Economic Structural Change and Economic Growth in Egypt

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Abstract

The paper studies the economic structural change and economic growth in Egypt during the period 1983-2014. This paper uses the methodology of Vries et al. 2014. The paper uses the novel Penn World Table (PWT) version 9 database to cover the period between 1983 and 2014. It is found that there are economic structural changes during the period 1983-2014 as the relative employment share of agricultural sector declined across the time. The relative employment share of industry sector increased since 1990 and the relative employment share of the services sector increased since 2000. Moreover, this research confirms that there is a strong relation (with a correlation coefficient of 85.11 percent) between the two series of employment and GDP growth rates. According to the labour productivity decomposition, the within effect was always greater than the total reallocation effect. However, if we look at the two components of the total reallocation effect, it is clear that the dynamic reallocation effect has a big role in determining the total productivity growth. Therefore, a new policy should be designed to favour the voluntary labour movement across sectors and areas in Egypt.

Key Words: Economic Structural Change, Economic Growth, Egypt

JEL Classification: O47, O53
1. Introduction

The term “structural change” is being widely used in economic research, although with different meanings and interpretations (Fan et al, 2003; Memedovic & Lapadre, 2009). In development economics and in economic history, structural change is commonly understood as Memedovic & Lapadre (2009) state “the different arrangements of productive activity in the economy and different distributions of productive factors among various sectors of the economy, various occupations, geographic regions, types of product, etc …” As Griffith and Wall (2012) state structural change means “change in the relative size of the sectors, however defined. We may judge size by output (contribution to Gross Domestic Product (GDP)), or by inputs used, either capital or labor. Usually, more attention is paid to labor because of the interest in employment and also because it is more easily measured than capital.” This paper uses the “structural change” as defined by Griffith and Wall (2012) to show the impact of the change of the importance of each sector on the economic growth.


To investigate the impact of the structural change on the economic growth in Egypt over the period 1983-2014, the paper first checks first if there is a structural change in Egypt during this period. Second, the paper examines the relationship between the employment and GDP growth rates during this period. Third, this paper measures the within effect, static and dynamic reallocation effects.

I have used data collected from PWT version 9.01, the World Bank indicators data base and the Ministry of Planning in Egypt for the period 1983-2014.

The organization of the rest of this paper will be as follows; section 2 presents some facts about the economic structure change and labor productivity in Egypt during the last thirty years. Section 3 presents the methodology of this paper. The results are presented in section 4 and section 5 concludes.

2. Egypt: Structural change and labour productivity

As table 1 shows, some important structural changes in Egypt for the period 1983-2014. According to employment percentage, the importance of agriculture sector declined, across

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1 PWT (Penn World Table) is a database with information on relative levels of income, output, inputs and productivity, covering 182 countries between 1950 and 2014. Released on: June 9, 2016
the time. On the other hand the importances of both of industry and services sector increased across the time.

According to value added, the importance of agriculture sector declined across the time. However, the importance of industry sector decreased between 1983 and 1990 then increased afterwards. The importance of the services sector increased from 1983 to 1990 then decreased from 1990 to 2000 and increased afterward.

Table 1: Employment and value added by sector in Egypt for the period 1983-2014

<table>
<thead>
<tr>
<th>Sectors</th>
<th>Employment (%)</th>
<th>Value added (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>39.8</td>
<td>36</td>
</tr>
<tr>
<td>Industry</td>
<td>22.6</td>
<td>23.9</td>
</tr>
<tr>
<td>Services</td>
<td>37.6</td>
<td>40.1</td>
</tr>
<tr>
<td>Total economy</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: World Bank Data base

Source: My own calculations derived from PWT which calculated Real GDP at constant 2005 national prices (in mil. 2005US$) and number of persons employed (in millions).

In Figure 1, displays the behavioural dynamics of labour productivity growth and GDP growth in the whole period is displayed. We notice that, the employment growth rate fluctuates significantly, reaching a maximum of 14.07 percent in 1983 and a minimum of -1.65 percent in 2003. Moreover, GDP growth rate fluctuates significantly, reaching a maximum of 15.66 percent in 1983 and a minimum of 1.94 percent in 2011. The growth rate of labour productivity averaged about 3.05 percent and the growth rate of GDP averaged about 5.21 percent in the whole period.
Obviously, the diagram suggests either that both labour and output growth have been driven by the same forces throughout the period 1983-2014 or that output growth during that period was completely caused and dominated by the changes in labour productivity (Kheir-El-Din, 2005). It may be rather difficult to justify the almost one-to-one correspondence between the behaviour of the Labour productivity growth and GDP growth rates series on economic grounds related to the development of the Egyptian economy during the period under examination. Hence, we are tempted to believe that the strong relation (with a correlation coefficient of 85.11 percent) between the two series is an artefact of the statistical procedure used in their calculation\(^2\).

