Structural Transformation Paths Across Countries

El-hadj M. Bah

ABSTRACT: Structural transformation is a key feature of economic development. Developed countries all followed the same process of structural transformation. This paper asks whether developing countries also follow a similar process. Three key findings emerge from the detailed analysis. First, developing countries are following different paths of structural transformation that deviate from those of developed countries in different ways. Second, the paths of the subcontinents of Africa, Asia, and Latin America are distinct, and there is great heterogeneity within each region. Third, many countries experience substantial structural transformation during periods of economic stagnation or even decline.

KEY WORDS: Africa, Asia, economic development, Latin America, structural change, structural transformation

Understanding why some countries are so poor relative to others is one of the most important objectives of economics. One prominent feature of economic development is the process of structural transformation, that is, the reallocation of resources across sectors that accompanies development. This paper examines key features of structural change that differ across rich and poor countries. These structural differences can provide important insights about the underlying sources of income differences.

Kuznets (1971) viewed structural transformation as one of six stylized facts of economic development. He distinguished between two phases of structural transformation. In the beginning of the development process, an economy allocates most of its resources to the agricultural sector. As the economy develops, resources are reallocated from agriculture into industry and services. This is the first phase of structural transformation. In the second phase, resources are reallocated from both agriculture and industry into services.

The general finding is that developed countries all followed the same process of structural transformation (Kuznets 1966; Maddison 1989). It is therefore of interest to ask whether developing countries are also following a similar process. In this paper, I conduct a detailed analysis that compares structural transformation processes in developed and developing countries. The analysis covers nine developed countries with data going back to 1870 and thirty-eight developing countries for the period 1965–2000.1

Using fixed effects panel data regressions, I confirm Kuznets’s claim that developed countries follow the same process of structural transformation. For developing countries, a quick look at the sectoral shares of output or employment reveals that the general path of a decline in the share of agriculture, an inverted U-shape for industry, and an increase in the share of services has been followed by a number of countries. However, the detailed analysis comparing the structural transformation processes in developed and developing countries reveals interesting differences. The comparison focuses on two key dimensions: the relationship between changes in sectoral output shares and changes in gross domestic product (GDP) per capita, which can be thought of as a slope dimension.

El-hadj M. Bah (e.bah@auckland.ac.nz) is a lecturer at the University of Auckland, Auckland, New Zealand.

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and the levels of sectoral output shares for a given per capita GDP. Three main findings result from the analysis.

First, there is not one process of structural transformation for developing countries. There are great differences among the paths being followed. To illustrate the differences, I show five specific paths, and only one resembles the path of the developed countries.

Second, the subcontinents of Africa, Asia, and Latin America are following different paths of structural transformation. African countries tend to have low output shares in agriculture and high shares in services at very low GDP per capita. Compared to developed countries, Latin American countries move from the first to the second phase of structural transformation at a lower level of GDP per capita. Asian countries, by contrast, have relatively higher industrial shares and comparable service shares. On average, Asian countries are the closest to the structural transformation path of the developed countries.

Third, whereas from Kuznets’s view we expect structural transformation to be associated with economic growth, I find that many developing countries experience substantial sectoral changes during periods of economic stagnation and even decline. This was most evident among African and Latin American countries. This finding suggests that structural transformation can occur without or with small changes in GDP. While this looks like a puzzle, the link between GDP per capita growth and structural change is not systematic in the theoretical literature. In some models of structural transformation (Bah 2010; Ngai and Pissarides 2007; Rogerson 2008), GDP growth is driven by the rates of growth of sectoral total factor productivities (TFP) while structural change is driven by sectoral TFP growth differentials and the elasticity of substitution between goods. In the context of those models, structural transformation can occur with very little growth in GDP per capita.

