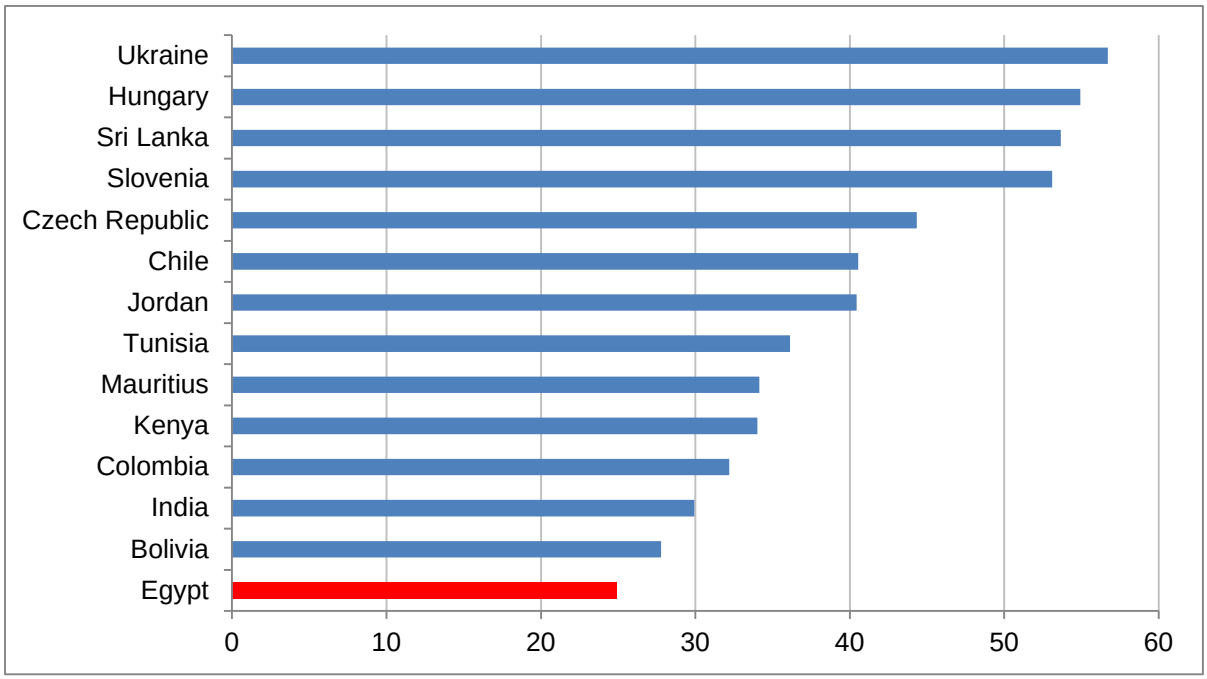
Source: IMF World Economic Outlook, United Nations World Productivity Database.

Figure 2: Unadjusted Share of Wages in GDP in Selected Countries



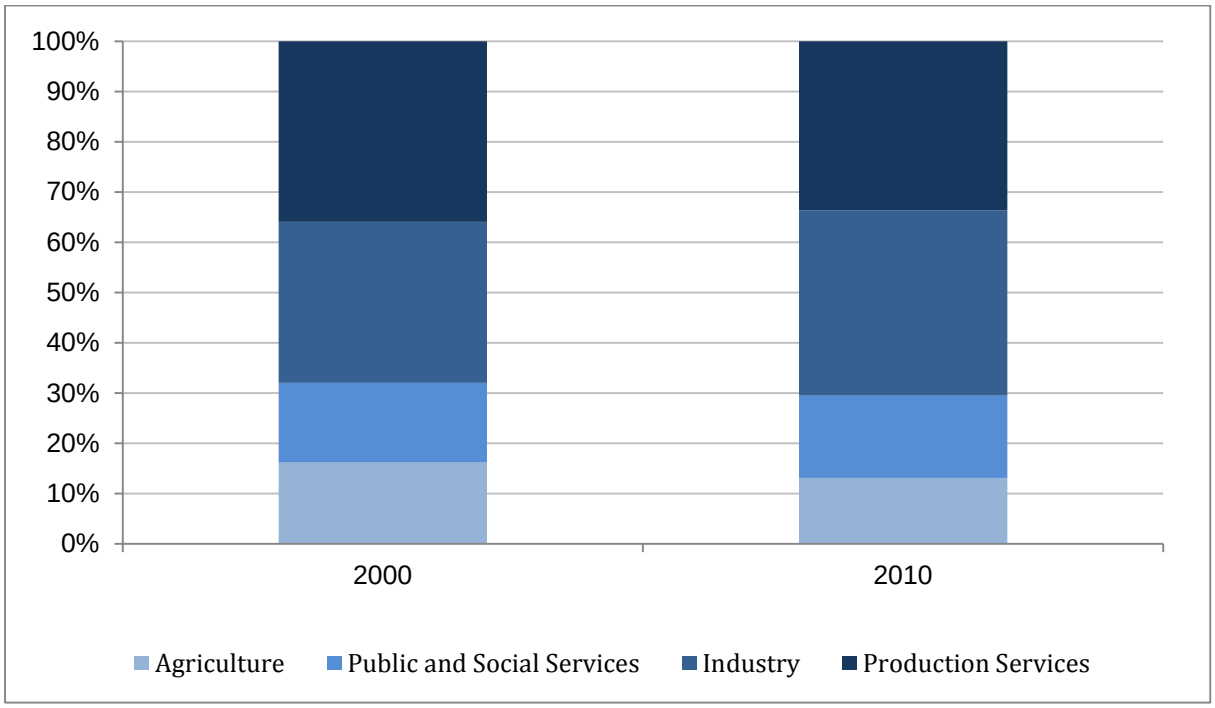
Note: Base 100 in 2000.
Source: International Labor Organization, Global Wage Database.

