WAGE DETERMINATES IN JORDANIAN LABOR MARKET COMPARATIVE STUDY (1976-2009)

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Abstract

The study aimed to measure the degree of labor market regulation across business sectors in Jordan through identifying the mechanisms of wage growth determination for the period 1976-2009. Wage determinants in financial sector was less depending on output growth since to take considerable time for wages to adjust to output change unlike other sectors which respond more rapidly but on average with less value than financial sector. Wage and output time series in agricultural, construction, and all sectors were non-stationary, this can be a sign of low regulation in these sectors. The financial sector seemed to be regulated since Wage and output time series were stationary and not co-integrated, which mean that wages in short run is not correlated on output and need more time to be. Finally we can say wages growth in Jordanian labor market was random and highly depended on output growth in less regulated markets (construction, agricultural, and whole labor market), while it depended more on ex-output factors in more regulated market (financial sector).

Keywords: Labor, Wage, Market, Business Sector

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INTRODUCTION

In free labor markets wages are determined by intersection between labor demand and supply. This intersection will remain only if determinates of labor supply and demand unchanged, otherwise wages will eventually change [1]. For example in short run, any increase in the aggregate demand of product market will stimulate output growth using more labor [2]. Consequently, the wage growth rate should reflect output growth at constant prices, or the marginal revenue product should equal the marginal wage expense, or workers are paid according to their marginal productivity [3]. But in regulated labor markets, other factors that influence wage growth rate, past wage growth rates, inflation, and unemployment levels, these factors effect may be strengthen by government
intervention, labor unions power, labor restriction and discrimination in respect to age, gender, or nationality. If these actions are intentionally distorting the equilibrium wage levels, then they should be beneficial to either product and labor market.

Thus, the wage growth which is mainly a function of productivity may be regulated, this regulation come in form of continuous wage adjustments and enhancement the terms of labor. Nevertheless the regulatory power may be disparate across business sectors.

The agricultural labor market in Jordan, for example, may be less regulated than financial or government sectors, that in government sector wage growth is regulated by specific laws of labor and civil servant while growth in production levels seem to be irrelevant at least in short run. In private sector, government intervention to influence wage growth rates will success as long as the product and labor market are organized. While in less organized business sectors like construction and agricultural, labor wages are more influenced by production growth, the skills of labor, and the conditions of industry (expanding or contracting).

Therefore, the nature of wage growth determinants in any business sector should reflect its degree of regulation. In this paper we tried to measure the degree of labor market regulation by examining the factors that determine wage growth rates across business sectors (agricultural, financial, construction sectors) in Jordan for the period 1978-2009, we obtained data related in each sector form the public department of census and World Bank publications. The remaining of this paper contains:

I. Problem statement,

II. Research importance,

III. Research hypotheses,

IV. Description of research variables,

V. Literature review,
VI. Research methodology,

VII. Estimation of results & conclusion.

PROBLEM STATEMENT

According to Figure 1, wage and production growth rates in Jordan seemed to be unsteady at macro level for the period 1976-2009. The two trends sometimes intersected but in many times there was a plus (negative) growth gaps. Therefore, it is important to identify the existence of an organized policy or mechanism that determine the levels and growth rates of labor wages in absence of output growth effect.

Moreover, are wage determinants in total and sub-total labor markets has approximately the same strength and direction of effect? And whether they are internal or external market determinants? These questions are important to recognition of the nature of wage policies in each business sector.

Figure 1: Wage and output growth rates 1976-2009.

RESEARCH IMPORTANCE

Labor compensations represent a considerable part of national income in Jordan, the importance of this study stems from the need to examine the relation between wage and production growth rates in order to discover the degree of labor market’s regulation by identifying wage determinants in Jordanian labor market. During the last three decades, Jordanian economy exposed to serious economic and political crises starting with the
collapse of Jordanian dinar in 1989, the gulf (war I 1991, war II 2003), ending with world economic crises in 2009 and continuing Syrian refugee crisis (Figure 2). These events in total caused a numerous effects on Jordanian product and labor markets, therefore it is important to examine the long term relationship between these variables and make reasonable conclusion about the existence of an orderly behavior of the growth in the two markets. Moreover, the study will examine the degree of consistency between Jordanian business sectors regarding external and internal wage determinants.

