PRODUCTIVITY AND SALARIES & WAGES IN MANUFACTURING SECTOR: COINTEGRATION AND CAUSALITY EVIDENCE FOR MALAYSIA

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iii. History

ii. The Performance of Manufacturing Sector

i. Objective

To examine the long-run and short-run relationship between productivity and salaries & wages in Manufacturing sector in Malaysia

The Manufacturing sector is one of the major contributors to the economy with a share of 23.0 per cent to Malaysia's GDP in 2014

A number of literature examine the relationship between productivity and salaries & wages

2. LITERATURE REVIEW

Author	Methodology	Results
Zekeriya Yildirim 2015 Relationship among Labour Productivity, Real Wages and Inflation in Turkey	Cointegration and Granger causality test	Inflation has a great effect on labour productivity than do real wages. Granger causality test shows that there is a strong feedback between labour productivity and inflation.
Saten Kumar Don J. Webber Geoff Perry 2010 Real Wages, inflation and Labour Productivity in Australia	Cointegration and Granger causality test	1.0% increase in Manufacturing sector real wages led to an increase of productivity between 0.5% and 0.8%. Granger causality test results suggest that real wages and inflation both Granger-cause productivity in the long run.

2. LITERATURE REVIEW

Author	Methodology	Results
Soo Khoon Goh 2009 Is Productivity Linked to Wages? An Empirical Investigation in Malaysia	Cointegration and Granger causality test	A long-term equilibrium relationship seems to exist between real wages and productivity for the period 1970 to 2005, but employment is apparently not connected to the other variables.
Zulkornain Yusop Law Siong Hook Norashidah Mohd Nor 2005 Relationship among Output, Wages, Productivity and Employment in the Malaysian Electronic and Electrical Sub-sector	Johansen's procedure	Wages may increase as long as it is commensurate with a higher increase in productivity. However, changes in wages can actually affect employment.

2. LITERATURE REVIEW

Author	Methodology	Results
Zulkifly Osman Mohd Azlan Shah Zaidi 2002 *'Cabaran Globalisasi: Strategi Ekonomi Upah Tinggi'*	Granger (1969) and Toda & Yamamoto (1995)	The results show that the phenomenon of high-wage economy does in fact exist. This would mean that higher wage will indeed lead to higher productivity.
Mansor Jusoh Chew Yuet Fah 1998 *'Upah Agregat dan Produktiviti Buruh di Malaysia:Penganggaran Model Penentuan Upah dengan Pendekatan Kointegrasi'*	Granger and Engle	In the short run, an increase in labour productivity will be followed by a larger increase in current wage.

Principal Statistics of Manufacturing Industries, Malaysia

i. Value of Gross Output

ii. Total Number of Persons Engaged during December or The Last Pay Period

iii. Salaries & Wages Paid

Productivity

Is the relationship between the amount of output produced and the amount of input used to produce the output. Higher productivity means achieving more with the same or lesser amount of input resources. Increase in productivity will lead to benefits such as higher standard of living, enhanced competitiveness and better quality of life

Productivity = Total Output/Number of Employees

Sources: Malaysia Productivity Corporation

Technique

The study employs a four step procedures in order to determine the relationship between productivity and salaries & wages. These procedures are:

4.1 Diagnostic Test	**4.2 Unit Root Test**
4.3 Johansen Cointegration Test	**4.4 Granger-Causality**

4.1   Diagnostic Test

Breusch-Godfrey Serial Correlation LM Test

- To test the presence of serial correlation

Harvey

- To test the heteroscedasticity

4.2 Unit Root Test

The Philips Perron (PP) unit root tests

Equation:

$$\Delta Y_t = \alpha + \beta Y_{t-1} + \sum_{t=1}^{p} \varphi \Delta y_{t-i} + \varepsilon_t$$

Where Δ is the first operator; y_t shows series used in the study; t=1, ... T is an index of time; p represents the number of lags, which is determined based on the Akaike Information Criterion (AIC); ε_t is the stationary random error terms.

4.3   Cointegration Test

A crucial role in deciding the model used – to detect the relationship between productivity and Salaries & wages

Johansen multivariate cointegration technique – provides two different likelihood ratio test based on trace statistics and maximum eigenvalue statistics

4.4   Granger Causality Test

Performed after obtaining the cointegration test result

If two time series variables are cointegrated, then at least one-directional Granger-causality exists

There are two possible sources of causality: Error correction terms, which shows long-run causality and lagged explanatory variables, revealing short-run causality

5.1 RESULT

Table 1: Correlation Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	63.1882	Prob. F(2,52)	0.0000
Obs*R-squared	39.6750	Prob. Chi-Square (2)	0.0000

Since the p-value (0.0000) of Obs*R-squared is less than 5 percent (p<0.05), reject null hypothesis meaning that residuals (u) are serially correlated.

Table 2: Heteroscedasticity Test

Heteroskedasticity Test: Harvey			
F-statistic	2.3786	Prob. F(1,54)	0.1288
Obs*R-squared	2.3626	Prob. Chi-Square (1)	0.1243

Since the p-value (0.1243) of Obs*R-squared is greater than 5 percent (p>0.05), do not reject null hypothesis meaning that residuals (u) are no heteroscedasticity.

Table 3: Result for Unit Root Tests Using Phillips-Perron

Variables	Level		First Difference	
	Constant without trend	**Constant with trend**	**Constant without trend**	**Constant with trend**
Productivity	5.8488 (8)	1.1707 (14)	-6.5715*** (4)	-9.9626 *** (5)
Salaries & Wages	6.0695 (4)	0.8247 (3)	-2.7377 * (3)	-5.2359 *** (2)

Notes: *** (**) and * denotes significant at 1%, (5%) and 10% significant level, respectively.

Table 4: Result for Cointegration Using Johansen-Jusselius Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.3281	24.5852	15.4947	0.0016
Ai most 1	0.0641	3.5123	3.8415	0.0609

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.3281	21.0729	14.2646	0.0036
Ai most 1	0.0641	3.5123	3.8415	0.0609

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 5: Result for Granger Causality Test

Null Hypothesis	Obs	F-Statistics	Prob.
Salaries & Wages does not Granger Cause Productivity	56 (2)	8.2975	0.0008
Productivity does not Granger Cause Salaries & Wages		1.1428	0.3273

The null hypothesis of Salaries & Wages does not granger cause productivity was rejected at 5% significance level. Therefore, Salaries & Wages granger cause productivity in manufacturing sector.

5.2 CONCLUSION

❖ Based on the analysis conducted, it was found that:

❖ There exist a long-run relationship between productivity and salaries & wages.

❖ There exist one directional short-run relationship between productivity and salaries & wages. Based on the Granger Causality test, the salaries & wages had causes the increase in productivity in Manufacturing sector. Concurrently, it will increase the quality of the manpower in Malaysia for this sector.

6. WAY FORWARD

The scope of the study is suggested to be extended to the other sector in the Malaysia's namely Agriculture, Mining, Construction and Services sectors. The results may assist the government and employers in drawing up the wage structure in line with current needs.

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THANK YOU