Figure 3: Unadjusted Share of Wages in GDP in Selected Countries (%), 2009



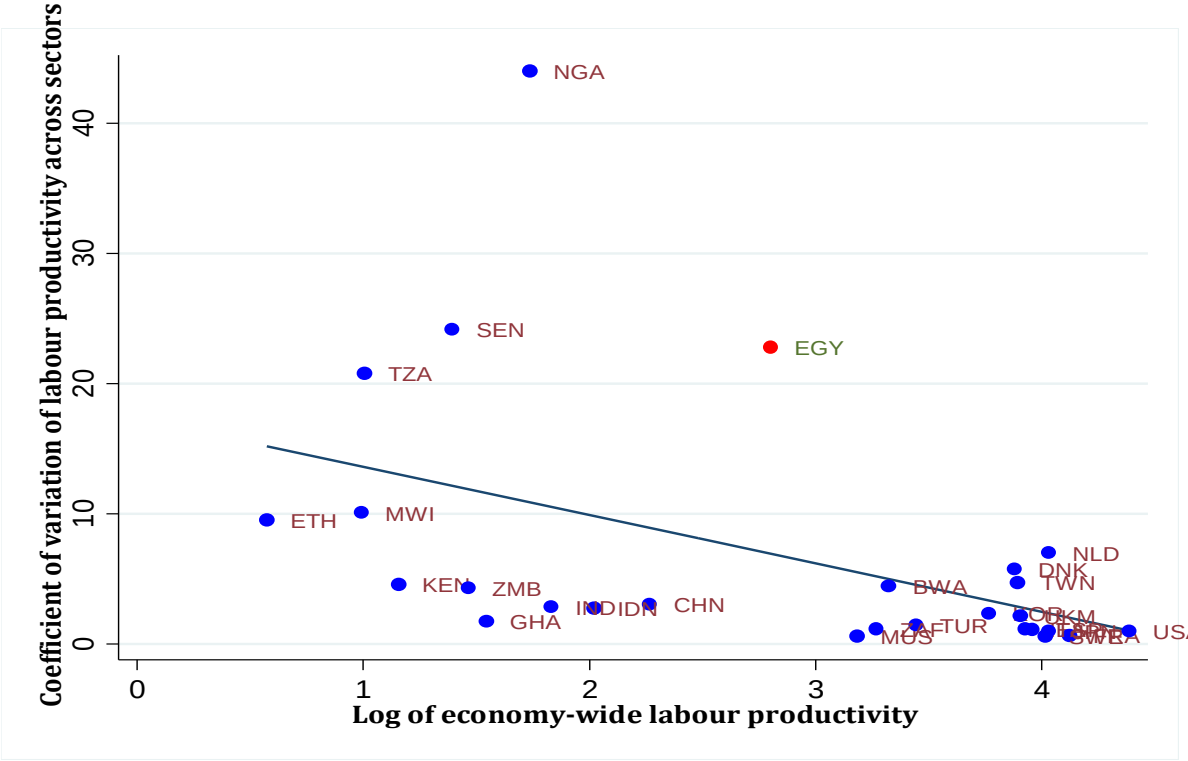
Source: International Labor Organization, Global Wage Database.

Figure 4: Sectoral Distribution of Real GDP (%) in Egypt



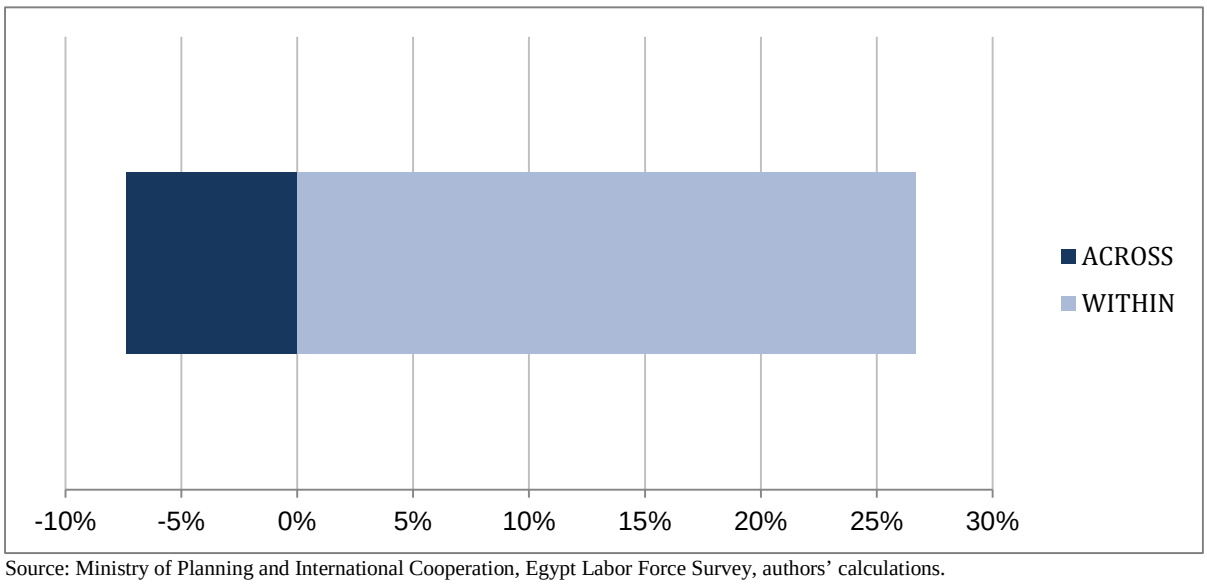
Source: Ministry of Planning and International Cooperation.