3. Methodology

To measure the contribution to growth from the reallocation of workers across sectors of the economy, researchers typically use the canonical decomposition originating from Fabricant (1942). It decomposes the change in aggregate productivity into a within and a between effect. The within effect captures productivity growth within sectors, whereas the between effect measures the productivity effect of labour reallocation across different sectors. This method was used in Africa by Vries et al (2014). Vries \textit{et al} (2014) measured the structural change in Africa during the period 1960-2010. They found that the structural change started in the mid-1970s and 80s. The main finding of Vries \textit{et al} (2014) is workers relocated to the services sector services as the services sector had above-average productivity levels.

Moreover, this method was used in Egypt by El-Mahdi et al (2014). El-Mahdi et al (2014) measured the structural change in Egypt during the period 2001-2008. They decomposed the labour productivity growth to its sources. El-Mahdi et al (2014) argued that the movement of labour from low productivity to high productivity sectors. Furthermore, another study had been done and in China and India by Valli & Saccone (2015). They measured the structural change in China and India during the period 1987-2009. Valli & Saccone (2015) found that both China and India achieved higher within sectors gains in productivity than between sectors ones.

The shift-share decomposition can be performed in various ways depending on the choice of base and end year of the periods, which has important ramifications for the measurement and interpretation of structural change. One alternative is to use base period employment shares and final period productivity levels as in McMillan and Rodrik (2011) to decompose the change in aggregate productivity

\(^2\) This result is consistent with Kheir-El-Din (2005).
Where $Si$ is the share of sector $i$ in overall employment, $Pi$ the labour productivity level of sector $i$, and superscript $0$ and $T$ refer to initial and final period. In equation (1), the change in aggregate productivity is decomposed into within-sector productivity changes (the first term on the right-hand side which we call the “within-effect” (also known as “intra-effect”), and the effect of changes in the sectoral allocation of labour which we call the “reallocation effect”, (the second term, also known as the “shift-effect” or “structural-change effect”). The within-effect is positive when the weighted change in labour productivity levels in sectors is positive. The reallocation-effect measures the contribution of labour reallocation across sectors, being positive when labour moves from less to more productive sectors. It is well known that using base period employment levels as in equation (1), will increase the relative contribution from within-sector productivity growth at the expense of the contribution from reallocation (Haltiwanger, 2000). As an alternative, opposite weights of equation (1) can also be considered thus using final period employment shares and base period productivity levels.

\[
\Delta P = \sum_i (P_i^T - P_i^0)S_i^T + \sum_i (S_i^T - S_i^0)P_i^0
\]  

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

\[
\Delta P = \sum_i (P_i^T - P_i^0)\bar{S}_i + \sum_i (S_i^T - S_i^0)\bar{P}_i
\]  

with $\bar{S}_i$ the average share of sector $i$ in overall employment, and $\bar{P}_i$ the average labour productivity level of sector $i$. This decomposition takes a middle ground between equations (1) and (2) with respect to the contribution of structural change. Note that the reallocation term presented in equations (1) to (3) is only a static measure of the reallocation effect as it depends on differences in productivity levels across sectors, not growth rates. According to equation (3), the change in labour productivity depended on the productivity levels across sectors which is not accurate as the growth rates plays an important role as McMillan and Rodrik (2011) showed.

McMillan and Rodrik (2011) argue that workers move to low productivity growth sectors, but they use a decomposition that measures productivity levels. For sectors that absorb additional workers, the marginal productivity of these additional workers might be low, depressing productivity growth rates. An alternative decomposition method accounts for the
possibility that growth and levels across sectors are negatively correlated. It uses base periods for both the employment shares and the productivity levels. Importantly, this introduces a third term in the decomposition that can be written as follows:

$$\Delta P = \sum_i (P^T_i - P^0_i) S^0_i + \sum_i (S^T_i - S^0_i) P^0_i + \sum_i (P^T_i - P^0_i) \times (S^T_i - S^0_i)$$

The first term is the within effect, similar to that in equation (1). The second term in equation (4) measures whether workers move to above-average productivity level sectors (static reallocation effect, which we will call the between-static effect). The third term in equation (4) is known as the cross term or interaction term (Timmer & Vries 2009).

