

**THE EMPLOYMENT AND WAGE EFFECT OF MINIMUM  
WAGE IN THE EGYPTIAN PUBLIC SECTOR**

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## 1. INTRODUCTION

Recently, minimum wage (MW) has become a hot issue in Egypt. The government has been discussing MW reform with a view to protecting its real value from deteriorating overtime, while accounting for the poverty line, productivity, the average wage (AW) and the inflation rate (based on the consumer price index). The discussion has become even more critical after the 25<sup>th</sup> of January revolution that called for social equity. The problem is that in 1984 the MW in Egypt was set at LE 35 per month and has stayed at that level until now. When the MW legislation was introduced in 1984, it represented 60 percent of GDP per capita, and it went down to only 4 percent in 2008. On the other hand, the share of the de facto MW to GDP per capita decreased gradually from 66 percent to 35 percent in 1985 and 2008, respectively.

Raising the MW level is usually surrounded with controversial views from the economic and social perspectives. The proponents of MW claim that low wages are partly responsible for low productivity of Egyptian workers, as they are not financially motivated to exert the required level of effort. Also, in a developing country that suffers from high poverty rates and low wage levels, a high MW might reduce poverty and secure a stable standard of living (Saget 2001). In addition, a developing labor market will probably be noncompetitive. Thus, setting a MW between the current and the competitive wage level could foster employment and economic activities. In contrast, opponents argue that wages must be determined by market forces without any government intervention, as setting a wage floor would put a financial burden on the government and private businesses. This will have disemployment effects according to traditional economic theories.

Empirical literature has not reached a consensus regarding the implications of MW on labor market outcomes. Concerning the employment effect of MW, Card and Krueger (1994), using US data, find that higher MW expanded employment in the fast-food restaurants. To the contrary, Perwira, Suryahadi, and Widyanti (2001)—on Indonesia—and Machin and Manning (2003)—on the UK—conclude that increasing MW leads to employment reduction. Bell (1997), Islam and Nazara (2000)—on Indonesia—and Fogel, Ramos and Careiro (2001) argue that MW has an insignificant impact on employment. Regarding the wage effect of MW, most studies find a positive and significant impact (Rama (1996) on Indonesia; and Gindling and

Terrell (2008) on Honduras), while Perwira, Suryahadi, and Widyanti (2001) find MWs to have an insignificant effect on AW.

While most of the Egyptian literature on this topic is based on qualitative analysis (e.g., Helmy 2006; Radwan 2010; Abdelhamid and El Baradei 2009), this paper explores quantitatively the employment and wage effect of MW in Egypt. It addresses the MW in the Egyptian public sector<sup>1</sup> using panel data over the period (1985-2008), across nine economic activities, namely: agriculture, hunting, breeding and fishing; mining and quarrying; manufacturing; electricity, gas and water; construction; wholesale and retail trade, restaurants and hotels; transport, storage and communications; financing, insurance, real estate and business services; and community, social and personal services.

To assess the wage and employment effect of MW, we used two equations. To estimate the wage equation, we used the two-stage least square (2SLS) method to account for the endogeneity problem. For the employment equation, we estimated it using the ordinary least square (OLS) method. The estimation results suggest the positive impact of MW on AW, but insignificant effect on employment. Interestingly, we found that the employment elasticity of real MW in the community services sector is positive. Also, wage levels in mining and construction sectors are considered the most responsive sectors to MW variations. Moreover, the paper predicted the impact of raising MW on employment level and AW. Despite this conclusion, we cannot depend just on it for the decision on MW policy, further studies are needed to investigate the other dimensions of MW like poverty, productivity, and inflationary impact.

The paper is divided into six sections. Following the introduction, Section II reviews the theoretical and empirical literature. Section III gives an overview on the MW in the Egyptian economy. Data description and methodology are presented in Section IV, followed by a discussion of the main findings in Section V. Finally, Section VI concludes.

## **2. LITERATURE**

Regarding the employment effect of introducing or increasing the MW, the neoclassical approach on one hand assumes a competitive labor market with homogenous labor and

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<sup>1</sup> Focusing only on the public sector does not negate the importance of the other sector. Data are unavailable for the informal sector. We found that the number of MW legislations that differentiate between the private and the public sector are few, yielding small variability in the data.

complete coverage, thus suggests that the introduction of a MW or raising the current MW above the equilibrium level will have a contractionary effect on employment. It predicts that introducing a MW that exceeds the marginal revenue product of workers will cause employers to reduce their labor demand, therefore price workers out of jobs. On the other hand, under monopsony, the wage level is set below the marginal revenue product of workers, i.e., below the competitive wage level. Thus, the introduction of a MW might result in a higher employment level as long as the MW is set between the monopsony and the competitive wage level.

Concerning the wage effect of introducing a MW, although a higher MW will push the AW level up, it does not necessarily imply higher living standards for those workers whose wages were initially below the MW level. Under a higher MW, a firm might decide to substitute its workers by more skilled ones, thus, pricing low-skilled labor out and decreasing the earnings share of low-paid workers. However, if the wage level of low-wage workers was below their marginal productivity, the introduction of a MW that is equal or below marginal productivity might not have that adverse effect (Forth and O'mahony 2003).

On empirical grounds, there is also no consensus regarding the implication of the MW for labor market outcomes. Card and Krueger (1994), using a telephone survey of fast-food restaurants on two states in the United States, find that restaurants in New Jersey with a MW increase expanded their employment relative to restaurants in Pennsylvania, where there was no change in the MW. On the contrary, Neumark and Wascher (1995), using data on actual payroll records, conclude that an increase in the MW lead to a decrease in employment in New Jersey relative to the Pennsylvania control group (see Castillo-Freeman and Freeman 1991). Similarly, Machin and Manning (2003), using a large-scale survey on U.K. residential care home manufacturing, find evidence of employment and working hours reductions after the MW introduction in the low wage sector. However, their result suggests that the MW raises the wages of low-paid workers sizably; that is protecting the most vulnerable working groups.

Rama (1996) and Islam and Nazara (2000), using the same econometric model and the same panel data set in Indonesia, come up with two opposing results. Rama (1996) concludes that on aggregate there is a small negative impact of higher MW on employment. However, on a disaggregate level, he finds that workers in large firms benefit from the MW hike as their

wages would increase and they would not risk losing their jobs. Islam and Nazara (2000) argue that the MW policy has not impaired employment prospects. Perwira, Suryahadi, and Widianti (2001) find that MWs in the Indonesian urban labor market have a negative and statistically significant effect on employment for all workers and all segments, except for the white-collar workers. Yet, they find insignificant effect of MWs on AWs.

Also, a number of studies on developing countries show conflicting results. Kristensen and Cunningham (2006), studying Latin America, concludes that MW increases AWs, and reduces employment. Gindling and Terrell (2008) confirmed the disemployment effect of MW in the large-firm covered sectors in Honduras, and in the private covered sector and the public sector in Costa Rica. This is contrary to the insignificant effect of employment in the public sector and the small-firm sector in Honduras. Despite that, a 1 percent increase in MW will increase AW in the public sector by 0.25 percent. To the contrary, Lemos (2006), using a monthly Brazilian household survey and panel data techniques, finds robust evidence of positive wage spillover effects for the MW, resulting in a strong wage compression in both the covered and uncovered sectors, while he finds no evidence of employment effect in either sector. Also, Fogel, Ramos, and Careiro (2001) and Bell (1997) find no impact on employment in Brazil.