Figure 5: Variation of Productivity across Sectors and Economy-Wide Labor Productivity



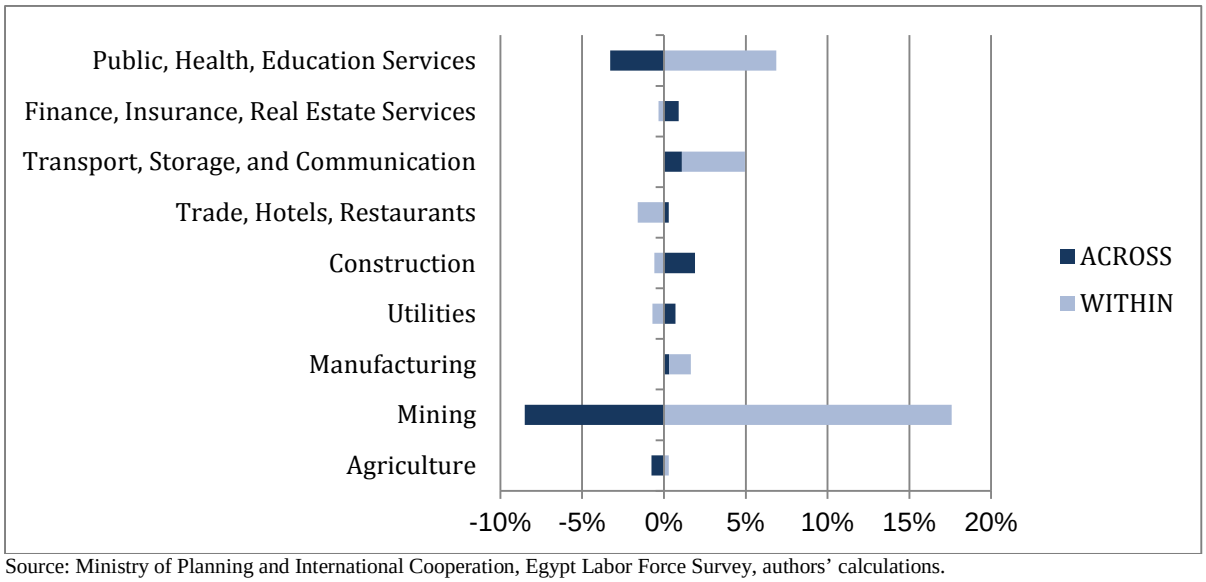
Source: Groningen Growth and Development Centre (GGDC) 10-Sector Database, World Input Output Database Socio-Economic Accounts (WIOD SEA), author's calculations.

Figure 6: Decomposition of Labor Productivity Growth in Egypt (2000-2010)



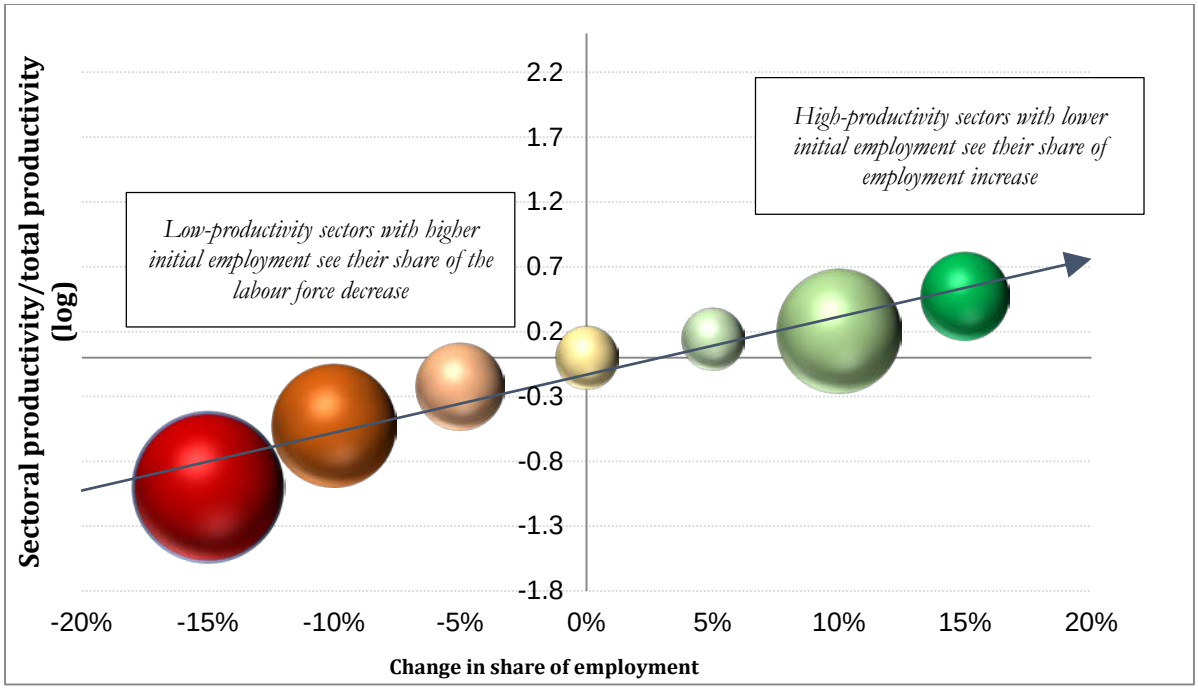
Source: Ministry of Planning and International Cooperation, Egypt Labor Force Survey, authors' calculations.

Figure 7: Decomposition of Labor Productivity Growth by Sector (Egypt, 2000-2010)