Figure 2: Wage growth of agriculture and construction sector.

RESEARCH HYPOTHESES

The study discomposed the problem statement into several hypothesis in order to obtain deductions that led us to solve the research problem, these hypotheses consists:

i. Output and wage trends are random.
ii. There is co-integration between wage and output growth.
iii. Long and short run response of wage to change in output is the same regardless the labor sector.

The first hypothesis will be examined by the unit root test (augmented Dickey –Fuller, ADF- test). This test shows that if the time series has a time trend or not, that applying common statistical test on no stationary data will be misleading.
We will use Johansen co-integrated test to examine the second hypothesis only if the dependent and independent variables series are non-stationary, this analysis will permit us to discover if there is a long run relationships between variables.

The third hypothesis will be examined using Koyck model (auto regressive lag model).

**DESCRIPTION OF RESEARCH VARIABLES**

This paper is conducted at two levels:

i. Macro level (total labor market): all sectors is examined as one unit of analysis

ii. Sectoral level (sub-total labor market): manufacturing, financial intermediation, and construction sectors.

At sectoral and macro levels, study variables consisted of:

1. **Wage**: Wages are measured by yearly labor compensations at sectoral and overall macro levels.

2. **Output**: this rate is measured by yearly production value (at constant prices) at sectoral and overall market levels.

**THEORETICAL FRAME WORK**

The profit maximization level of output is a function of output and input prices; in short run the level of output depends mainly in the labor input since capital input is relatively constant.

\[ \pi = f (\text{output, inputs}) \]

\[ \pi = f (P \cdot Q - WL - CK) \]

Where,

P: price
Q: output
W: wage
L: labor  
C: cost of capital  
K: level of capital.

Differentiating for $L$ ($k$ is constant in short run), then the marginal profit is depending only on the level of labor input:

$$M \pi = MP \cdot P - W = 0$$
$$MRP = W$$ since $MP \cdot P = MRP$

In other world, at profit maximization level of labor, the value of added output is equal the marginal wage.

In this study, we take the percentage change in output (output growth rate) as a proxy for marginal revenue product, and the percentage change in wages (wage growth rate) as proxy for marginal wage.

Taking into account the regulation of labor market, not only the marginal revenue product is main determinant of wage, inflation, and minimum wages, unemployment levels are also play role determination of wage. Therefore, labor wage growth structure is function of internal factor (marginal revenue product) and external factor (inflation, unemployment, previous wage growth levels, immigration, regulations ...).

**LITERATURE REVIEW**

From the point that economic growth is a function of output growth and since output growth is also a function of input (labor) productivity which depends on labor marginal cost (wages). Consequently, the integral relationship between the growth of real wages and their productivity was widely examined in many empirical studies.

The US economy showed from the 1995 to mid of 1999 that the hourly wage and production growth rates go hand in hand for non-farming sectors, while from the mid of 1999 to 2006 the production growth rate was highly spreads over wage growth rate. The
reason behind this spread is referred to technological improvement and to the increase in the capital to labor ratio [4].

The importance of relation between wage and productivity is a key factor to improve the quality of life for population (employed especially), and also is considered as indicator for efficiency of resource allocation between labor and capital [5].

Haegelond et al. [6] showed that the growth in productivity is also a function wage growth of workers who are highly educated. A new method call for relating wage with age in relevance to productivity, the finding of Crepene [7] in France labor market approved those older workers wages was raising when their productivity was constant or decreasing.

Perry et al. [8] examined the effect of real wage on productivity in manufacturing sector; they showed that the percentage change in the wages was larger than the increase productivity of this sector using data from the Australian labor market (1965-2007).

Nurke [9] considered that agricultural productivity is the key driver of economic development in other business sectors, that the increase in agricultural productivity increase the national income and also the demand for manufacturing products [10,11]. Other studies showed that if the productivity in agricultural sector is more than manufacturing sector assuming these sectors are complements, then labor force tends to move less productive sector [12].

