ARAB ECONOMIC JOURNAL

Published by the Arab Society for Economic Research

No. 51, Summer 2010

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Wages, Productivity and Prices in Egypt (1995-2007)

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Research Hypothesis:

1- There is a strong relationship between wages & prices.

2-There is a strong relationship between wages & productivity.

Research Objectives:

1- Study the development of wages and productivity in Egypt.

2- Determine the interrelationship between wages (public and private sector), prices and productivity in Egypt.

Introduction:

The relationship between inflation, wages and productivity growth has received much attention in the empirical literature.

For example Christopoulos and Tsionas (2005) imply a long run negative relationship between inflation and productivity growth.

Tsionas (2003) also found a negative relationship between inflation and productivity for fifteen European countries over the period 1960-1997.

Wakeford (2004) found that there is a positive relationship between wages & productivity because higher real wages put pressure on labor costs and cause firms to substitute capital for labor, thereby increasing the marginal productivity of labor.

Mahadevan (2005) application of granger causality tests to domestic inflation and mineral product price data for the Australian mining sector provides results that imply a negative unidirectional causality from prices to mining productivity growth between 1968 and 1998.

Narayan and Smyth (2009) used panel co-integration techniques to examine the relationships between inflation, real wages and productivity growth for the G7 countries over the period 1960-2004. They found a positive statistically significant relationship between real wages and productivity growth but no statistically significant relationship between inflation and productivity growth.

This paper investigate the relationships between nominal wages (public & private sector), productivity and prices in Egypt over the period (1995- 2007)

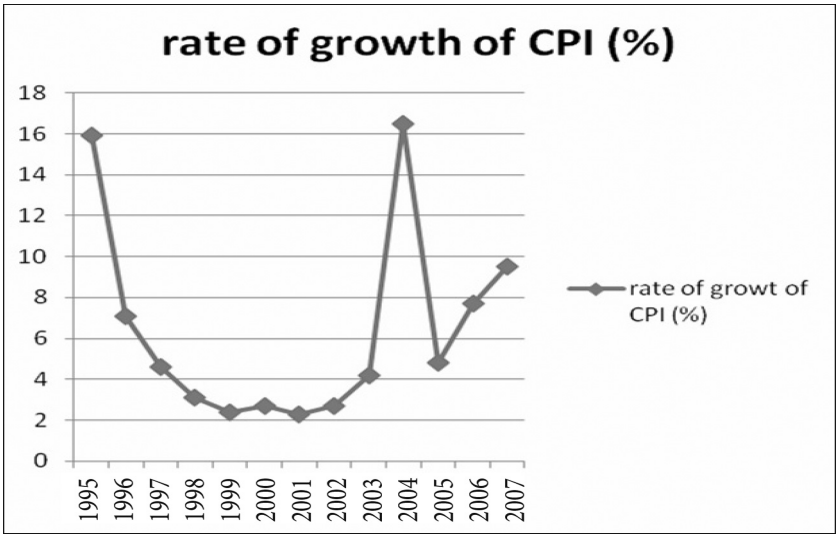
Inflation:

Inflation is defined as a sustained increase in the general level of prices for goods and services. It is measured as an annual percentage increase.

Demand Pull Inflation: Occurs when price levels rise because of an imbalance in the aggregate supply and demand. This type of inflation is a result of strong consumer demand. When many individuals are trying to purchase the same goods, the price will inevitably increase. When this happens across the entire economy for all goods, it is known as demand pull inflation.

Cost push Inflation: Occurs when general price levels rise due to increase in the cost of production like wages or raw materials.

Figure (1)
Rate of Growth of CPI (1995-2007)



Source: CAMPAS.

The year 1990/1991 witnessed the start of the ERSAP (Economic Reform and structural Adjustment Program) inflation declined from 20% in 1991 to 7.1% in 1996.

A turning point for the inflation trend was the flotation of the Egyptian pound in 2003, which raised inflation from about 3 percent in 2002 to about 17 percent in 2004.

Development of Wages In Egypt:

Wages are a major source of income for households as well as a major cost component in production; it is important to look at the development of wages in both the public and private sectors to see whether inflation was a cause or an effect of the development of wages in the economy.

Table (1)
Development of wages in Egypt (1995-2007)

Wage- private sector	Wage- public sector	year
88	88	1995
91	103	1996
105	108	1997
108	116	1998
120	158	1999
137	165	2000

to be Continued

Continued

138	171	2001
141	182	2002
149	195	2003
175	232	2004
168	257	2005
172	303	2006
214	308	2007

Source: CAMPAS.