This paper aims at filling the gap in the Egyptian literature on the MW impact on labor market outcomes. Only few papers highlighted the MW issue in Egypt. For instance, Helmy (2006), Metwally (2008) and Radwan (2010) track qualitatively the MW regulations for the past few decades and provide some policy recommendations. Abdelhamid and El Baradei (2009) stress the need for re-evaluating the pay system of the government employees in Egypt, and propose a set of policy reforms to satisfy both employees and employers and maintain decent living and sufficient social protection upon employment.

### **3. MW IN THE EGYPTIAN ECONOMY**

#### ***MW Regulations***

Egyptians suffer from a general heightened level of dissatisfaction from low wages, modest living standards and huge income differences, especially among public workers. Many laws considered the MW level in Egypt, however. The latest was law no. 53/1984, according to which the MW in the government and the public sector has been set at LE 35 per month. A

series of special added and un-added<sup>2</sup> bonuses, annual increases and various incentives introduced in 1987 to date burden the pay system. Bonuses caused the actual paid MW to reach LE 305 in 2008 (see Table A1 in the appendix for detailed calculations) (Abdelhamid and El Baradei 2009). Also, the National Council for Wages was established per law no. 12/2003 with a view to ensuring that salaries of the public and private sector cover the cost of living. However, the Council did not manage to adjust the MW and only set a minimum of 7 percent for the annual periodic bonuses of the basic wage.

Egyptian laws guarantee a MW for all government and non-government employees, plus yearly wage increments ranging usually between 10-20 percent since 1978; the only exception being the 30 percent increment decided in 2008 (Abdelhamid and El Baradei, 2009). As stated by the labor decrees, the bonus is paid to the employee on the same year but is added to the basic salary after five years from the issuance date of the decree. That is, the legally binding MW was LE 35 per month, and starting 1992 a series of bonuses were added annually to the basic salary, therefore the basic salary reached LE155.3 in 2008. Moreover, there is a huge difference between the basic salary and what the employees actually receive. After a series of bonuses and incentives introduced during the period 1987-2008, the in-hand wage reaches LE 305 per month in 2008. This complicated pay system raises the need to modify the MW policy in Egypt and therefore the entire grade scales.

### ***MW and Main Macro Indicators***

Over the period FY85-FY08, real GDP per capita in the Egyptian economy was steadily trending upward with annual growth rate averaging 2 percent. The growth of GDP per capita was characterized by frequent fluctuations around its average, with values ranging between a minimum of -3 percent in FY92 and a maximum of 7 percent in FY07, except for a sharp decline of 12 percent in FY87 (Ministry of Planning). The sharp decline in GDP per capita growth in FY87 is attributed to the inefficient allocation of investments across sectors and activities and thereby investments' decline. This was mainly due to the macroeconomic imbalances of open door policies adoption and the collapse of international prices of petroleum in FY86. In an attempt to reduce the economic risk of unsustainability, Egypt adopted ERSAP (Economic Reforms and Structural Adjustment Programme). Although the program was successful in reducing macroeconomic imbalances, unfortunately its impact was

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<sup>2</sup> Neither the employer nor the employee is required to pay insurance payments over unadded bonuses.

negative on the growth rate with a decline of 3 percent in FY92. Following the stabilization effort, the reform program managed to reduce macroeconomic imbalances and to establish conditions for sustainable growth. In 2001, GDP per capita started to decline and continued its downward trend until FY03 due to the global economic fallout from the September 11 attacks and further by the war in Iraq. By FY04, the economy recovered until the 2008 financial crisis and food crisis, when GDP per capita growth declined from 5.4 percent to 3 percent in FY08 and FY09, respectively.

Until recently, the fiscal, monetary and investment policies were the main concern of the Egyptian government, ignoring the microeconomic policies including the labor market, especially wage and MW policy. Then, the attention was drawn to wage restructuring and MW reform, especially after the 25<sup>th</sup> of January revolution which called for social equity.

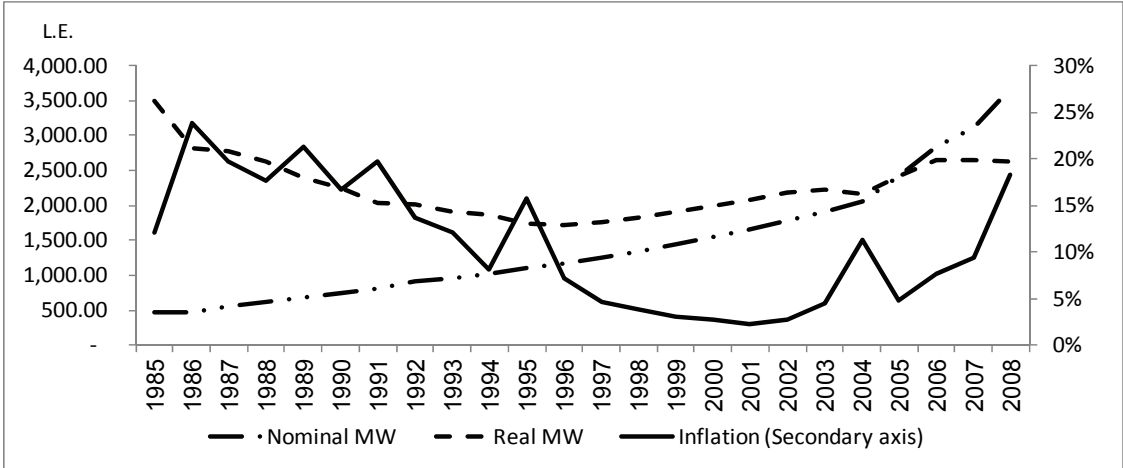
Wages represent the main source of income for most Egyptian families; they represented 72 percent of families' income in FY09 (CAPMAS 2008/09). Also, wage earners represented 50 percent of all Egyptians (poor and non-poor) and 44.4 percent of the poor in FY05 (CAPMAS 2004/05). The share of wage earners to labor force increased from 54.7 percent to 61 percent in 2008<sup>3</sup> and 2009, respectively. In 2009, out of the 61 percent representing the wage earners 40.6 percent were working in the public sector (El-Gebaly 2010).

MW proponents claim that the inefficient MW setting might explain the inequality in income distribution and the poor living standards, low labor productivity, and the unequal relationship between the employer and the employee where the employer has the stronger bargaining power. Over the period (1985-2008), on average, nominal MW grew by 9.4 percent, while annual inflation was 11 percent on average. This indicates that the declared MW did not cope with inflation and stopped short of keeping stable living standards and covering basic living expenses. Although nominal MW steadily increased from LE 35 to LE 305 per month, real MW exhibited a stable downward trend decreasing from LE 291 to LE 219 per month, in 1985 and 2008, respectively (Figure 1).

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<sup>3</sup> In 2008, wage earners represented 54.7 percent of labor force, self-employed and do not hire represented 9.8 percent, self-employed and hire represented 13.6 percent, and working for the family without wage represented 12.8 percent.