Pandey et al. [13] in a study applied to 15 European countries to measure the productivity of labor wage in agricultural and non- agricultural countries, the study revealed that there is a large agricultural wage-productivity gap which mean that labor force are misallocated and transfer will tend to increase marginal production of labor in non-agricultural sectors and agricultural sector at same time [14].
RESEARCH METHODOLOGY

This study is an applied research method, therefore will use historical time series data concerning the dependent and independent variables which transformed in the following model:

\[ Wg_0i = \alpha_0 + \alpha_1 Ogi + \alpha_2 Wg_{-1i} + \epsilon \]

Where \( \alpha_1 \) represents the short run response of wage to output change, while \( (\alpha_1 + 1 - \alpha_2) \) represents the long run response.

The median lag which is \((-\log2/\log\alpha_2)\) give us the average period needed for 50% of changes in wages to be completed. The median lag \((\alpha_2/1-\alpha_2)\), represents the time needed for changes in output to be felt in changes in wages.

ESTIMATION OF RESULTS

In this section we conducted three types of statistical analysis starting with unit root test, co-integration, and auto regressive model (Koyck model).

Unit Root Test (ADF Test)

All-time series are non-stationary except the financial sector which means that there is a possibility for co-integration between wage and output trends in the non-stationary series. While we can use the unrestricted VAR model in financial sector time series.

What this mean? The non-stationarity means that the times series are unstable overtime and using OLS me be misleading that the dependent variable may be changing in absence of independent variables (Table 1).
Table 1: Table showing Unit root test (ADF test).

<table>
<thead>
<tr>
<th></th>
<th>t-Value</th>
<th>Critical value</th>
<th>t-Value</th>
<th>Critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural sector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wages</td>
<td>1.209</td>
<td>2.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>output</td>
<td>0.876</td>
<td>2z.957</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction sector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wages</td>
<td>1.866</td>
<td>2.954</td>
<td></td>
<td></td>
</tr>
<tr>
<td>output</td>
<td>0.295</td>
<td>2.95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level (taw table)

Co-integration Test

Applying Johansen co-integration test to examine if wage and output series are co-integrated. The test showed that the time series are not co-integrated and therefore no error correction mechanism. The absence of error correction means that no equilibrium between wage and output levels overtime.

This result is not surprising since the data are used at levels, but using the growth rates for time series may show a co-integration between wage and output growth rates, but using percentage growth rate will loss us the long run relationship between variables (Tables 2-6).

Auto Regressive Lag Model

Table 2: Showing Auto Regressive Lag Model.

<table>
<thead>
<tr>
<th>Variable</th>
<th>coefficient</th>
<th>t-value</th>
<th>S.E</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-13.495</td>
<td>-1.761</td>
<td>7.64</td>
<td>0.0883</td>
</tr>
</tbody>
</table>
Construction Sector

Table 3: Showing Construction sector.

<table>
<thead>
<tr>
<th>Variable</th>
<th>coefficient</th>
<th>t-value</th>
<th>S.E</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-32.69</td>
<td>-3.056</td>
<td>10.69</td>
<td>0.047*</td>
</tr>
<tr>
<td>output</td>
<td>0.0952</td>
<td>4.113</td>
<td>0.023</td>
<td>0.003**</td>
</tr>
<tr>
<td>Wage (-1)</td>
<td>0.6976</td>
<td>7.005</td>
<td>0.099</td>
<td>0.000**</td>
</tr>
<tr>
<td>R-squire</td>
<td></td>
<td>96.9%</td>
<td>F-test</td>
<td>479.8</td>
</tr>
<tr>
<td>Adjusted R-squire</td>
<td></td>
<td>96.7%</td>
<td>P-value</td>
<td>0.000**</td>
</tr>
</tbody>
</table>

*sig at 0.05 **sig at .01

Financial Service Sector

Table 4: Financial service sector.