* Wages are expressed in LE per week

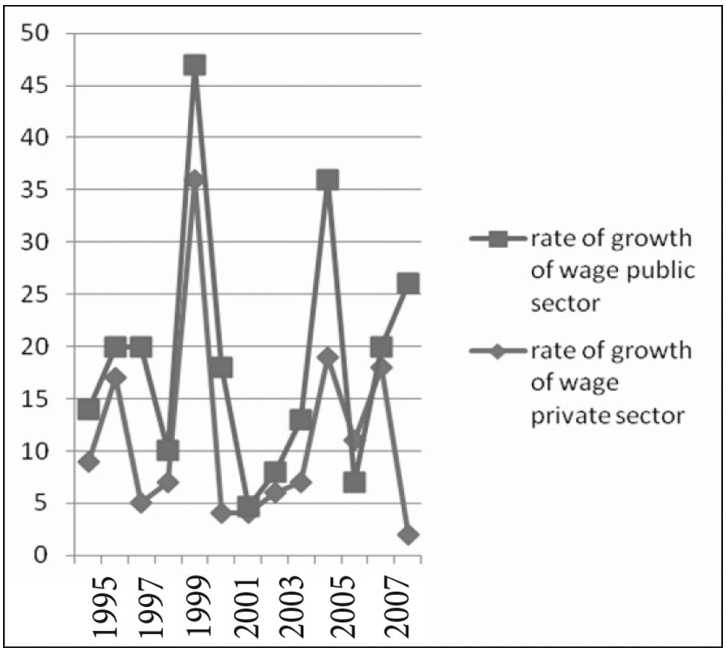
The total wages increased from 115.3 LE billion in 2001/2002 to 188.6 LE billion in 2006/2007 by growth rate 64%.

Wage in the public and private sectors are growing at different rates.

By 2007, public sector average wage was one and a half times as high as the private sector average wages.

The highest wages mainly in service sectors (financial, insurance and construction sectors) and the lowest wages in Agriculture, fishing and Mining sectors.

Figure (2)
Development of private and public sectors wages (1995-2007)



Source: Calculated by the author depend on CAMPAS data.

Wages and Productivity:

The relation between wages and productivity is important because it is a key determinant of the standard of living of the employed population as well as of the distribution of income between labor and capital. If wages rise at the same ratio as productivity, labor's share of national income remains essentially unchanged.

The relationship between wages and productivity is tested by Granger causality in order to find out whether wages influence Productivity, or Productivity influence wages or whether both wages and productivity are influenced by one another or whether productivity and wages are independent of each other.

Wages and Inflation:

The increase in wages will increase the production costs, which would provide the incentives for businessmen to raise prices, especially that high prices reflect a general rise in the prices of all inputs.

So demand pull inflation will raise prices, which in turn lead workers to ask for more wages.

Inflation and Productivity:

There is negative relation between inflation and productivity. As inflation reduces the incentive to work, it distorts the informational content of relative price levels (leading to inefficient investment plans), and shrinks tax reductions for depreciation (leading in an increase in the rental price of capital)

Wages, Inflation and Productivity:

There is a relationship between wages and productivity; when wages increase this represents a strong incentive for workers to increase their productivity. Also, workers will ask for more wages to compensate the increase in their productivity.

From one side wages represent cost of production which affects prices. But from the other side wages represent income for workers which affect their standard of living

Rise in worker's standard of living will increase their capabilities to produce, which at end will increase productivity.

If a wage increase is brought about by increased labor productivity, it will not create inflationary pressure.

Table (2)
Wages, productivity and inflation

Year	Rate of growth of wage-public sector	Rate of growth of wage-private sector	Inflation rate	Growth rate of labor productivity
1995	9	5	15.9	2.2
1996	17	3	7.1	2.4
1997	5	15	4.6	1.5
1998	7	3	3.1	1.3

to be Continued

Continued

1999	36	11	2.4	1.6
2000	4	14	2.7	1.7
2001	4	0.7	2.3	1.7
2002	6	2	2.7	1.9
2003	7	6	4.2	2.1
2004	19	17	16.5	1.3
2005	11	-4	4.8	1.3
2006	18	2	7.7	1.2
2007	2	24	9.5	1.1

Source: Calculated by author based on CAPMAS Data.

* Growth rate of labor productivity = GDP growth rate / employment growth rate

Comparing the growth rate of Private and public sector wages to the rate of growth of consumer price index (inflation rate), it appears that wages in the private sector show slower growth rates than the consumer price index.

Wage growth cannot be attributed to productivity growth. A steady source of growth in wages, especially in the public sector, used to be the annual increment, every July.

Granger - Causality Test:

Methodology:

Causality in the sense defined by Granger (1969) is inferred when lagged values of a variable, say X_t, have explanatory power in a regression of a variable Y_t, on lagged values of Y_t, and X_t

Granger causality test amounts to testing the following

$X_t = F(X_{t-1}, Y_{t-1})$ (1)

$Y_t = F(X_{t-1}, Y_{t-1})$ (2)

If Y_{t-1} is significant in (1) then Y causes X and if X_{t-1} is significant in (2) then X causes Y. If $Y_{t-1}$is insignificant in (2) then Y does not cause X, if X_{t-1} is insignificant in (2) then X does not cause Y.