**Figure 1. Nominal vs. Real MW and Inflation Rate (2005=100)**

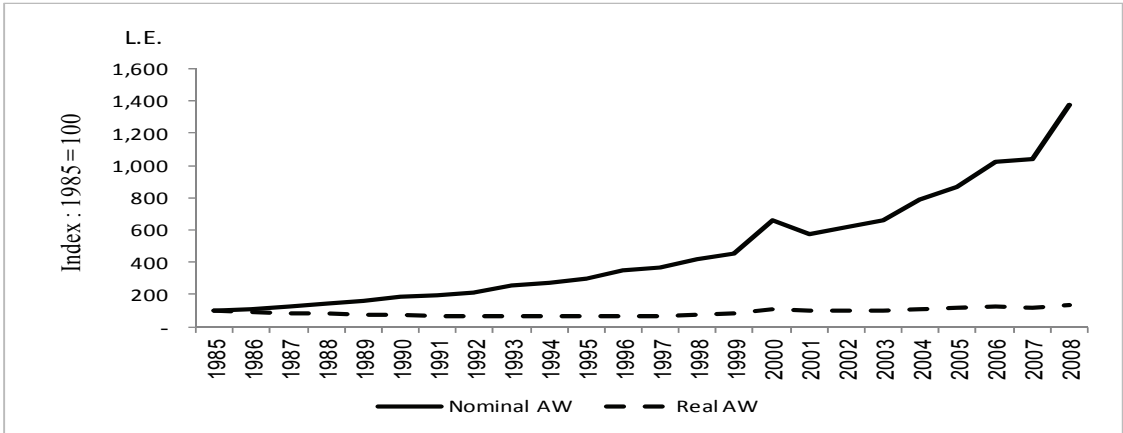


Source: Calculated by the authors from WDI data.

Note: Nominal and real MW per year.

The same pattern is observed for the AW (Figure 2). Over the period 1985–2008, the nominal wage in the public sector exhibited a remarkable upward trend. It increased by 1274 percent, from LE 1,539 in 1985 to LE 21,139 per year in 2008. As for the real wage (using 2005 as the base year), it followed a stable trend, increasing slightly by 32 percent from LE 11,464 per year in 1985 to LE 15,182 per year in 2008. Indeed, on average the nominal wage grew annually by 12 percent exceeding the inflation rate growth of 11 percent and is also much higher than the growth of the real wage (1.8 percent). Nevertheless, we found high correlation coefficients between the growth of nominal and real AWs in most sectors reaching 0.99 in electricity and community services (see Table A2 in the Appendix), which indicates that the gap between MW and AWs does not vary much over time.

**Figure 2. Nominal vs. Real AW in the Public Sector**



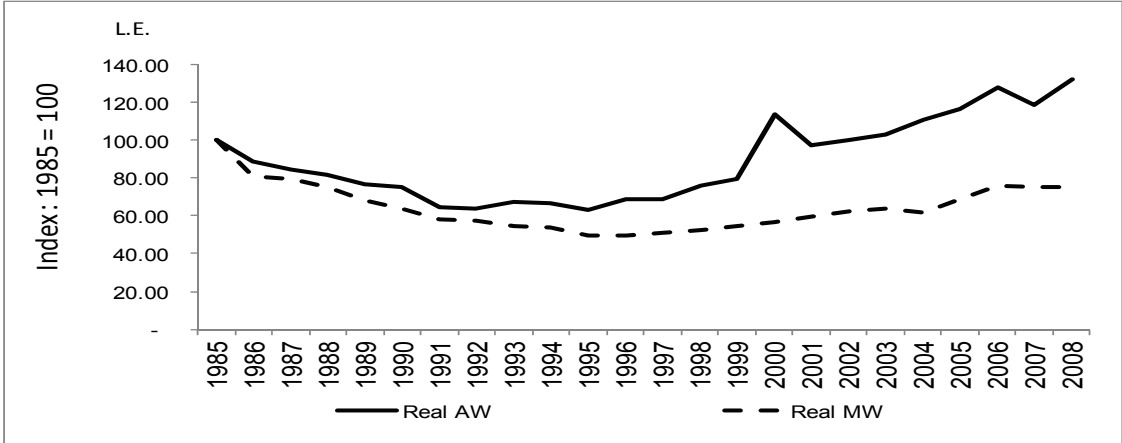
Source: Calculated by the authors using CAPMAS, and WDI data.

Note: Nominal and real MW per year.



The inefficient MW policy can be further described by the widening gap between the real AW and the real MW over time (Figure 3). During the period (1985–2008), minimum to average public wage ratio was stably declining ranging between 30 percent and 15 percent, in 1985 and 2000, respectively. Despite the increasing trend of nominal MW reaching LE 305 per month in 2008, its ratio to public wage is only 17 percent. This share is considered relatively low compared to other countries where minimum to AW ranges between 40 percent and 50 percent (Helmy 2006).

**Figure 3. Real MW and Real Average Public Wage (2005= 100)**



Source: Calculated by the authors using ILO and WDI data.  
 Note: Real AW and MW per year.

On the economic activity level, there are huge variations in the AW level and hence in the gap between AW across economic activities and the national MW. This indicates that AWs in all activities are higher than the MW level. For instance, the gap in the mining sector was the largest with an average of LE 13,000 over the period (1985-2008), while the agriculture sector has the lowest gap of LE 4,000 (Table 1). This is puzzling as neither the economic activities' contribution to GDP nor their productivity growth rates explain these differences (see Table A3 and Figure A1 in the Appendix).<sup>4</sup>

Also, the importance and effectiveness of MW has been decreasing over time. The share of de facto MW to GDP per capita decreased gradually from 66 percent to 35 percent in 1985 and 2008, respectively (Figure 4). This share is considered comparable to other countries where MW represents approximately 25 percent of GDP per capita (Helmy 2006). It is worth mentioning that, using the legislated MW of LE 35 per month (declared by Law No.

<sup>4</sup> The sectoral classification of the data differs between CAPMAS and the Ministry of Planning. Also, the classification was altered more than once over the studied period.

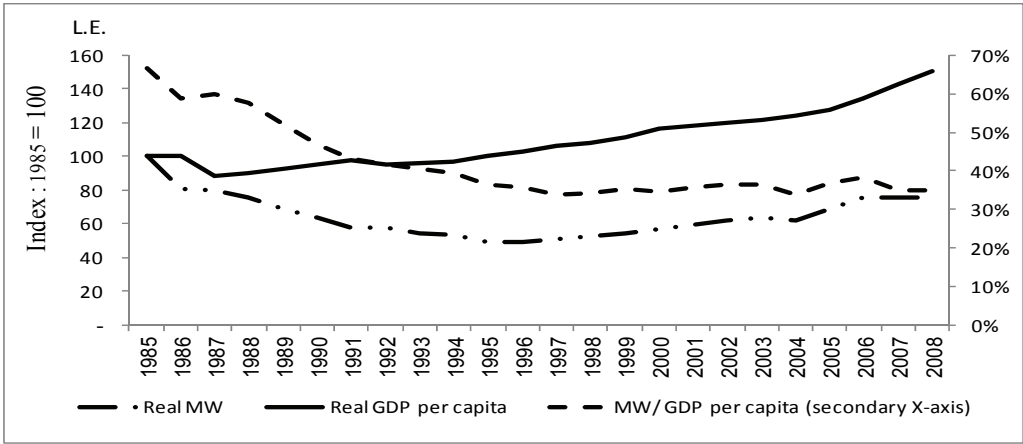
53/1984), the situation is not comparable to any other country, as MW to GDP per capita decreased drastically overtime reaching 4 percent in 1985 and 2008, respectively.

**Table 1. Annual Average Gap between AW and MW Across Sectors During (1985-2008) (in LE)**

Agriculture	4,437
Mining	13,418
Manufacturing	7,799
Electricity	8,663
Construction	7,529
Trade	7,808
Transportation	8,585
Finance	10,004
Community services	4,959

Source: Calculated by the authors using CAPMAS data.