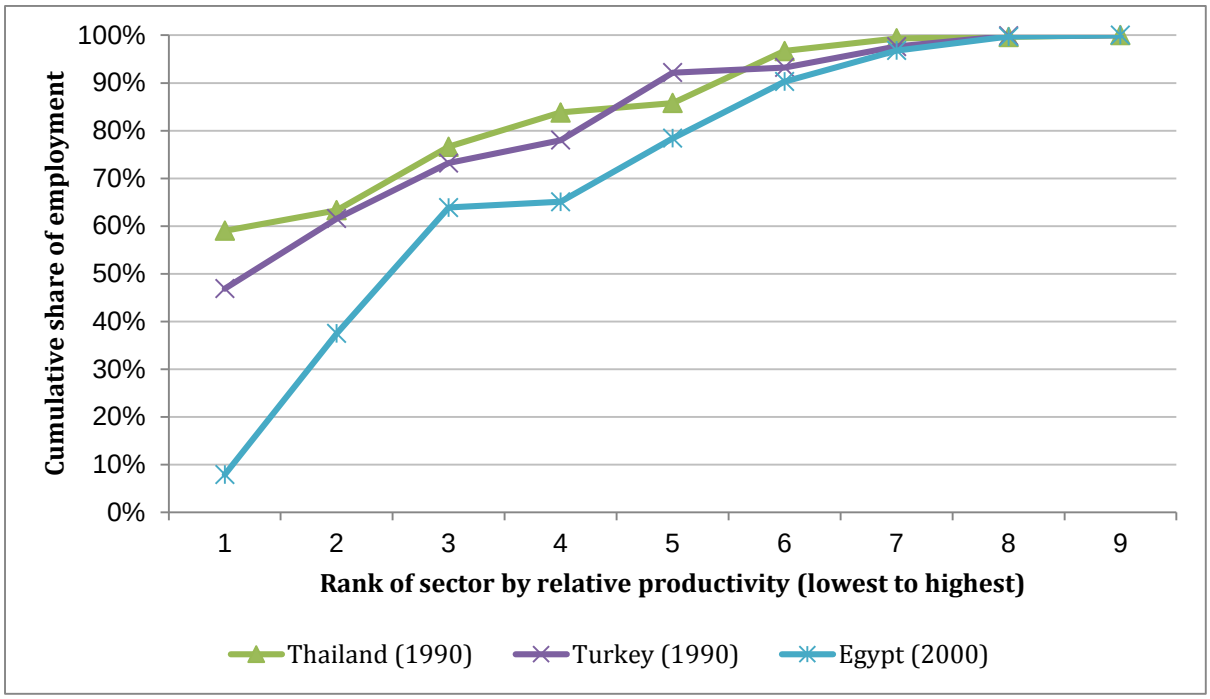
Source: Ministry of Planning and International Cooperation, Egypt Labor Force Survey, authors' calculations.

Figure 8: A Stylized View of the "Ideal" Structural Change Process



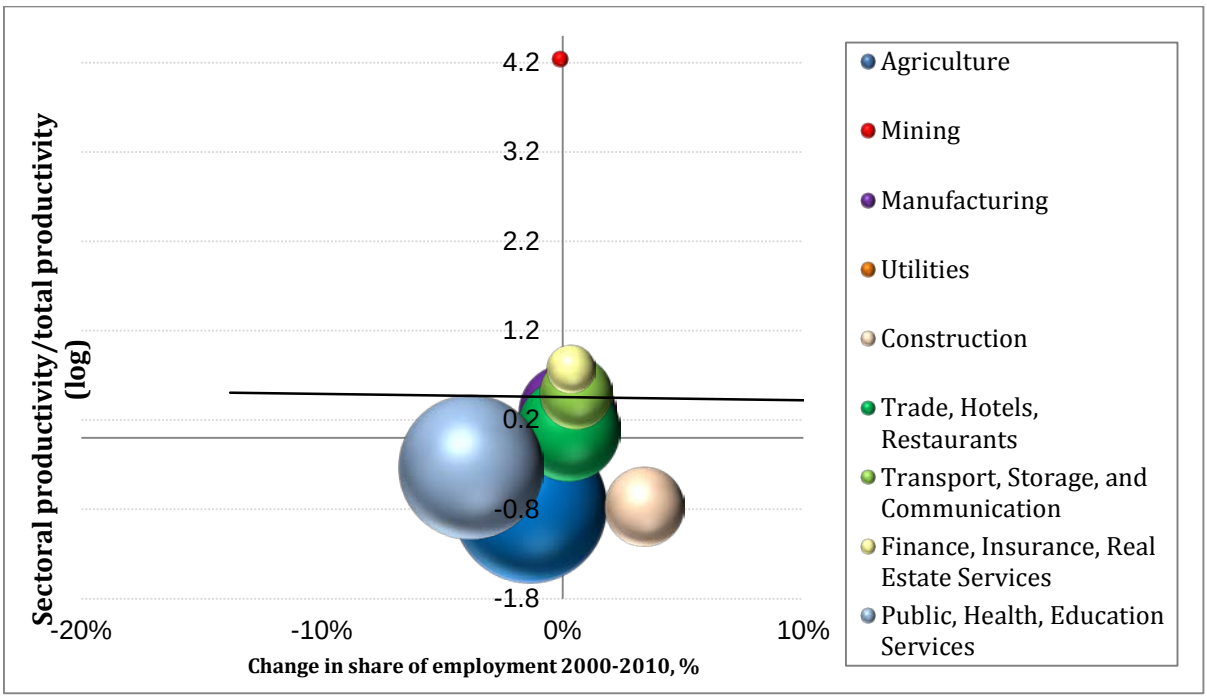
Source: Authors' illustration.

Figure 9: Cumulative Share of Employment by Number of Sectors



Note: Sectors ranked by ascending order of relative labor productivity.
Source: CAPMAS, authors' calculations.

Figure 10: Structural Change in Egypt, 2000-2010[9]



[9]The chart shows the change in each sector's share of employment (on the x-axis) plotted against the sector's relative labour productivity (in log terms, y-axis). Relative labour productivity is end-of-period sector GDP per person employed as a share of the economy-wide GDP per person employed. The size of the circle represents the share of employment at the beginning of the period.