If Y_{t-1} in (1) and X_{t-1} in (2) are both significant, then there is bidirectional causality, and if Y_{t-1} in (1) and X_{t-1} in (2) are both insignificant then the two variables are independent.

Inflation & wages:

$CPI_t = a\ CPI_{t-1} + â\ W_{t-1} + U_{t1}$ (3)

$W_t = a\ W_{t-1} + â\ CPI_{t-1} + U_{t2}$ (4)

Wages & Productivity:

$P_t = a\ P_{t-1} + â\ W_{t-1} + U_{t1}$ (5)

$W_t = a\ W_{t-1} + â\ P_{t-1} + U_{t2}$ (6)

Where:

CPI_t : the rate of change in CPI in time t (inflation rate)

W_t : wage inflation in time t.

P_t : growth rate of labor productivity in time t.

CPI_{t-1} : lagged inflation rates.

W_{t-1} : lagged wage inflation.

P_{t-1} : lagged growth rate of productivity.

U_{t1} and U_{t2} : uncorrelated.

Results of Granger Test :

Inflation rate & wages:

* Inflation rate is independent from the rate of change in public sector wages.

* There is a unidirectional causality running from the rate of change in private wages to price inflation at a 5 percent level of significance.

Productivity & Wages:

* Growth rate of wages is independent from the growth rate of labor productivity.

* There is a unidirectional causality running from the growth rate of productivity to rate of change in private wages at a 5 percent level of significant.

Wage Indexation:

Wage indexation is a mechanism designed to adjust wages to information that cannot be foreseen when the wage contract is negotiated. A wage contract with indexation clauses will specify the wage base (i.e. the money wage applicable in the absence of new information), the indexation formula that will be used to update wages, and how often updating will occur.

Most traditional discussion has focused on wage indexation to the price level. Wage indexation is designed to allow workers to recover, wholly or in part, purchasing power lost through price increases since the signing of the labor contract.

So according to this definition, the mere adjustment of wages in line with inflation does not qualify as wage indexation. What is special about indexation is that it is a mechanism that enables wages to adjust to new information without the need to renegotiate the contract.

a- Wage indexation to current inflation:

$W_t = \lambda CPI_t$

Where:

CPI_t : inflation rate in period t.

W_t : wages in period t.

λ : wage indexation (degree of indexation)

Wage indexation adjusts wages according to the changes in the current price level.

The effects of wage indexation are varying by the degree of indexation. Under full wage indexation ë the real wage is assumed to be fixed. But when ë = 0, this assumes that without indexation the contract's nominal wage is fixed. Intermediate degrees of indexation correspond to partial wage indexation. Wage indexation helps stabilizing real wages.

b- Lagged wage indexation:

Wage adjustments are not proportional to current inflation but to inflation cumulated since the last wage revision.

$W_t = E_{t-1} P_t - E_{t-2} P_{t-1}$

Where:

P_{t-i} : Price level in period t-i (i = 0,1)

E_{t-j}: Expected value operator on the basis of information available at the end of period (j = 1,2)

c-Wage indexation (Prices & Productivity):

A wage contract is supposed to be a function

$W = p^e + (1-\lambda)(p-p^e) + \phi\,\theta$

Where:

P^e: expected price level

$1-\lambda$: degree of wage indexation to aggregate prices

ϕ : an index for wage adjustments to productivity.

Is wage indexation applicable in Egypt?

Actually wage indexation requires the existence of formal contracts. But in fact the large informal sector and the existence of many workers who work in the private sector on a part time basis or with no formal contracts in Egypt make wage indexation not suitable for Egypt case.

Results of the Granger causality test on Inflation (consumer price index) and wages (1995-2007)

Wt public	CPIt	**0.359**	**Do not reject H0**
Wt Private	CPIt	**2.512**	**reject H0**
CPIt	Wt public	**0.0731**	**Do not reject H0**
CPIt	Wt private	**1.5**	**Do not reject H0**

Results of the Granger causality test on Inflation (consumer price index) and wages (1995-2007)

Wt public	Pt	0.612	Do not reject H0
Wt Private	Pt	3.102	reject H0
Pt	Wt public	0.056	Do not reject H0
Pt	Wt private	0.92	Do not reject H0

Conclusion:

This paper shows that changes in public sector wages are independent from changes in prices. While growth in private sector wages affect price inflation (there are several factors affecting inflation other than wages).

Also this paper shows that growth rate of wages is independent from the growth rate of labor productivity.

Some countries use wage indexation to stabilize real wages. But in Egypt wage indexation is not applicable because if some workers enjoy wage indexation and the rest will not, workers without formal contracts will suffer more and more inflationary pressure.

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