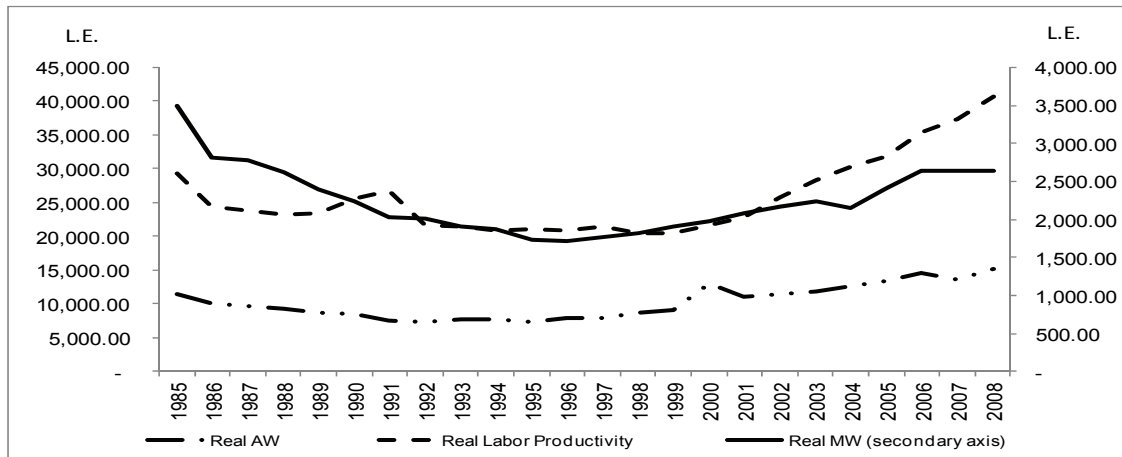
**Figure 4. Real MW and Real GDP Per Capita (2005=100)**



Source: Calculated by the authors from the Ministry of Economic Development and WDI data.

Concerning productivity, decree no. 23 of the Egyptian constitution states the importance of linking wage with production, and having a MW, and a wage ceiling to narrow the gap between incomes. However, labor law no.13 of 2003 does not establish a link between wages and productivity (Radwan 2010). Figure 5 shows that real public wage and MW are always way below real labor productivity. Both real AW and MW were declining until 1996 then started increasing slightly. Consequently, labor productivity started growing since 2000 at higher rates. This might signify that labor productivity responds to recent progress in real values of minimum and AW levels.

**Figure 5. Real AW, MW and Productivity (2005= 100)**



*Source:* Calculated by the authors from the Ministry of Economic Development, ILO, and WDI data.

*Note:* AW, MW, and real labor productivity per year.

Labor productivity differed to a large extent across economic activities. For instance, over the period FY85–FY08, the mining sector had one of the highest real labor productivity (LE 879,000), while the least productive sector was the agriculture sector with real labor productivity of LE 1,500. However, the dilemma that Egypt faces is that its wage structure is incompatible with the labor productivity level. For example, although real AW of the transportation sector is almost equal to that of the electricity sector, the real labor productivity of the electricity sector is only 60 percent of the transportation sector. Such variations in the productivity level across economic activities should be reflected in MW and wage structure, which suggests the implementation of a multiple MW policy (Tauchen 1981; Muller 2010).

Another central rationale for MW legislation is to lift the working poor out of poverty (Card and Krueger 1994; Morley 1995; Lustig and McLeod 1997). However, the World Development Report on labor markets states that “minimum wages may help protect the most poverty-stricken workers in industrial countries, but they clearly do not in developing nations.” This statement might apply to the Egyptian economy, since it has some features that might limit the desirable impact of MW on poverty. First, the coverage of MW laws in Egypt is limited to the formal sector, while these laws are difficult to enforce in the dominant informal sector. El-Ehwany and El-Megharbel (2008) show that formal workers are less likely to be poor than informal workers. Hence, the large portion of poor workers concentrated in the informal economy might not benefit from the MW policy. Second, the poor are characterized by weak participation in the labor market, especially in the urban areas with 36 percent (Metwally 2008). However, Lustig, and McLeod (1997) showed there is room for

reducing poverty in developing countries by having higher uncovered sector wages. The rise in uncovered sector wages should be large enough to push some of the population out of poverty and the number of beneficiaries (that is, those who are no longer poor) should exceed the number of those who become poor, because the increase in MWs leaves them unemployed or earn less in the uncovered or “subsistence” sector especially if they are unskilled or have low productivity. Therefore, even if MW increases, this is not enough to reduce poverty.

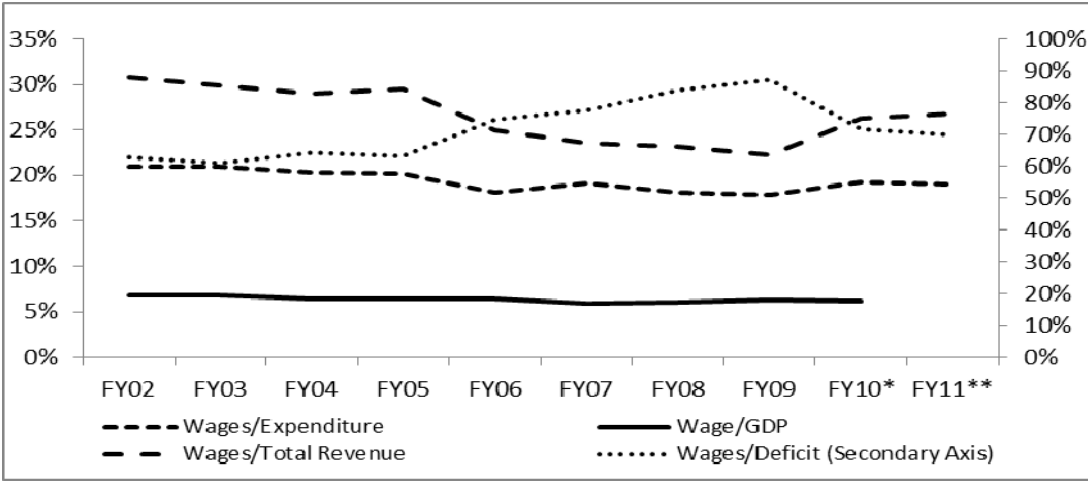
Using the legally binding MW of LE 35 per month, when compared to the international upper poverty line, Egypt has a value of 0.05 percent of the upper poverty line. It also has the lowest rate among other countries; in Argentina it is 1.32 percent, in Mexico 2.02 percent, while in the Philippines it is 1.55 percent (Metwally 2008). Hence, in reality, MW is not effective in reducing poverty. But if we consider the actual MW, it was LE 2,411 and LE 3,662 per year, in FY05 and FY09, respectively. These values are higher than the national poverty lines for the same years (LE 1,423 and LE 2,216 per year) (World Bank 2007, 2011). This might show that the Egyptian labor law takes people's basic needs into account in its calculation of the MW, despite the growing poverty rates. In FY91 and FY00, poverty decreased from 24.18 percent to 16.7 percent, while from FY05 until FY09 poverty reversed its downward trend and increased to 19.6 percent and further to 22 percent, respectively (using absolute poverty line) (EL-Laithy and Kheir-El Din 2006; UNICEF 2010).

The increase in poverty might be attributed to reasons other than the MW. For instance, between FY05 and FY09, according to World Bank (2011), the increase in poverty is mainly due to the decline in GDP growth after the 2008 financial crisis. Even the economic growth that was achieved was not helping the poor, since it was concentrated in few sectors with very little participation of the poor. Almost 40 percent of the poor rely on the agriculture sector, despite its small and declining share in overall employment and value added of the economy. The agriculture sector's share to total employment declined constantly from 2.6 percent in FY85, to 1.5 percent in FY95 reaching only 1 percent in FY08. Also, the sector's contribution to GDP was minimal; less than 1 percent and declined even further reaching 0.01 percent in FY08. In addition, the acceleration of inflation due to the 2008 food crisis degraded the real income of poor and their living standards. Nevertheless, we cannot have a clear answer about the impact of MW on poverty unless quantitative studies are done.