Figure 11: Structural Change in Thailand, 1990-2000[8]

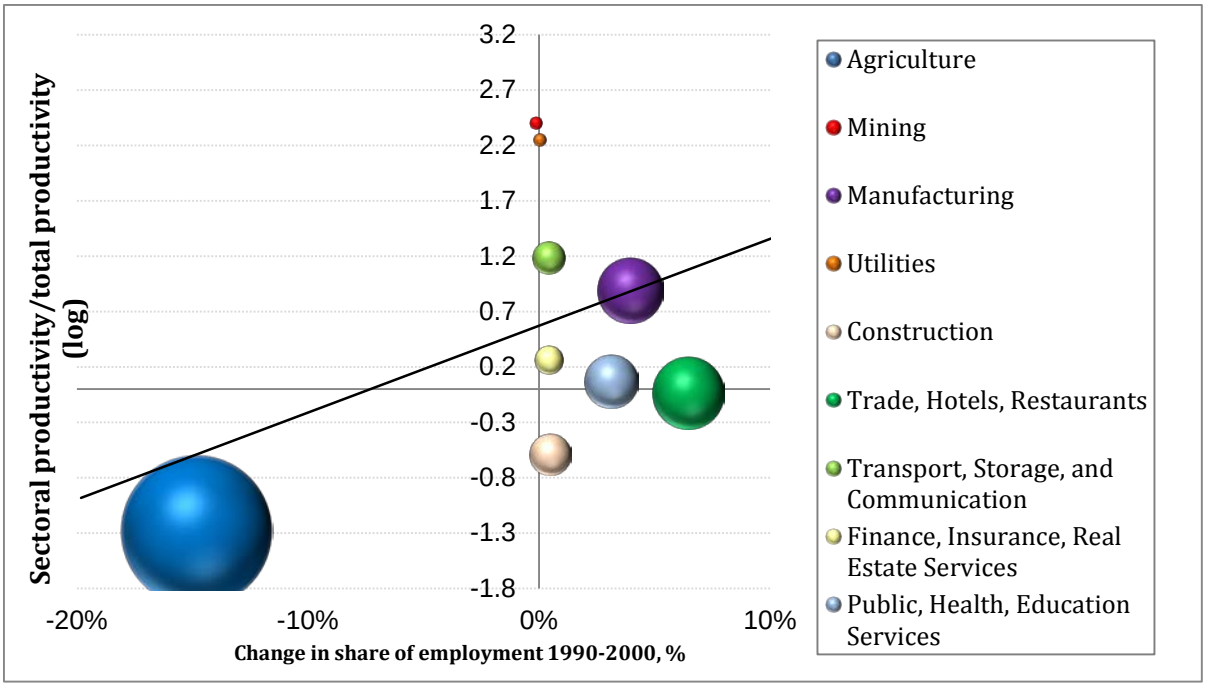


Figure 12: Structural Change in Turkey, 1990-2000[8]

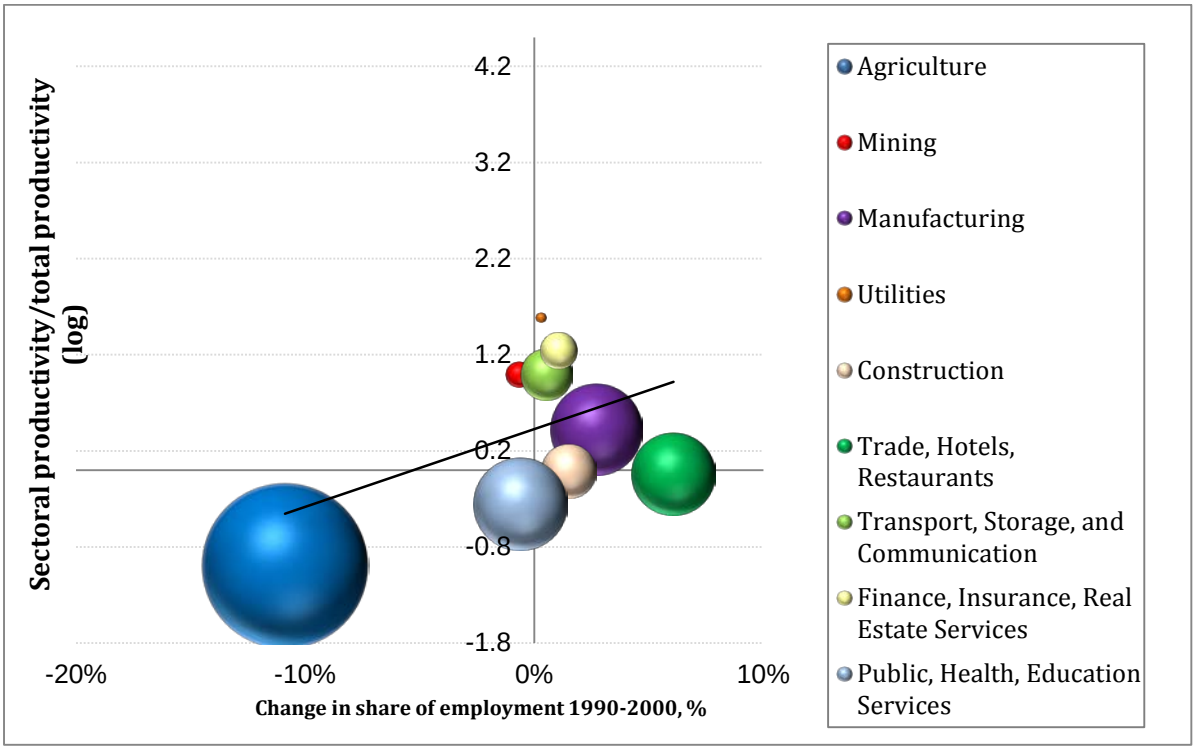
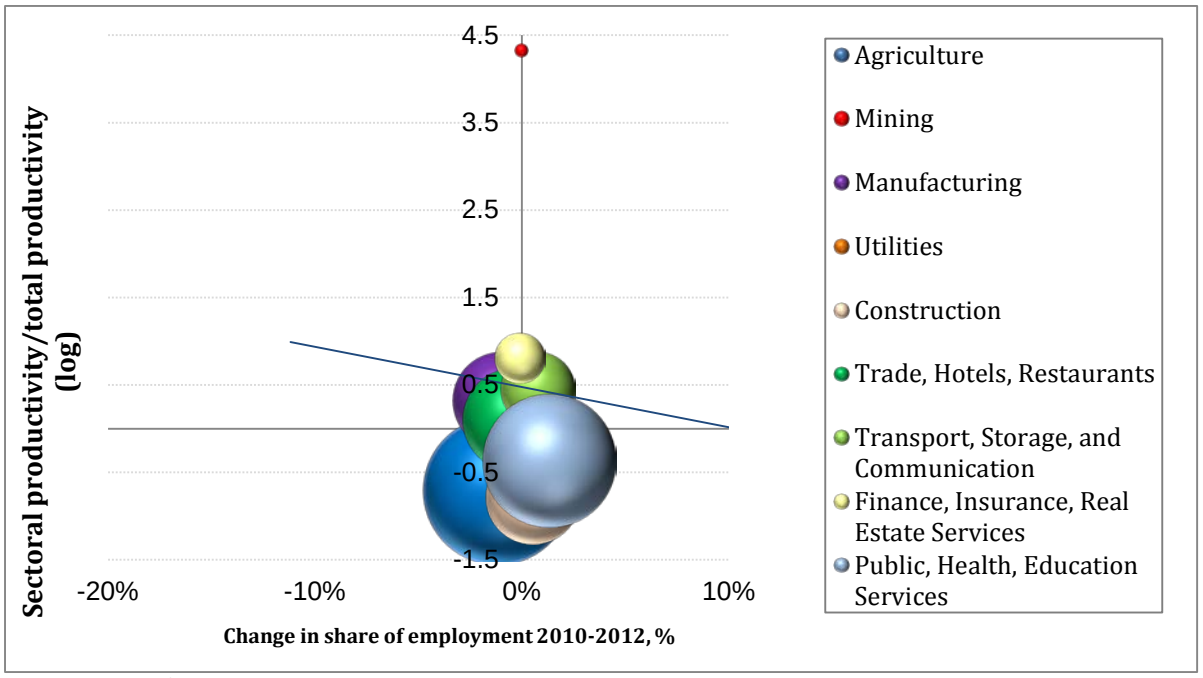