The importance of structural transformation in economic development was a central theme in the development literature of the 1960s and 1970s. The issue was made prominent by the works of Kuznets (1957, 1966, 1971) and Chenery (1960, 1975).2 Because of data limitations, early studies focused mainly on industrialized and middle-income countries. A notable exception is Syrquin (1986), who analyzed the growth and economic structure of Latin America. Today, data are available for many more countries, including the poorest ones, and for longer time series. This paper uses this larger data set to provide a systematic characterization of structural transformation processes in developing countries. Recently, there has been a renewed interest in the role of structural transformation that accompanies growth and development. A fair number of recent papers used models of structural transformation to address key issues of development and growth.3

**Structural Transformation in Developed Countries**

This section studies the structural transformation process followed by developed countries from 1870 to 2000. The analysis covers nine developed countries: Australia, Canada, France, Germany, Italy, Japan, Sweden, United Kingdom, and the United States. The choice of countries is based on data availability.

**Data**

The data for sectoral output shares come from three sources. The early series are from Temin (1967), which provides agricultural and industrial shares of national income in current prices for the years 1870, 1890, 1910, 1930, and 1950. I obtained data from the

Paths of Sectoral Output Shares

The movement of sectoral output shares is a key regularity of the data for developed countries. Even though the speed of transformation may differ across countries, all present the following similar features: (1) as the GDP increases, the share of agriculture in output declines, (2) the share of industry initially increases and subsequently decreases, and (3) the share of services increases steadily. Polynomial functions are used to fit the relationship between sectoral output shares and per capita income for all the countries. The degree of the polynomial is determined by the goodness of fit. Starting from a linear polynomial, I increase the degree by 1 and continue this process until the change in \( R^2 \) is less than 0.01.³

For each sector, I estimate the following equation:

\[
y_{it} = \alpha_i + \beta_1 x_{it} + \beta_2 x_{it}^2 + \beta_3 x_{it}^3 + \epsilon_{it},
\]

where \( y_{it} \) is the sectoral output share and \( x_{it} \) is the log of GDP per capita for country \( i \) in period \( t \).

The regression results are presented in Table 1. The relationship between agricultural output share and log of GDP per capita is best fitted by a quadratic polynomial (\( \beta_3 = 0 \)). The \( R^2 \) for the fixed effects estimation is 0.92. For industry and services, the best fit for the data are third-degree polynomials with \( R^2 \) of 0.63 and 0.74, respectively. All the coefficients are significant at the 1 percent or 5 percent level.

To pin down the fixed effect (\( \alpha_i \)) for each country, I estimate the least square dummy variable model (LSDV). Let \( \bar{\alpha}_i \) be the average fixed effects for the nine countries and \( \bar{\alpha}_i = \alpha_i - \bar{\alpha} \) be the fixed effect deviation from the mean for country \( i \). The distribution of this coefficient highlights the variation across countries. The standard deviations of the distributions are 3.7 for agriculture, 3.1 for industry, and 2.5 for services. Figure 1 shows the scatter plots of the sectoral output shares corrected for the fixed effects deviation from the mean (\( y_{it} - \bar{\alpha}_i \) for all \( i \)) versus log of GDP per capita. The graphs also show the fitted curves with the lower and upper bounds at two standard deviations of the forecasted values. Most of the data points are very close to the fitted curves, and almost all are within the bounds of the estimation.

The graphs along with the regression table show that the developed countries all followed a similar process of structural transformation. This process fits Kuznets’s description well. The following sections compare the structural transformation paths of developing countries to the above baseline process.

Structural Transformation in Developing Countries

The two main questions analyzed in this section are whether developing countries have a structural transformation process similar to the one for developed countries, and if not, what are the characteristics of the different paths being followed? The analysis covers
thirty-eight developing countries selected based on a set of criteria. The first criterion is coverage of as many different regions of the world as possible. Thus, countries from sub-Saharan Africa, Southeast and East Asia, and Latin America were selected. The second criterion is data availability. Sectoral output shares from 1965 to 2000 are available for fifty-two developing countries from the regions mentioned above. From this initial sample, five countries with less than 1 million inhabitants in 1965 (Botswana, Gambia, Guinea-Bissau, Lesotho, and Swaziland) were excluded. I also excluded countries that experienced major political disruptions like civil war. This criterion excluded Burundi, Nicaragua, Rwanda, and South Africa. In addition, major oil and mineral producers are not included. In particular, I excluded countries that had mining and oil production above 30 percent of GDP for five years. The following five countries fit this criterion: Republic of Congo, Mauritania, Nigeria, Venezuela, and Zambia. At the end of the selection process,