Moreover, any government should account for the undesirable impact on unemployment, state budget and inflation. A change in the MW might affect economic well-being by increasing unemployment. The imposition of higher MWs increases AWs, but it will also affect the supply and demand in the labor market, leading to unemployment, especially among vulnerable groups: female, youth, unskilled and poor workers.

In addition, a MW increase represents a burden on the state budget (Figure 6). Over the period FY02–FY10, the share of wages to gross domestic product decreased from 7 percent to 6 percent. The share of wages to budget sector deficit increased significantly over time, from 63 percent reaching 72 percent in FY02 and FY10, respectively. This suggests that the wage item represents a huge burden on the economy. On the other hand, wages to total expenditure decreased from 21 percent to 19 percent, in FY02 and FY10, respectively. Also, the share of wages to total revenue decreased gradually over the period, from 31 percent in FY02 to 26 percent in FY10. However, the increase in MW followed by higher AW would increase the budget deficit, since extra expenditure would not be easily accompanied by larger revenues in the short run, especially after the 25<sup>th</sup> of January revolution.

**Figure 6. Wages to Total Budget**



Source: Calculated by the authors using Ministry of Finance data.

\* Preliminary actual. \*\*Budget.

Moreover, the MW policy should consider the inflationary impact of a wage increase that would harm the economy, especially the poor (i.e., wage inflation). For example, if wages represent 32 percent of the value-added of the Egyptian economy, a wage increase of 10 percent might increase the inflation rate by more than 3 percentage points (Radwan 2010).

## METHODOLOGY AND DATA USED

### *Methodology*

In assessing the wage and employment effects in the labor market equilibrium, we use a structural system of labor demand and supply, as follows:

$$l^s = \alpha^s + \beta^s w + \gamma^s m(w) + \theta^s X + \eta^s D \quad (1)$$

$$l^d = \alpha^d + \beta^d w + \gamma^d m(w) + \theta^d Y + \eta^d D \quad (2)$$

where superscript  $s$  and  $d$  refer to supply and demand, respectively.  $w$  and  $l$  denote the wage level and employment level, respectively.  $m(w)$  is the real MW, and  $D$  is a dummy for privatization by sector.  $X$  is the labor supply shifter, specifically the labor force participation rate (LFP); and  $Y$  is the labor demand shifter, namely the real gross domestic product (GDP).

The reduced form of the structural system in equilibrium,  $l^s = l^d$ , is:

$$w = \delta^w + \phi^w m(w) + \pi^w Y + \Sigma^w X + \lambda^w D \quad (3)$$

$$l = \delta^l + \phi^l m(w) + \pi^l Y + \Sigma^l X + \lambda^l D \quad (4)$$

where superscripts  $w$  and  $l$  refer to the wage equation and employment equation, respectively. Also,

$$\delta^w = \frac{\alpha^d - \alpha^s}{\beta^s - \beta^d}; \phi^w = \frac{\gamma^d - \gamma^s}{\beta^s - \beta^d}; \pi^w = \frac{\theta^d}{\beta^s - \beta^d}; \Sigma^w = \frac{-\theta^s}{\beta^s - \beta^d}; \lambda^w = \frac{\eta^d - \eta^s}{\beta^s - \beta^d}$$

$$\delta^l = \frac{-\alpha^s \beta^d - \alpha^d \beta^s}{\beta^s - \beta^d}; \phi^l = \frac{\beta^s \gamma^d - \beta^d \gamma^s}{\beta^s - \beta^d}; \pi^l = \frac{\beta^s \theta^d}{\beta^s - \beta^d}; \Sigma^l = \frac{-\beta^d \theta^s}{\beta^s - \beta^d}; \lambda^l = \frac{\beta^s \eta^d - \beta^d \eta^s}{\beta^s - \beta^d}$$

Our parameters of interest are  $\phi^w$  and  $\phi^l$ , which indicate how the MW affects wages and employment, respectively.

For estimation, after testing for endogeneity, we find that all variables are exogenous in both equations, except for LFP in the wage equation. Hence, we use the two-stage least square

method (2SLS) for the wage equation (3) in order to obtain a consistent estimator. The instrumental variable of the LFP is its one-period lag and the other exogenous variables. Regarding the employment equation (4), the ordinary least square (OLS) is sufficient to produce consistent and efficient estimates. We run both regressions in total and by economic activity. Using panel data, we tested the null hypothesis of using OLS estimation against fixed effect. The F-test on small sample suggests using fixed effect model. Hence, we used the fixed effect model in the estimation of both the employment and the wage equations, where an economic activity dummy was included to account for the economic activity characteristics that do not vary over time.

### ***Data Used***

In exploring the wage and employment effect of MW in the public sector,<sup>5</sup> the following variables are used in logarithmic form: real MW, GDP, real AW per month and number of workers per year, except for labor participation rates and privatization dummy.

The paper uses panel data on wages and employment in the public sector covering the period 1985-2008 by economic activity, namely: agriculture, hunting, fostering and fishing; mining and quarrying; manufacturing; electricity, gas and water; construction; wholesale and retail trade and restaurants and hotels; transport, storage and communications; financing, insurance, real estate and business services; and community, social and personal services.

The data are obtained from different sources. The MW series was extracted from various labor legislations that were issued throughout the period 1984-2009. According to the Egyptian legislation, MW is a monthly pay to new entrants in the labor force who neither write nor read, with the purpose of keeping balance between wages and prices. Data on AW and employment level by sector are from “Employment, Wages, and Working Hours Survey” carried out by the Central Agency for Public Mobilization and Statistics (CAPMAS). The GDP by sector and LFP are extracted from the Ministry of Planning and the World Bank database,<sup>6</sup> respectively. The consumer price index series, from the World Development Indicators, was used to deflate the MW, the average and minimum wages and the GDP into their real values. In addition, we accounted for the privatization of public entities by sector, by

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<sup>5</sup> According to CAPMAS, data was collected from all facilities of the public sector and public enterprises regardless of the number of employees, with the distribution of the branches of each of these facilities in accordance with its headquarters geographical province.

<sup>6</sup> <http://data.worldbank.org/>

including a dummy variable with a 1 value in the presence of privatization and 0 otherwise. This dummy was generated using the Ministry of Investment's unpublished studies and the "Employment, Wages, and Working Hours Survey" classification.

## **ESTIMATION RESULTS**

### ***Wage and Employment Equations Estimation***

The wage equation (Table 2) requires the use of 2SLS fixed effect to ensure consistency of estimated coefficients. The coefficients of MW and LFP are statistically significant with the expected signs, while GDP and D are not. The estimated coefficients of the real MW are positive and statistically significant at 5 percent. This indicates that a 10 percent increase in MW pushes up the average real wages by 8.4 percent, other things held constant. One possible explanation for the positive real wage elasticity is that the pay system in Egypt is mainly based on a crisis driven approach,<sup>7</sup> where adjustments of the basic salary are not linked to the increasing cost of living (Abdelhamid and El Baradei 2009), but to public pressure.

Most studies—whether on developed or developing economies—reached similar results in terms of the direction but vary only in magnitude. Results in other countries such as Colombia, Brazil and Mexico suggest that a one percent increase in MW increases AW in a range of 0.1–0.6 percent (Kristensen and Cunningham 2006).

In the employment equation (Table 2), coefficients of LFP and GDP are statistically significant with the expected positive sign, while MW and D are insignificant. The insignificant coefficient of MW could be explained by the productivity figures discussed in Section II, which show that real labor productivity for all economic activities exceed their real AW. Thus, a higher MW will not affect the employment level because the marginal productivity of the worker will continue to be higher than the new AW level.