Figure13: Structural Change in Egypt, 2010-2012



Source: Ministry of Planning and International Cooperation, Egypt Labor Force Survey, author's calculations.

Figure14: Projected Structural Change in Egypt, 2010-2020, Using Current Trends

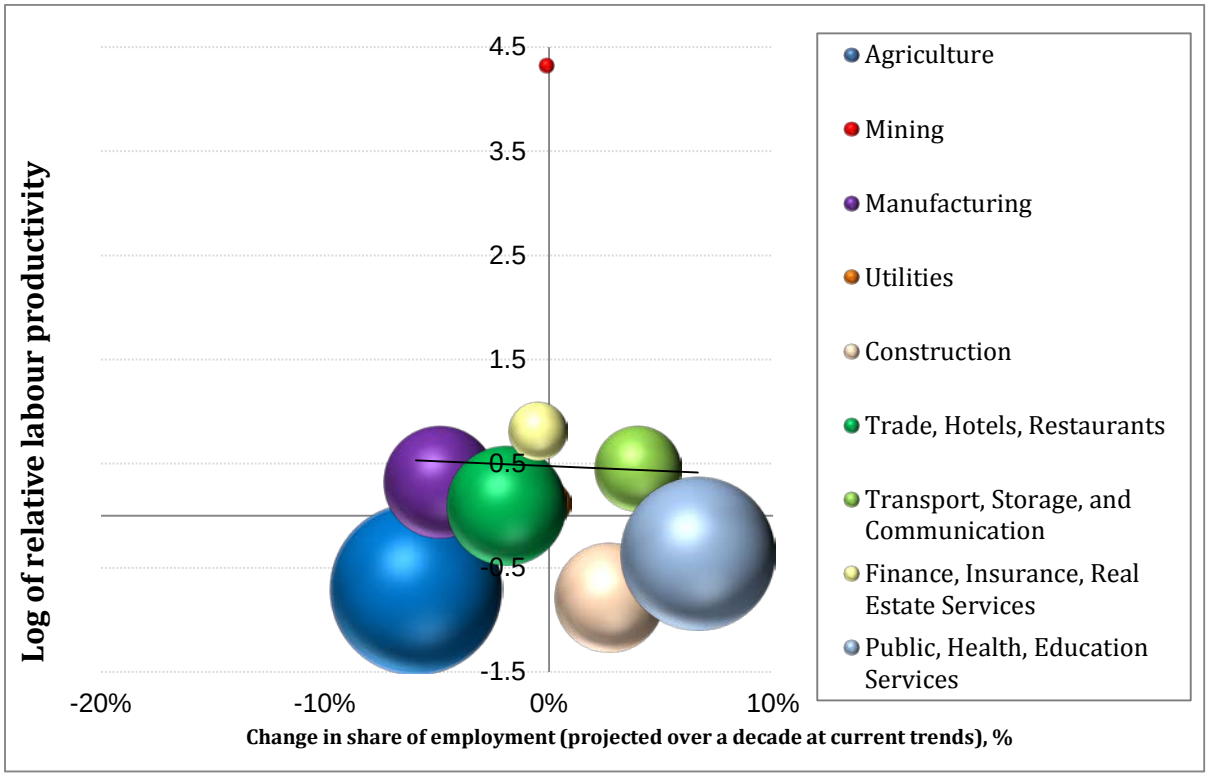


Table 1: Summary Sector-Level Statistics on the Egyptian Economy

	Share of Employment 2010 (%)	Share of GDP 2010 (%)	Average Labor Productivity (2000 International US$)
Mining and Quarrying	0.20	13.7	1,143,234
Utilities	1.75	1.9	17,471
Finance, Insurance, Real Estate Services	3.25	7.0	35,616
Transport, Storage and Communication	7.06	11.7	27,222
Construction	11.31	5.3	7,651
Manufacturing	12.09	16.1	21,906
Wholesale and Retail Trade, Hotels, Restaurants	13.53	14.9	18,181
Public, Health, Education Services	22.59	16.3	11,896
Agriculture	28.23	13.2	7,678
Overall Economy	100	100	16,467

Source: Central Agency for Public Mobilization and Statistics, Ministry of Planning, authors' calculations.