### Table 1. Regression results for developed countries

<table>
<thead>
<tr>
<th></th>
<th>Agriculture</th>
<th>Industry</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\log(gdp)$</td>
<td>-103.7</td>
<td>-394.9</td>
<td>651.7</td>
</tr>
<tr>
<td></td>
<td>(8.1)**</td>
<td>(129.5)**</td>
<td>(157.6)**</td>
</tr>
<tr>
<td>$\log(gdp)^2$</td>
<td>5.2</td>
<td>54.9</td>
<td>-78.4</td>
</tr>
<tr>
<td></td>
<td>(0.5)**</td>
<td>(15.2)**</td>
<td>(18.5)**</td>
</tr>
<tr>
<td>$\log(gdp)^3$</td>
<td>-2.4</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.6)**</td>
<td>(0.7)**</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.92</td>
<td>0.63</td>
<td>0.74</td>
</tr>
<tr>
<td>Standard dev.</td>
<td>3.7</td>
<td>3.1</td>
<td>2.5</td>
</tr>
</tbody>
</table>

**Notes:** The fixed effects panel regressions of Equation (1) for each sector are based on data from nine developed countries with fifteen observations per country. The standard errors are in parentheses. ***, **, and * significant at the 0.01, 0.05, and 0.10 levels, respectively.

### Figure 1. Structural transformation for developed countries

**Notes:** The figure plots sectoral output shares corrected for the fixed effects deviation from the mean. The solid line is the fitted curve, and the dashed lines are the prediction bounds at two standard deviations.
thirty-eight countries are left: sixteen in Africa (Benin, Burkina Faso, Cameroon, Central African Republic [CAR], Chad, Côte d’Ivoire, Ghana, Kenya, Madagascar, Malawi, Mali, Niger, Senegal, Togo, Uganda, and Zimbabwe), seven in Asia (China, India, Indonesia, Korea, Malaysia, Nepal, Pakistan, Philippines, Sri Lanka, and Thailand), and twelve in Latin America (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Honduras, Mexico, Paraguay, and Uruguay). The comparison of structural transformation processes between developed and developing countries is along two key dimensions. The first is the nature of the relationship between sectoral output shares and log of GDP per capita. This addresses the degree of the polynomial that best fits the data. I refer to it as the slope dimension. The second dimension highlights the difference in the levels of sectoral output shares for a given level of GDP per capita. This is referred to as the levels dimension.

For the first question, I use similar polynomial functions to fit the data for developing countries. The first panel of Table 2 shows the results of the fixed effect panel data regressions of Equation (1). This reveals interesting findings. First, the $R^2$ values are very low: 0.08 for services, 0.27 for industry, and 0.35 for agriculture. For agriculture, only the constant term is statistically different from 0. None of the coefficients is different from 0 for services, while all of them are statistically different from 0 for industry. These results differ greatly from those of developed countries, where the $R^2$ values were high and all the coefficients were significantly different from 0 at the 1 percent or 5 percent level. These findings show that the structural transformation process for developing countries differs from that of developed countries.

For the heterogeneity among developing countries, I calculated the fixed effect deviation from the mean ($\tilde{\alpha}_i$) for each of the thirty-eight countries. Table 3 shows considerable heterogeneity among the countries. For agriculture, the deviations range from a minimum of –15.6 to a maximum of 16.2. The range for industry is from –13.5 to 20.6, and for services, it is from –16.6 to 17.7. The standard deviations for the distributions are 6.8 for agriculture, 5.8 for industry, and 7.0 for services. These standard deviations are much larger than those obtained for developed countries.