Equation 4 is much developed than equation 3 as it represents the joint effect of changes in employment shares and sectoral productivity. It is positive (negative) if workers are moving to sectors that are experiencing positive (negative) productivity growth. Hence, the reallocation term of equation (1) is split into two terms: whether workers move to above-average productivity level sectors (static reallocation effect) and whether productivity growth is higher in sectors that expand in terms of employment shares (dynamic reallocation effect).

4. Results

The decomposition results are reported in table 2. The productivity per employed person always increased at positive rates except for few years (1985-86, 1992-93, 1993-94, 2002-03 and 2003-04). If we look at the growth decomposition, it can be noticed that the within effect was always greater than the total reallocation effect (static reallocation effect plus dynamic reallocation effect).

However, if we look at the two components of the total reallocation effect, it is clear that the dynamic reallocation effect (the reallocation of workers across the three sectors (agriculture, industry and services), played an important role in determining the total productivity growth.

<table>
<thead>
<tr>
<th>Years</th>
<th>Productivity Growth</th>
<th>Within %</th>
<th>Static Reallocation Effect %</th>
<th>Dynamic Reallocation Effect %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982-83</td>
<td>14.07</td>
<td>9.86</td>
<td>70.1</td>
<td>1.83</td>
</tr>
<tr>
<td>1983-84</td>
<td>8.23</td>
<td>5.77</td>
<td>70</td>
<td>-2.47</td>
</tr>
<tr>
<td>1984-85</td>
<td>5.06</td>
<td>2.28</td>
<td>45</td>
<td>-0.86</td>
</tr>
<tr>
<td>1985-86</td>
<td>-0.23</td>
<td>-0.15</td>
<td>66</td>
<td>-0.02</td>
</tr>
<tr>
<td>1986-87</td>
<td>4.75</td>
<td>3.89</td>
<td>82</td>
<td>-0.14</td>
</tr>
<tr>
<td>1987-88</td>
<td>2.73</td>
<td>2.27</td>
<td>83</td>
<td>-0.33</td>
</tr>
<tr>
<td>1988-89</td>
<td>3.15</td>
<td>2.46</td>
<td>78</td>
<td>-0.19</td>
</tr>
<tr>
<td>1989-90</td>
<td>3.85</td>
<td>2.81</td>
<td>73</td>
<td>0.08</td>
</tr>
</tbody>
</table>
The first two years, 1982-84 and the period 1990-92, were characterized by relatively high growth rates of labour productivity, determined by a high weighted productivity growth within sub-sectors and a suitable reallocation of labour across the three main sectors. The period after the 25th of January revolution, 2011-14, was characterized by relatively low growth rates of labour productivity determined by a low weighted productivity growth rates within and between sectors.

5. Conclusion

The aim of this paper is to investigate the impact of the structural change on the economic growth in Egypt over the period 1983-2014. This paper uses a model similar to Vries et al (2014). Vries et al (2014) developed a model using the model of Timmer et al (2009).
This paper decomposes the labour productivity into within, static re-allocation effect and dynamic reallocation effect.

This paper depends on the data from PWT version 9.0, the World Bank indicators data base and the Ministry of Planning in Egypt for the period 1983-2014. The main findings of this paper are as follows:

A. There are economic structure change in during the period 1983-2014 as the importance of agriculture sector declined across the time, the importance of industry sector increased since 1990 and the importance of the services sector increased since 2000.

B. The employment and GDP growth rates fluctuate significantly and there is a strong relation (with a correlation coefficient of 85.11 percent) between the two series of employment and GDP growth rates.

C. According to the labour productivity decomposition the within effect was always greater than the total reallocation effect. However, if we look at the two components of the total reallocation effect, it is clear that the dynamic reallocation effect played an important role in determining the total productivity growth.

As a policy recommendation, the Egyptian government should design a new policy to favour the voluntary labour movement across sectors and areas and the government and private sector should increase investment in R&D, infrastructure, and human capital.

References


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3 PWT (Penn World Table) is a database with information on relative levels of income, output, inputs and productivity, covering 182 countries between 1950 and 2014. Released on: June 9, 2016