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<sup>7</sup> One of three approaches defined by Kiragu and Mukandala (2003). These approaches are used in the developing countries in reforming the pay system. The crisis-driven approach refers to the case where the government does not have a proactive policy to adjust the pay system regularly, but reacts to problems and pressures.



**Table 2. Results of Wage and Employment Regression Estimation**

Independent variable	Wage equation log of real wage	Employment equation log of employment
Constant	10.95993* (0.884863)	-5.830735* (1.91488)
Log of real MW	0.835555* (0.090316)	-0.293667 (0.189756)
Log of real GDP	0.010611 (0.025052)	0.409446* (0.059614)
Privatization	-0.000598 (0.041236)	0.057492 (0.09901)
LFP	-0.177084* (0.016351)	0.289253* (0.037366)
Economic activity dummy	Yes	Yes
Adjusted R-squared	0.65903	0.887719
Number of observations	216	142.6526
		216

Source: Calculated by the authors.

Notes: Numbers in parentheses are standard errors. \*\* Significant at 1 percent level. \* Significant at 5 percent level.

### ***Wage and Employment Equations Estimation by Economic Activity***

Re-estimating the same models using fixed effect cross-section specific coefficients allows us to examine the wage and employment effects of MW in each economic activity independently. In the wage equation, real MW coefficient is positive and is statistically significant in all economic activities, except for electricity and community services activity. Table 3 indicates that the elasticity of AW to MW variations differ across economic activities. Some sectors are more responsive to MW variations, for instance; the elasticity of wages in mining is almost double that in the financial sector.

Concerning the construction sector, its high positive wage elasticity might be explained by a number of reasons. First, the construction sector contributed to real GDP by 4 percent on average over the period FY85-FY08, and the growth rate of the sector reached 10 percent in FY08 (Ministry of Planning). Second, the sector has a high employment elasticity to its value added. According to El Ehwany and El Megharbel (2008), the employment elasticity to the value added in the construction sector was estimated at 0.51 and 0.54 during the periods FY81-FY91 and FY92-FY05, respectively. This might suggest that the high labor demand generated by the growth in the construction sector might be accompanied with a higher wage level to attract more labor. Third, its real labor productivity is LE 18,000, on

average for the period FY85-FY08, which is much higher than its real AW of about LE 9,000 per year. Fourth, the construction sector is dominated to a large extent (almost 89 percent) by the private sector. Accordingly, its high real wage elasticity might be explained by the possible spillover effect of high wage rate in the private construction sector on the public sector. In other words, the public sector might be forced to increase the wage level to be able to compete with the private sector over skilled labor. Evidence shows the correlation between public and private real AW growth rate in the construction sector, reaching 44 percent during the period 1985-2008.

**Table 3. Results of Wage and Employment Regression Estimation by Economic Activity**

<b>Independent variable</b>	<b>Wage equation log of real wage</b>	<b>Employment equation log of employment</b>
Agriculture, fishing and hunting	0.918661* (0.39474)	-0.93333** (0.493223)
Mining	1.088002* (0.279062)	-0.46059 (0.458017)
Manufacturing	0.835401* (0.303359)	-0.95724* (0.470032)
Electricity, water and gas	0.668839 (0.424173)	0.120795 (0.658641)
Construction	0.989794* (0.330284)	-0.80989 (0.499701)
Transport, storage and communications	0.866866* (0.26062)	-0.66685 (0.411986)
Trade, restaurants and hotels	0.713574* (0.316828)	-0.69364 (0.451857)
Financing, insurance and real estate	0.539225** (0.31336)	-0.38038 (0.466114)
Community, social and personal services	0.19995 (0.398483)	2.638826* (0.534416)
Adjusted R-square	0.6877	0.940288
Number of observations	207	216

*Source:* Calculated by the authors.

*Notes:* Numbers in parentheses are standard errors. \*\* Significant at 1 percent level. \* Significant at 5 percent level.

As for the employment equation, the results presented in Table 3 show that three activities only have statistically significant coefficients, namely: agriculture, manufacturing, and community services. The coefficients of the agriculture and manufacturing activities have a negative sign, while surprisingly the community services' coefficient had a positive sign.

The negative sign of manufacturing and agriculture is in line with the neoclassical theory. This is understood for the manufacturing sector in light of its high employment share to total public employment. It employed half of the public workers over the period 1985–2008. On average, public manufacturing employment represents 50 percent of all public workers and 83 percent of total employment (public and private employment) in the manufacturing sectors, (based on the Employment, Wages, and Working Hours Survey). Also, our results are consistent with the estimation results of the manufacturing sector in Latin America (Maloney and Nunez 2001). As for the agriculture sector, although it employs a tiny share of total public workers (1 percent in 2008), it is a labor-intensive sector, where 55 percent of the factor share is labor, 10 percent is capital and 35 percent is land.<sup>8</sup> Thereby, these activities might react to the increase in MW by reducing employment. Concerning the insignificant coefficients, each activity has its own specific reason. For instance, the financial sector's gap between AW and MW is very big to the extent that higher MW will not have an adverse impact on the sector's employment.

Regarding the employment elasticity coefficient in the community services activity, as shown in Table 4 below, a 10 percent increase in MW pushes up total employment in the social services sector by 26 percent. This outstanding relation could be justified by the argument in Abdelhamid and El Baradei (2009) that the government could face some challenges with cutting employment in the social services sector because the quality of the service is mostly related to increasing the number of workers. For instance, improving the educational system requires hiring more teachers to reduce the teacher/student ratio. Thus, the public sector will have to face a trade-off between maintaining the quality of the community services and cutting down employment to respond to a MW increase.

Also, Stigler (1946) acknowledged that a higher MW could theoretically raise employment in a labor market characterized by monopsony. The studied period confirms this result. Labor productivity in the community service sector is generally higher than the average real wage (see Figure A2 in the appendix). Over the period 1985–2008, real labor productivity and real AW in the community services sector averaged LE 8,793 and LE 7,167, respectively. Thus, a rise in the real MW would lead the monopsonist to increase the employment level to approach the competitive level.

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<sup>8</sup> The Ministry of Agriculture and Land Reclamation and USAID (2002).

Also, Gemmell (1985) indicated that since 1960 the activity and employment in the community sector had been growing at relatively higher rates compared to other economic activities, which is expected in the early stages of development. The same upward trend continued during the studied period (1985–2008). The average annual growth rate of employment in community service sector averaged 35 percent, which is the highest relative to other economic activities. That is, the negative effect of increasing MW on employment in the community service sector is outweighed by the positive effect of the sector growth on employment. This is also verified by its considerable share to real GDP (26 percent), on average over the period 1985-2008. Also, the real value added of the community service sector grows steadily with an average of 4 percent.

The above results show that wages and employment in each sector respond differently to MW changes. The evidence suggests the MW level to differ across these activities. Sectors with higher labor productivity should have higher MW to encourage workers to increase their productivity. Different MW levels across economic activities will also make the MW policy more effective; it will better assist the government in affecting the targeted sectors more efficiently with minimum undesirable effects on other sectors.

### ***Predictions***

In the context of discussing the issuance of a new MW legislation, a number of Egyptian economists along with labor committees came up with some suggestions for the monthly MW. Among other suggestions, for instance, Helmy (2008) calculated the MW based on the poverty line and stated that it should be equal to LE 660, Abdel Khalek (2008) set the MW based on a study of living expenses, for a basket of basic goods and services required for a family of four individuals in July 2007, to be equal to LE 840. On the other hand, Labor Committees (2010) demanded a legislation that pushes the MW up to LE 1200.