Patterns of Structural Transformation for Developing Countries

Given the heterogeneity of structural transformation processes for developing countries, I selected five countries to highlight some of the differences. These five countries show how the paths of structural transformation followed by developing countries deviate from the path of developed countries. The process in each of the five countries represents a particular pattern of structural transformation that is followed by other developing countries in the sample. The selected countries are Korea, Brazil, Pakistan, Ghana, and Senegal. To keep the analysis simple, I just show, in Figure 2, the service output shares versus log of GDP per capita for the example countries.

From the figure, we see that Korea’s data points can be fitted by a third-degree polynomial. Korea’s path is similar to the one followed by developed countries, especially after per capita GDP surpasses $4,000 (log of GDP per capita higher than 8.3). Other countries that have a similar path include Chile, Indonesia, Malaysia, and Thailand.

The path followed by Pakistan traces the upper-bound curve of the prediction for developed countries. Thus, this pattern differs from that of the developed countries in the level dimension. Countries that have this pattern include India, Sri Lanka, and Uruguay.
Brazil’s path shows a clear change in trend. Before per capita GDP reaches $5,000, service output shares were close to the fitted curve. From there, the service output shares increase greatly with only a small change in per capita GDP. The last data points are all above the upper-bound curve. Thus Brazil’s path deviates from both the slope and level dimensions.

The two African countries in the figure have no clear paths. Their GDP per capita growth rates were erratic and had no clear trend. However, it is clear that Senegal had the highest service shares, all above the predictions’ upper-bound curve while Ghana’s data points are all close to the fitted curve. Therefore, Ghana deviates from the baseline process in the slope dimension while Senegal deviates from both the level and slope dimensions. Countries with Ghana’s pattern include Mali, Cameroon, and Uganda, while countries like Madagascar and Zimbabwe follow Senegal’s pattern.

The analysis above shows that structural transformation in developing countries is different from the one followed by developed countries. The analysis also shows some of the heterogeneity that exists among developing countries.

Table 2. Regression results for developing countries

<table>
<thead>
<tr>
<th></th>
<th>log(gdp)</th>
<th>log(gdp)^2</th>
<th>log(gdp)^3</th>
<th>R^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>All the developing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>countries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>−7.8</td>
<td>−0.4</td>
<td>—</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>(6.0)</td>
<td>(0.38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>−304</td>
<td>41.4</td>
<td>−1.8</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>(46.4)***</td>
<td>(6.1)***</td>
<td>(0.26)***</td>
<td></td>
</tr>
<tr>
<td>Service</td>
<td>14.0</td>
<td>−1.7</td>
<td>0.1</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>(57.8)</td>
<td>(7.5)</td>
<td>(0.3)</td>
<td></td>
</tr>
<tr>
<td>Africa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>−3.9</td>
<td>—</td>
<td>—</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(1.7)**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>4.0</td>
<td>—</td>
<td>—</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>(1.0)***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service</td>
<td>−54.1</td>
<td>4.0</td>
<td>—</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>(27.6)*</td>
<td>(2.0)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>−62.2</td>
<td>2.9</td>
<td>—</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td>(6.9)***</td>
<td>(0.4)***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>20.6</td>
<td>−6.0</td>
<td>—</td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td>(6.0)***</td>
<td>(0.4)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td>650.7</td>
<td>−79.7</td>
<td>3.2</td>
<td>0.44</td>
</tr>
<tr>
<td></td>
<td>(75.4)***</td>
<td>(9.6)***</td>
<td>(0.4)***</td>
<td></td>
</tr>
<tr>
<td>Latin America</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>−101.0</td>
<td>5.2</td>
<td>—</td>
<td>0.49</td>
</tr>
<tr>
<td></td>
<td>(16.4)***</td>
<td>(1.0)***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>−1,127.3</td>
<td>146.6</td>
<td>−6.3</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>(428.1)***</td>
<td>(51.6)***</td>
<td>(2.1)***</td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td>1,447.6</td>
<td>−178.3</td>
<td>7.3</td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td>(522.7)***</td>
<td>(63.0)***</td>
<td>(2.5)***</td>
<td></td>
</tr>
</tbody>
</table>