<table>
<thead>
<tr>
<th>Variable</th>
<th>coefficient</th>
<th>t-value</th>
<th>S.E</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-4.164</td>
<td>-2.02</td>
<td>2.27</td>
<td>0.0517</td>
</tr>
<tr>
<td>output</td>
<td>0.097</td>
<td>3.76</td>
<td>0.025</td>
<td>0.000**</td>
</tr>
<tr>
<td>Wage (-1)</td>
<td>0.935</td>
<td>18.708</td>
<td>0.049</td>
<td>0.000**</td>
</tr>
<tr>
<td>R-squire</td>
<td></td>
<td>99.48%</td>
<td>F-test</td>
<td>2704</td>
</tr>
<tr>
<td>Adjusted R-squire</td>
<td></td>
<td>99.41%</td>
<td>P-value</td>
<td>0.000**</td>
</tr>
</tbody>
</table>

*sig at 0.05 **sig at .01
All Sectors

Table 5: Showing all sectors.

<table>
<thead>
<tr>
<th>Variable</th>
<th>coefficient</th>
<th>t-value</th>
<th>S.E</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>80.8</td>
<td>2.83</td>
<td>28.49</td>
<td>0.0081**</td>
</tr>
<tr>
<td>output</td>
<td>0.0102</td>
<td>2.64</td>
<td>0.0038</td>
<td>0.0129*</td>
</tr>
<tr>
<td>Wage (-1)</td>
<td>0.6924</td>
<td>6.59</td>
<td>0.104</td>
<td>0.000**</td>
</tr>
<tr>
<td>R-squire</td>
<td>92.4%</td>
<td>F-test</td>
<td>183.45</td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squire</td>
<td>91.9%</td>
<td>P-value</td>
<td>0.000**</td>
<td></td>
</tr>
</tbody>
</table>

Koyck Model Estimations

Table 6: Showing estimations of Koyck model estimations.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Short run response</th>
<th>Long run response</th>
<th>Median lag</th>
<th>Mean lag</th>
</tr>
</thead>
<tbody>
<tr>
<td>agricultural</td>
<td>0.0486</td>
<td>0.2248</td>
<td>2.84</td>
<td>3.63</td>
</tr>
<tr>
<td>construction</td>
<td>0.0952</td>
<td>0.3148</td>
<td>1.924</td>
<td>2.306</td>
</tr>
<tr>
<td>Financial</td>
<td>0.0970</td>
<td>1.492</td>
<td>10.313</td>
<td>14.38</td>
</tr>
<tr>
<td>market</td>
<td>0.0102</td>
<td>0.03317</td>
<td>1.88</td>
<td>2.25</td>
</tr>
</tbody>
</table>

RESULTS ANALYSIS

1. Short run response: The financial service sector showed the highest immediate response of wage change to one dinar change in output level (0.097), while the market short run response was the lowest (0.0102).

2. Long run response: also financial service sector showed the highest long response of wage change (1.492), while the market long run response was the lowest (0.03317). What this mean? In the financial sector a sustained increase in output by one dinar will eventually lead to 1.492 dinar increase in wages.
3. Median lag: the labor market showed the lowest median lag (1.88 year), while the financial sector was the highest (10.313 year). This means that 50% increase in wages following the change in output levels will be sustained in 1.88 years. The speed on wage adjustment is more when the coefficient of wage lag is large.

4. Mean lag: also the labor market showed the lowest mean lag (2.25 year), while the financial sector was the highest (14.38 year). This means that in average it take considerable time for the effect of output change to be felt on wage change in financial sector more than other sectors.

**CONCLUSION**

On the light of these results we can conclude that:

1. Wage determinants in financial sector was less depending on output growth since to take considerable time for wages to adjust to output change unlike other sectors which respond more rapidly but on average with less value than financial sector.

2. Wage and output time series in agricultural, construction, and all sectors were on stationary, this can be a sign of low regulation in these sectors. The financial sector seemed to be regulated since wage and output time series were stationary and not co-integrated, which mean that wages in short run is not correlated on output and need more time to be.

3. Finally we can say wages growth in Jordanian labor market was random and highly depended on output growth in less regulated markets (construction, agricultural, and whole labor market), while it depended more on ex-output factors in more regulated market (financial sector).

**References**