In an effort to predict the impact of these different scenarios of MW legislation on AW and employment equilibrium, the estimated wage and employment equations (along with all independent variables values of 2008) were used to calculate the employment and wage levels while setting the MW at LE 660, LE 840, and LE 1200. Table 4 shows the percentage change in employment and real wage levels at the suggested new MW levels relative to the 2008 figures, holding all other variables constant.

Concerning the real wage effect, the predicted wage levels increase with the MW; a 116 percent increase in the MW leads to a 91 percent increase in the real AW. As expected, real AWs in mining and construction sectors (the two sectors with the highest wage elasticities) respond the most to a change in the MW regardless of its percentage.

As mentioned above, MW has no significant impact on total employment. However, the employment level changes as a response to MW changes only in three economic activities. For instance, in agriculture and manufacturing, setting the nominal MW at LE 660 reduces employment by 51 percent and 52 percent, respectively. On the contrary, employment in the community service sector was positively correlated with the MW level, which was justified earlier by the significant growth in this sector.

Results indicate that setting the MW policy is a complex and difficult procedure. The negative spillover effect of MW on employment in some sectors might outweigh its positive effect on AW; thus exacerbating the unemployment phenomenon that Egypt already suffers from. Moreover, conventionally, MWs reduce employment among workers, but stronger on low-skilled workers (Goldfarb 1974; Neumark and Wascher 2007). Also, the disemployment effect of MW is higher for the youth, especially due to their low productivity (Brown, Gilroy, and Kohen 1983; Ghellab 1998; Perwira, Suryahadi, and Widyanti 2001). These concerns should be seriously considered when setting MW, since unemployment among the youth aged 15-24 is much higher than total unemployment. In 2008, youth unemployment reached 25.4 percent compared to total unemployment of 8.7 percent (CAPMAS). If applying a higher MW is a must, then it should be probably accompanied with other policies that trigger labor demand to limit any possible decrease in employment. For example, the enhancement of general and vocational education is a way to provide the labor market with workers equipped with the required skills. This in turn increases labor productivity in the long run and encourages firms to provide new job opportunities despite the MW rise.

Moreover, since increasing the MW from LE 305 to LE 660 per month increases AW by 91 percent, this indicates that the item of wages and salaries in the government budget will increase by 91 percent. An increase in wages and salaries will further burden the government; the share of wages to total expenditure will increase from 18 percent in 2009 to 34 percent, given the same total expenditure. Also, wages would represent 167 percent of the budget deficit compared to 87 percent in 2009 without the increase. According to the estimated

parameters, if the government adopted the new MW level of 700 by FY12, AW will increase by 164 percent.

**Table 4. Predictions of Wage and Employment Percentage Change Relative to 2008 Figures**

Nominal MW level	660	840	1200	660	840	1200
	Employment level			Average real wage		
Total	..	..	..	91%	133%	214%
By economic activity						
Agriculture, Fishing and Hunting	-51%	-61%	-72%	103%	154%	252%
Construction	..	..	..	115%	173%	288%
Facilities	..	..	..	..	..	..
Finance	..	..	..	52%	73%	109%
Manufacturing	-52%	-62%	-73%	91%	133%	214%
Mining	..	..	..	132%	201%	344%
Social services	667%	1349%	3614%	..	..	..
Trade, Restaurants and Hotels	..	..	..	73%	106%	166%
Transportation	..	..	..	95%	141%	228%

*Source:* Calculated by the authors.

-- : Estimated coefficients are insignificant.

## CONCLUSION

This paper attempts to measure the wage and employment effects of MW in the Egyptian economy by economic activity, using annual panel data over the period 1985-2008. The study covers nine economic activities (according to the CAPMAS classification): agriculture, hunting, breeding and fishing; mining and quarrying; manufacturing; electricity, gas and water; construction; wholesale and retail trade, restaurants and hotels; transport, storage and communications; financing, insurance, real estate and business services; and community, social and personal services. In line with the neo-classical theory and most empirical studies, our results suggest that AWs are positively affected by the MW, but there is no employment effect.

Estimating the wage equation by economic activity, we got the same positive signs. Real AWs in construction and mining sectors were found exceptionally more elastic to changes in MW level compared to other sectors. For the employment equation, the employment effect was only significant for three out of nine economic activities, namely,

manufacturing, agriculture and community services. In the manufacturing and agriculture sectors, the MW has a negative impact on employment as expected. But, surprisingly, employment in the community service sector was always growing regardless of the MW level. This indicates the need to impose different MW levels across economic activities to account for productivity differences between sectors. Gindling and Terrell (2008) stated that “clearly the impact of the policy will differ if there is one v. multiple MWs, if the structure of MWs is set by occupation v. industry v. region, if its coverage is universal v. for a small segment of the labor market, or if MWs are set only at the low end of the wage distribution (as in the US) v. throughout the wage distribution (as in Costa Rica)”. For this reason, a number of developing countries applied multiple MWs. For instance, Honduras during the period 1995-2004 had 22 MW categories that differ based on the industry, the firm size and the location. Also, until 2000, the Indonesian economy had different MW levels for each province and sometimes different MWs across sectors. This advocates the need for variation in MW based on gender, skills, location, inflation rate, poverty line and on economic activity by productivity level, share to GDP, or sector’s growth rate, etc.

Based on estimation results, predictions of the wage and employment effects in the public sector found that raising the nominal MW from LE 305 to LE 660 monthly is projected to have a insignificant impact on employment while increase the AW by 91 percent. However, this does not mean adopting MW policy, as the negative employment effect found in some sectors is enormous, especially in an economy that has a long history of high unemployment like Egypt. In a way, to reduce the adverse effect of MW on employment in some sectors and maximize its benefits from higher wage level, there are some complementary policies that should be considered. For instance, the government has to work on enhancing the quality of education and training programs that increase labor productivity and thus limit the negative employment effect, and provide incentives for the informal sector to formalize in order to better affect poor workers’ wages.

This study follows a quantitative approach, covering one of many dimensions of MW issue in Egypt. The other dimensions of MW should also be studied to analyze the net impact of MW and identify the MW level at which Egyptians could benefit from this policy with minimum adverse effects. Firstly, the persistence and intensity of the impact of MW on wage and employment is an important dimension to explore. For instance, MW might be insignificant on employment in the short run, but in the long run it might have a negative

effect. In this case, if the negative employment effect and inflation last in the long run while the wage effect ends in the year of the MW adjustment, any positive wage effect could be outweighed by the growing unemployment rates. Thus, if the unemployment effect is intense and its duration is long, MW will not be a rational decision and would harm the economy.

Practically, despite the probability of such negative impact of MW, in many countries MW is adopted for social and political reasons. So, policymakers should undertake other complementary measures in reducing these negative effects. Governments should work on upgrading the general and vocational education to offer the labor market graduates with its needed skills. Also, they must devote efforts to increase workers' productivity by giving the right training—general and specific. These efforts are essential even if MW has just a positive impact on wages without an adverse impact on employment, as the increase in the wage bills will harm employers, who will gradually pass the burden to employees.

Secondly, when studying the MW policy, one should not only consider the covered sectors but also the uncovered and incompliant sectors to MW policies (informal sector). The classical two-sector competitive model argues that those who will be priced out of the covered sector will join the uncovered or noncompliant sectors, thus increasing labor supply and reducing wage levels in these sectors. In case of data availability, it is recommended that future studies be conducted on the informal sector. Such studies could explore the indirect impact of imposing a MW in the formal sector on informal businesses, through the mobility of workers across sectors and the change in the salary structure in response to changes in the MW or because MWs act as a guide in wage setting (Gindling and Terrell 2008). Secondly, these studies will help investigate the impact of MW on poverty as most of the poor in Egypt are concentrated in the informal sector.