Notes: The fixed effects panel regressions of Equation (1) are shown for all the developing countries and by continent. The constant term is not reported. The standard errors are in parentheses. ***, **, and * significant at the 0.01, 0.05, and 0.10 levels, respectively.
Table 3. Fixed effects deviations from the means for developing countries

<table>
<thead>
<tr>
<th></th>
<th>Agriculture</th>
<th>Industry</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum</td>
<td>Maximum</td>
<td>Standard deviation</td>
</tr>
<tr>
<td>All countries</td>
<td>-15.6</td>
<td>16.2</td>
<td>6.8</td>
</tr>
<tr>
<td>Asia</td>
<td>-6.4</td>
<td>9.0</td>
<td>4.6</td>
</tr>
<tr>
<td>Asia w/o China</td>
<td>-5.5</td>
<td>9.0</td>
<td>4.2</td>
</tr>
<tr>
<td>Latin America</td>
<td>-6.9</td>
<td>8.0</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Notes: The difference of the average fixed effects with each country fixed effect is shown. The average fixed effect is obtained by regressing Equation (1) for each sector. The country fixed effect is obtained by LSDV estimation.
In the previous section, all the developing countries were analyzed as a group. This section groups the countries by continent and analyzes the differences in the structural transformation processes of Africa, Asia, and Latin America. It also analyzes the heterogeneity within each continent.

**Comparing Fitted Curves**

In these exercises, I find the best fit for the data for each continent and compare the fitted curves. Similar to the previous analysis, polynomial functions are used to fit the data. The fixed effects panel data regressions results are reported in Table 2. For African countries, it is clear that there is no good fit for the data. The regressions for all three sectors have $R^2$ close to 0. This suggests that Africa’s structural transformation is different from the other processes. For Asia, the agriculture and industry sectors are best fitted with quadratic polynomials with $R^2$ equal to 0.76 and 0.63, respectively. The service sector is fitted with a third-degree polynomial with an $R^2$ of 0.44. For Latin America, the output shares of agriculture are fitted by a quadratic polynomial while those of industry and services are fitted by third-degree polynomials. The highest $R^2$ is for the agricultural sector at 0.49. The other two sectors have $R^2$ at 0.17 and 0.19, respectively.

Figure 3 shows the fitted curves for Asia, Latin America, and the developed countries. For agriculture, the fitted curve for Latin America is very close to the one for the developed countries. For the Asian countries, the fitted curve starts well below but moves closer to the other two as the GDP per capita increases. For the industry sector, the previous pattern is reversed. The curve for Asia is above the one for developed countries. However, the two curves are close when log of GDP per capita is between 8 and 9. The curve for Asia is increasing during the whole range of log of GDP per capita. This suggests that
these countries are in the first phase of their structural transformation process. The curve for Latin America coincides with the baseline path in the beginning, but it reaches its maximum at a lower per capita GDP. This suggests that Latin American countries transitioned from the first to the second phase of their structural transformation at a lower GDP per capita with a lower maximum industrial output share. For the service sector, the curves for Asia and developed countries are close while the one for Latin America again starts close to the two but ends up well above. To show the heterogeneity between countries in each group, I calculated the fixed effect deviation from the mean for each country. Table 3 shows the results.9 For Asia, the standard deviations are 4.6 for agriculture, 6.6 for industry, and 5.2 for services. These standard deviations are high because China is to some extent an outlier. When China is excluded, the standard deviations are respectively 4.2, 3.2, and 3.9. For Latin America, the standard deviations are respectively 4.9, 5.4, and 3.2. For both continents, the standard deviations are higher than those for developed countries. This implies that developed countries are more homogeneous as a group compared to Asian and Latin American countries.

This brief analysis shows that Africa, Asia, and Latin America have different structural transformation processes. There is no typical process for Africa. Latin America and Asia are generally following the path of the developed countries with Asia being the closest.