Table 2: Productivity by Sector, 2010 (2000 US$): Egypt Performance in International Context

	Egypt		Minimum		Maximum	
	Labor Productivity (2000 US$)	Decile	Country	Labor Productivity (2000 US$)	Country	Labor Productivity (2000 US$)
Agriculture	7,678	6	ZMB	842	USA	61,892
Mining	1,143,234	10	ETH	1,522	NDL	1,249,806
Manufacturing	21,906	5	ETH	1,504	USA	120,062
Public utilities	17,471	2	NGA	5,624	KOR	339,369
Construction	7,651	3	NGA	2,661	BWA	66,728
Wholesale and retail trade	18,181	5	GHA	2,199	USA	64,129
Transport, storage and communication	27,222	5	NGA	5,885	USA	110,780
Finance, insurance and real estate	35,616	2	NGA	8,897	TZA	179,078
Public, health, education services	11,896	5	NGA	1,356	TWN	51,166
Overall productivity	16,467	5	ETH	1,775	USA	80,308

Note: See Appendix for country names abbreviations.
Source: Groningen Growth and Development Centre (GGDC) 10-Sector Database, World Input Output Database Socio-Economic Accounts (WIOD SEA), author's calculations.

Table 3: A Counterfactual Approach Using Turkey Sector Shares

	Egypt's actual sectoral labor productivity (2010)	Sectoral employment share, Turkey (2009) (%)	Turkey sectoral shares (2009) applied to Egypt (2010 employment)	Contribution to aggregate product (counterfactual Turkey)	Contribution to aggregate product (Actual)
Agriculture	10,526	24.69	5,884,174	61,939,610,278	70,817,317,582
Manufacturing and Mining	54,705	19.04	4,538,004	248,252,190,628	160,208,165,961
Utilities	62,997	0.37	87,355	5,503,116,950	26,244,260,048
Construction	10,490	5.87	1,398,807	14,673,706,186	28,260,243,467
Wholesale, Retail Trade, Hotels, Restaurants	24,926	21.35	5,086,775	126,792,260,894	80,332,890,323
Transport, Storage and Communication	27,650	5.08	1,210,657	33,474,625,784	46,498,558,341
Finance, Insurance, Real Estate Services	48,830	6.29	1,499,602	73,225,322,394	37,818,392,483
Public, Health, Education Services	16,309	17.31	4,123,625	67,253,819,458	87,797,609,484
			Average Labor productivity	**26,485**	**22,577**
			Counterfactual impact	**17.31%**	

Source: Groningen Growth and Development Centre (GGDC) 10-Sector Database, Egypt Labor Force Survey, author's calculations.

Table 4: Ranking of First and Last 10 Countries by Structural Growth Over the 2000s

Country	Structural component of productivity growth (%)
China	54.5
Turkey	33.1
Malawi	30.7
Ethiopia	30.7
Tanzania	27.9
India	26.7
Mauritius	7.9
Taiwan	7.5
Korea	6.5
Ghana	5.7
Zambia	0.3
Sweden	-1.2
Kenya	-2.2
Netherlands	-2.8
Indonesia	-2.9
United Kingdom	-4.2
United States	-5.5
Egypt	**-7.4**
Nigeria	-8.0
Botswana	-26.8

Source: Groningen Growth and Development Centre (GGDC) 10-Sector Database, World Input Output Database Socio-Economic Accounts (WIOD SEA), author's calculations.

Table 5: Determinants of Structural Change: OLS Regressions

	(1)	(2)	(3)
Initial share of agriculture in employment	0.433***	0.428***	0.436***
	(3.48)	(3.40)	(3.24)
Share of primary commodities in exports	-0.221*	-0.221*	-0.219*
	(-1.83)	(-1.81)	(-1.77)
Change in trade openness	0.002*	0.003*	0.003*
	(1.70)	(1.74)	(1.73)
Change in financial openness	0.002	0.002	0.002
	(1.40)	(1.45)	(1.42)
Growth in domestic credit to private sector	0.025*	0.021	0.021
	(2.00)	(1.50)	(1.46)
Initial level of credit to GDP	0.001	0.001	0.001
	(1.30)	(1.11)	(1.10)
High-income dummy	-0.047	-0.039	-0.051
	(-0.68)	(-0.55)	(-0.53)
Africa dummy	-0.088	-0.082	-0.081
	(-1.25)	(-1.14)	(-1.11)
Asia dummy	-0.102	-0.119	-0.118
	(-1.33)	(-1.43)	(-1.40)
Change in capital intensity		0.024	0.024
		(0.56)	(0.56)
Initial level of capital accumulation per worker			0.000
			(0.19)
Change in education			
Constant	-0.052	-0.062	-0.071
	(-0.79)	(-0.90)	(-0.83)
r2	0.455	0.460	0.460
N	50	50	50

Note: t statistics in parentheses; *p< 0.10, **p< 0.05, ***p< 0.01

Table 6: OLS Regressions and Test for Multicollinearity (Variance Inflation Factors)

	(1)	Variance inflation factor
Initial share of agriculture in employment	0.433***	5.60
Share of primary commodities in exports	-0.221*	5.05
Change in trade openness	0.002*	1.48
Change in financial openness	0.002	1.21
Growth in domestic credit to private sector	0.025*	1.35
Initial level of credit to GDP	0.001	2.64
High-income dummy	-0.047	4.64
Africa dummy	-0.088	5.10
Asia dummy	-0.102	3.06
Constant	-0.052	
r2	0.455	
N	50.000	

Note: VIF in second column; $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$.

Appendix: Data transformation and analysis

Data Sources

For Egypt, annual employment data obtained from Egypt's annual labor force survey (LFS) carried out by the Central Agency for Public Mobilization and Statistics (CAPMAS), are used. They include a breakdown of data across nine sector groups. We use real GDP data obtained from the Ministry of Planning and International Cooperation for the period fiscal year (FY) 2000-01 to FY 2010-11, adjusted to base year FY 2006-2007.[10]Sectors were regrouped to ensure consistency between sectoral value added and employment data whenever the methodology of one of the two agencies was changed.[11]For the years 2000 and 2001, backwards extrapolation from the growth trend in the following years is used to separate mining and manufacturing into separate categories for a more meaningful comparison with peer countries. The GDP data are broken down into 17 sectors which we group into nine sectors to be consistent with the available sectoral breakdown for the employment data. Labor productivity at the sectoral level is calculated using the simple ratio of total GDP by sector to total persons employed by sector. The chosen timeframe 2000-2010 also allows for more consistent sector-level data classification among agencies.[12]

The data was grouped into the following nine sectors:

- agricultural activities (including agriculture, forestry and fishing)
- manufacturing
- mining (includes crude oil, gas and other mining)
- utilities (includes electricity, water and sewerage)
- construction
- trade, hotels and restaurants (includes wholesale and retail trade)
- transport, storage and communication
- finance, insurance and real estate services
- public, health and education services.