Thirdly, covering the MW policy impact on the Egyptian private labor market, one can come up with a number of scenarios. On the one hand, if the private sector complies with the MW policies, the wage and employment effects might be similar to what was found in the public sector provided that real AWs and productivity levels are similar in both sectors. On the other hand, if the private sector does not comply, the priced out workers from the public sector will queue in the private sector; and if they were lucky enough to get a job in this sector, this will be at the expense of receiving a lower wage than the competitive wage level. However, it might happen that the private sector salary structure changes indirectly in



response to changes in MW in the compliant public sector as the case in Honduras. If we have a monitoring system on the compliance of each sector to MW legislations and the extent of direct and indirect effect, policymakers can work on minimizing heterogeneity of wages and employment standards between sectors.

Fourthly, investigating the reliability of implementing different MWs across economic activities. This requires a more detailed study on the variations of wages and productivity across different economic activities and figuring a mechanism that ensures that the MW level in each economic activity matches wage and productivity levels in this sector. Multiple MW policy has been implemented in different countries like Honduras and Indonesia. This policy, whether implemented in public or private sector, encourages workers to raise their efforts and productivity to increase their salary. Specifically in the public sector, it will prevent the government budget from paying a MW that is higher than the productivity in some sectors.

This reveals that the issue of MW is rich and open for further investigation. In case of data availability, it will be useful to generate a general equilibrium model that comprises all the above factors, which are closely related to the MW policy.

## APPENDIX

**Table A1. Minimum Wage Calculations**

Law no.	Annual bonus (%)	Added bonus to basic salary	Basic salary (LE)	Annual bonus (LE)	Total MW* (LE)
53/1984	0	--	35	0	39
--	0	--	35	0	39
--	0	--	35	0	39
101/1987	20	1992	35	7	46
149/1988	15	1993	35	5.25	51.3
123/1989	15	1994	35	5.25	56.5
13/1990	15	1995	35	5.25	61.8
13/1991	15	1996	35	5.25	67
29/1992	20	1997	42	8.4	75.4
174/1993	10	1998	47.3	4.73	80.1
203/1994	10	1999	52.5	5.25	85.4
23/1995	10	2000	57.8	5.76	91.2
85/1996	10	2001	63	6.3	97.5
82/1997	10	2002	71.4	7.14	104.6
90/1998	10	2003	76.1	7.62	112.2
19/1999	10	2004	81.4	8.14	120.3
84/2000	10	2005	87.2	8.72	129.1
18/2001	10	2006	93.5	9.35	138.4
149/2002	10	2007	100.6	10.1	148.5
89/2003	10	2008	108.2	10.82	159.3
86/2004	10	2009	116.3	11.63	170.9
92/2005	20	2010	125.1	30	200.9
85/2006	10	2011	134.4	36	236.9
77/2007	15	2012	144.5	21.67	258.6
114/2008	30	2013	155.3	46.59	305.2

*Source:* Calculated by the authors based on various labor legislations from 1984-2008.

*Note:* The bonus in 2005 and 2006 had a minimum of 30 and 36 pound, respectively.

\* Law no. 113 for 1982 offering an additional social bonus of LE4.

**Table A2. Correlation between Growth Rates of Real and Nominal AWs across Sectors (1985-2008)**

Agriculture	Mining	Manufacturing	Facilities	Construction	Transportation	Restaurant	Finance	Community Services
0.976	0.979	0.626	0.997	0.958	0.888	0.973	0.944	0.990

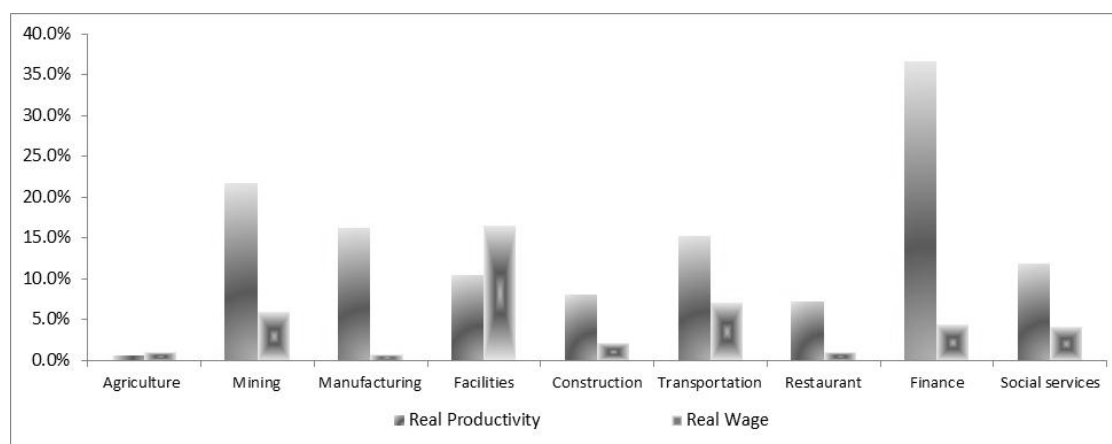
*Source:* calculated by authors using CAPMAS and WDI data.

**Table A3. Average Annual Contribution to GDP and Growth by Economic Activity (1985-2008)**

Economic activity	Contribution to GDP (%)	Real growth (%)
Mining	22.7	0.3
Finance	14.7	20.4
Facilities	18.4	14.3
Transportation	14.9	5.2
Restaurant	6.6	3.9
Manufacturing	10.9	16.2
Construction	7.5	4.1
Social services	15.0	9.7
Agriculture	1.7	25.9

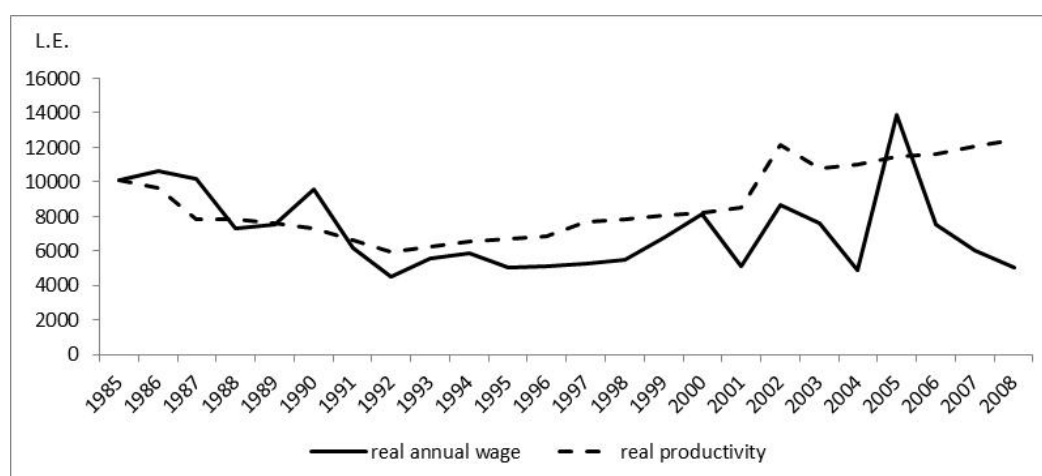
Source: Calculated by the authors using Ministry of Planning data.

**Figure A1. Growth Rate of Real Wage and Labor Productivity during the Period (1985-2008)**



Source: Calculated by the authors using MOED and CAPMAS data.

**Figure A2. Real Labor Productivity and Real AW in the Social services Sector**



Source: Calculated by the authors using MOED and CAPMAS data.

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