**Structural Transformation for Africa**

The analysis of the sectoral output shares for the sixteen African countries reveals some important features. In 1965, the service output share was the highest in nine countries out of the sixteen in the sample. After services, the agricultural sector was the second most important. The averaged output shares were 42.81 percent for services and 40.62 percent for agriculture. Maddison (1989) argues that Africa started its structural transformation around 1950. It is then surprising to see high service output shares at such an early stage of the transformation.
In Figure 4, I plot the yearly averages from 1965 to 2000 of sectoral output shares versus the average log of GDP per capita, which shows that the changes of sectoral output shares are different from the process of structural transformation described by Kuznets. This process deviates from the path of the developed countries in both the slope and levels dimensions. On average, the sectoral output shares change very little. The output shares of agriculture and industry are low while those of services are high.

Another way to analyze the data is to use scatter plots as in Figure 1 for the developed countries. The sectoral output shares for developing countries are then compared with the predictions from developed countries. Such an exercise shows that African countries have significantly lower output shares in agriculture and higher shares in services. The shares for industry seem consistent with the predictions from developed countries. There are also large differences among countries. We already saw, for example, that Ghana had service output shares close to the fitted curve while Senegal has all its data points well above the upper-bound curve of the predictions. Many countries with comparable per capita GDP have very different sectoral output shares.

**Structural Transformation for Latin America**

Figure 5 shows the yearly averages of sectoral output shares versus average log of GDP per capita for the twelve Latin American countries. On average, Latin America follows the path of the developed countries. A key difference is that the Latin American countries moved from the first to the second phase of structural transformation at GDP per capita around $4,000. Another interesting feature is the change in the speed of transformation after the GDP per capita surpasses $4,000. An analysis of the scatter plots shows that most countries have output shares in agriculture and industry within the prediction bounds for the developed countries. The shares for services are consistent with the predictions at low levels of GDP per capita but are inconsistent at higher levels of GDP per capita. There are also large differences among the countries.

*Figure 4. Structural transformation for Africa*

*Note:* The data points represent the cross-country average of sectoral output shares for African countries.
Structural Transformation for Asia

The average structural transformation path for the ten Asian countries is shown in Figure 6. There are two points to note about this figure. First, there was a steady decline in the agricultural output shares. Since the service sector shares initially decreased as well, there is a big increase in the industry output shares in the initial years. After GDP per capita passed $2,000, there were steady increases in the shares of industry and services. The second point is that, on average, the Asian countries are in the first phase of structural transformation as we saw with the fitted curves analysis. An analysis of scatter plots for all the countries reveals that agricultural output shares are somewhat lower than the predictions from developed countries while industrial shares are within the predictions bound, that is, they are on the high side. For services, the shares are consistent with the predictions. Large differences exist among countries. For example, China has very high shares in industry and low service shares. It is the opposite for Pakistan and India.

Structural Transformation and Economic Stagnation

In the literature, structural transformation is commonly linked to development or growth of per capita GDP. As Syrquin puts it, “There is a strong association of economic structure with the level of development and between growth and structural change” (1994, p. 5). However, structural transformation can also occur during periods of economic stagnation and even decline. In fact, this was a key feature of structural transformation in Africa and Latin America.

For Latin America, this happened when the countries moved from the first to the second phase. For African countries, GDP per capita in 2000 was the same or lower than that of
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1965, and yet they experienced structural transformation during the period 1965–2000. From Kuznets’s view of structural transformation, this may seem like a puzzle because we would expect the sectoral output shares not to change if GDP is not changing. Figure 7 shows the time series plot for Niger as an illustration.

From Figure 7, we see that GDP per capita for Niger decreased from $935 in 1965 to $518 in 2003, a 45 percent decline. During the same period, the share of agriculture decreased from 67.7 to 39.86 percent, the share of industry increased almost fivefold, from 3.47 to 16.76 percent, while the share of services increased from 28.82 to 43.38 percent. This shows a substantial structural transformation with a big decrease in GDP per capita. It is the reverse of what one might expect. Other countries with structural transformation during economic stagnation and decline are Argentina, Honduras, and most African countries.