Data for other countries are used to compare patterns of structural change in emerging or advanced economies relative to those witnessed in Egypt over two decades: 1990-2000 and 2000-2010 (or 1999-2009 when no data are available for 2010). Data for employment and value added by sector are obtained from the Groningen Growth and Development Centre (GGDC) 10-Sector Database for the first decade for most countries, the GGDC's African Sector Database for sub-Saharan African countries for both decades, as well as from the World Input Output Database Socio-Economic Accounts (WIOD SEA) for the second decade. Data from the WIOD SEA included value added, employment and price level data for a breakdown of 36 sub-sectors, which we regrouped and merged into 9 sectors to ensure comparability with the GGDC data.

Data Transformations

Using initial data in local currency at current prices, we then established new sector-level price indices for each country-sector pair, rebased in the year 2000, in order to convert all sectoral value added data to constant 2000 prices. To merge data for both decades, the most relevant

[10] Using deflated output numbers may understate productivity growth if price level changes reflect quality differences (and therefore improvements in productivity translating into higher quality goods are not taken into account when using constant prices), but it is assumed that there are no major distortions in prices.

[11] From fiscal year 2001/2002 onwards, certain economic activities were reclassified. Mining and manufacturing output data were separated into distinct categories, whereas they were previously not separately reported; social solidarity and insurance were regrouped.

[12]The Ministry of Planning and International Cooperation adopted the new United Nations System for National Accounts (SNA.93) at the start of 1999, which allowed a better link between the Sector of National Accounts (in MPIC) and the other statistical agencies (such as CAPMAS and the Ministry of Agriculture).

year of merging was selected by comparing employment and value added data on a country-by-country basis in order to ensure consistency across time, dropping country-decade pairs for which differentials were too high. We merged series from 1990 to 2005 (obtained from the GGDC 10-Sector Database) and series from 1995 to 2010 (obtained from the World Input Output Database or the African Sector Database), using the most relevant base year for each country in order to obtain consistent series for value added and employment by sector across time, and compute sector-level labor productivity.

Using the International Monetary Fund's World Economic Outlook implied PPP conversion rates, data were converted to constant 2000 international US dollar prices, and labor productivity by sector was computed in this unit for purposes of comparability between countries.

Labor productivity in each sector is calculated in order to compare the patterns of labor flows with changes in sector-level productivity. Sector-level labor productivity is defined as output by economic activity over total employment by economic activity, for each given year. A measure of value added per worker is thus obtained at the sector level. To calculate relative labor productivity, end-of-period sector labor productivity is computed as a share of overall labor productivity (obtained as total value added over total employment).

Other control variables were extracted from a number of sources.

- The International Monetary Fund's World Economic Outlook for government debt and PPP exchange rate data.
  - We computed the real growth in debt over a decade by taking the initial and final ratio of debt to GDP, and then adjusting for real GDP growth over the decade to obtain the growth in real debt.
  - WEO's data on public fixed capital formation and total fixed capital formation in a country in a given year were used to compute the share of public investment; we then averaged this share over a decade to obtain meaningful results.
- The Penn World Tables for capital stock and total factor productivity data.
  - The initial and final levels of capital per worker were calculated simply by dividing the capital stock by our employment figures for each country, before computing the growth in capital per worker and in total factor productivity.
- The World Bank's World Development Indicators for domestic credit data.
  - We computed real growth in domestic private credit over a decade by taking the initial and final ratios of domestic private credit to GDP, and then adjusting for real GDP growth over the decade in order to obtain the growth in real credit.
- The UNCTAD database for trade openness data as well as the UN COMTRADE for a detailed composition of export flows.
  - The UNCTAD database enabled us to compute trade openness as a percentage of GDP, and the change in this ratio for each country-decade pair. We used UN COMTRADE data for a detailed composition of exports, notably regarding the share of manufactured products or of primary commodities in the exports of a country.
- The Cohen-Soto database for educational attainment data.
  - Using this database, we obtained the average number of years of schooling for people aged 15-64 at the beginning and end of both decades for each country, and computed the change in average years of schooling over a decade.
- The External Wealth of Nations database (Lane and Milesi-Ferretti, 2007) for foreign investments and financial openness data.

- A canonical ratio of financial openness was calculated as the sum of foreign assets and liabilities of a country divided by its GDP, and then we estimated the change in this ratio over a decade to obtain a proxy for external financial liberalization.

- The Bruegel Real Effective Exchange Rate database for data on change in the real exchange rate.
  - We computed the change in the index (with base 100 in 2007) for each decade-country pair, with a positive figure denoting real appreciation.

Table 7: Country Names Abbreviations

Country identifier	Country	Country identifier	Country	Country identifier	Country
BRA	Brazil	ITA	Italy	SWE	Sweden
BWA	Botswana	JPN	Japan	THA	Thailand
CHN	China	KEN	Kenya	TUR	Turkey
DNK	Denmark	KOR	Korea*	TWN	Taiwan
EGY	Egypt	MEX	Mexico	TZA	Tanzania
ESP	Spain	MUS	Mauritius	UKM	United Kingdom
ETH	Ethiopia	MWI	Malawi	USA	United States
FRA	France	NGA	Nigeria	ZAF	South Africa
GHA	Ghana	NLD	Netherlands	ZMB	Zambia
IDN	Indonesia	PHL	Philippines		
IND	India	SEN	Senegal		

Notes: *Republic of Korea