In the theoretical literature, this finding is not a puzzle. In one class of models (Bah 2010; Ngai and Pissarides 2007; Rogerson 2008), structural transformation is driven by two features: nonhomothetic preferences and productivity growth differentials across sectors. In general, labor flows from the sector with the highest productivity growth to the one with the lowest growth. There is no systematic link between structural transformation and economic growth.

**Conclusion and Policy Implications**

In this paper, I used the process of structural transformation in developed countries as a benchmark to analyze in detail the processes of structural transformation across developing countries. Contrary to the developed countries, developing countries follow very distinct paths of structural transformation. I showed five general patterns of structural transformation followed by developing countries, and only one resembles the path fol-
This heterogeneity in structural transformation paths also exists between the averages of the subcontinents of Africa, Asia, and Latin America as well as within each region. Asia is following a path that is the closest to that of developed countries. A key feature for Asian countries is high industrial output shares. African countries have low agricultural output shares and high service output shares at very low GDP per capita. Latin American countries are in general following the path of the developed countries, but a key difference is that they move from the first to the second phase of structural transformation at lower GDP per capita and with lower maximum industrial output shares. This leads to high service output shares around the end of the period.

In the class of models of structural transformation discussed above, resources flow from the most productive to the least productive sector. While the share of agriculture in output is low in Africa, the available data show that its share in total employment is very high. This implies then that this sector is very unproductive. Indeed, there is a vast literature showing that Africa is very unproductive in agriculture, and increasing its productivity in that sector is crucial for reducing poverty on the continent. The share of services is also high both in Africa and Latin America. Again, this is a result of low productivity in services. The biggest subsector for services is retail and trade that is primarily informal. In Mali, for example, data from the International Labor Organization (ILO) show that retail and trade employs 67 percent of the total workers in services. In addition, 10 percent of service employees work for other households. Lautier (2000) reports that more than 70 percent of total workers in Mali’s informal sector did not receive any education. The picture is similar in other African countries. This high level of informality and the lack of skills in services make this sector very unproductive. The governments of these countries need to encourage formality by reducing the obstacles for registering and running formal businesses. They also need to provide some form of training for informal sector employees and increase the general level of education so people will be literate before joining the informal sector.11

The final main finding of the paper is the presence of structural transformation during periods of economic stagnation or decline. Many African and Latin American countries

![Figure 7. Structural transformation for Niger](image)

*Note: The figure plots the time series of GDP per capita and sectoral output shares.*

lowed by developed countries. This heterogeneity in structural transformation paths also
experienced periods of significant sectoral output changes in the “wrong” direction while GDP per capita was stagnant or even declining.

Notes
1. The paper uses sectoral output shares in current prices. I also use limited data in constant prices to verify that my findings are not driven by relative price changes. The data and analysis are available from the author upon request. Kuznets (1966) also argued that for the developed countries for which he had data, the conclusions on structural transformation were robust to unit changes.
2. Other works include Beaumol (1967), Chenery et al. (1986), Syrquin (1986, 1994), and Temin (1967).
4. Note that the panel data set has two different time intervals: twenty-year intervals until 1950 and five-year intervals after 1950. I also used a second panel data set with twenty-year intervals for the whole period. The results are essentially the same.
5. I also experimented with higher-order polynomials, but there was no improvement in the fit of the data.
6. South Africa had no civil war, but I consider the apartheid system as a major political disruption.
7. The selection criteria eliminate the two biggest African economies (South Africa and Nigeria) and also the two most successful (Botswana and Mauritius). In the working paper version, I analyze these countries briefly. Botswana and Mauritius follow the path of the developed countries, but South Africa follows the path of Brazil.
8. Although Korea cannot be counted now as a developing country, it was one for a better part of the period 1965–2000.
9. I do not show the results for Africa because there is no good fit of the data.
10. The figures for all three continents are in the working version of the paper.
11. The ILO and various nongovernmental organizations have training programs for workers in the informal sector (see Liimatainen 2002).

References


