Analyzing the Productivity-Wage-Unemployment Nexus in Malaysia: Evidence from the Macroeconomic Perspective

Soo Khoon Goh\textsuperscript{1} and Koi Nyen Wong\textsuperscript{2,3}

Abstract:
Using multivariate cointegration and error-correction modeling techniques, this paper attempts to examine whether there exists a productivity-wage-unemployment relationship in Malaysia at the macroeconomic level. The main findings show that unemployment is dichotomized from the long-run equilibrium relationship between labor productivity and real wages, implying labor productivity is an important long-run factor in determining real wages, while unemployment has negligible effect on the real wage rates. However, the real wages are very responsive to a change in labor productivity, signaling the labor market is tight that leads to an increase in unit labor cost. To be more resilient to rising wages and productivity gap in a globally competitive environment, the Malaysian industries should move up the value chain, and promote skill- and technology-intensive production.

Keywords: Real wages, productivity, Malaysia

JEL classification codes: J39

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1. Introduction

Human resources play a vital role in the export-led industrialization of the Malaysian economy. Low labor cost coupled with relatively higher skill and capabilities of the workforce then were the major pull factors that attracted foreign firms to set up their subsidiaries in the country since the early 1990. The rapid structural change in the economy from commodity-dependent into a manufacturing export-based economy has caused a shortage of skilled workers in the country. It is interesting to note that a series of successful adoption of industrialization programs during the past three decades had repercussions on Malaysia’s labor market. The labor market in Malaysia has been enjoying near full employment with unemployment rate as low as 2.5 per cent in 1996 and in 1997. The current tight labor market conditions have tendency to exert upward pressure on the labor cost, which makes the country a less attractive destination for inward foreign direct investment (FDI), especially, with the emergence of low-wage countries such as the People’s Republic of China (PRC), India as well as transitional economies from Indochina (see Hussain and Radelet (2000) and Yusof (2006)). At present, there are already several multinational corporations (MNCs) in Penang which have already relocated their production bases to the PRC because of its comparative advantage in producing labor-intensive goods.

Consequently, this observation poses an interesting empirical question pertaining to the implications of labor-cost competitiveness for the nation in an exceptionally tight labor market condition. Hence, this paper attempts to ascertain empirically how productivity, wage and the level of unemployment interact in the long run in order to address this empirical question. Applying multivariate cointegration and error-correction modeling techniques, the analysis can examine whether there is a cointegrating relationship as well as the causality patterns among these three variables of interest. The study not only can provide
further evidence concerning the empirical validity of labor market theories but also have salient contributions to the empirical literature using Malaysia as a case since the available evidence is limited for developing economies especially in Southeast Asia. Moreover, the findings can shed important light on issues relating the rising wages and productivity growth currently experienced by the country, and can have useful policy implications for the economy’s manpower development and international competitiveness in the face of trade liberalization and the entry low-wage countries.

The structure of the paper is as follows. Section 2 presents the labor market theories and the previous empirical research work on the productivity-wage-unemployment relationship. Having looked in detail at the relevant economic theories as well as the methodological issues, a theoretical framework will be specified to analyze the long-run relationship and the causality patterns of the key variables. Section 3 describes and analyses the data used in the study. Section 4 outlines the empirical methodologies and reports the results. Section 5 summarizes the main results with conclusions and policy implications.

2. Labor Market Theories and the Empirical Literature

Labor Market Theories
According to different wage determination theories, the evolution of wages is not only influenced by productivity but also influenced by other factors, such as unemployment (see Blanchflower & Oswald, 1994, Blanchard & Katz, 1999, Bell et al., 2002). Real wage, productivity and unemployment represent an important nexus within labor markets which has received a significant amount of attention in economic literature. For example, Blanchard & Katz (1999) suggest the following specification:

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4 Section 2 of the paper will provide a review of the empirical literature testing for the validity of labor market theories.
\[ w_t - p_t^e = \alpha + \beta \text{prod}_t + \lambda (w_{t-1} - p_{t-1}) + \gamma u_t + \varepsilon_t \]

where \( w_t \) is the nominal wage rate, \( p_t^e \) is the expected price level in time \( t \), \( \text{prod}_t \) is the level of productivity, \( u_t \) is the unemployment rate, \( w_{t-1} - p_{t-1} \) is the lagged term of real wage which acts as a proxy for reservation wage.

The coefficient on the productivity term is expected to be positive, and the coefficient on the unemployment term is expected to be negative. Although the sign of the coefficient of productivity and unemployment on wages is fairly clear in theory, a number of causal relations between real wages, productivity and unemployment are suggested based on theory and previous empirical evidence.

The marginal productivity theory suggests that highly productive workers are highly paid, and less productive workers are less highly paid. At the macroeconomic level, an increase in real wages is expected to raise the cost of labor and therefore cause factor substitution from labor to capital. This could raise marginal productivity and, hence, average out labor productivity. Higher productivity in turn influences the real wages to rise. Therefore, it is hypothesized that productivity positively affects real wages.

On the other hand, efficiency wage theory proposes that wages affect productivity. Firms pay their employees more than market clearing wages in order to increase their employees’ productivity or efficiency. High wage workers are less likely to quit. Thus firms can retain more experienced and productive workers than newly hired workers who may not be as productive as experienced workers. For example, it has been argued that raising pay can stimulate worker effort and strengthen long-term employment relationships. Akerlof (1982) had proposed that when firms raise pay, workers put forth greater efforts out of a sense of loyalty to those employers.
There is also a growing volume of work making use of insider-outsider models, closely related to bargaining models and theoretical analysis of trade unions, which postulates a relevant role for insider effects in wage determination. Unlike the efficiency wage theories, the insider-outsider approach does not assume a direct effect of wages on productivity and unemployment. The insider-outsider theory, by contrast, rests on the assumption that incumbent workers in their own interest exploit various labor turnover costs, some of which insiders may influence themselves.

**Empirical Literature**

There has been an increasing volume of empirical literature concerning the relationship between real wage, productivity and unemployment. Using the two-step procedure of Engle and Granger (1987), and Hall (1986) found real wages, productivity and unemployment formed a cointegrated system in the United Kingdom (U.K.). A more detailed analysis was later conducted by Alexander (1993), who investigated the relationship between productivity, wages and unemployment in the U.K. for the period 1955 – 1991. The study split the sample into two sub-periods after finding evidence of a structural break in 1979. She found that there was no direct link between wages and productivity from 1955 to 1979 while unemployment was the central variable, being caused by both wages and productivity during this period. After 1979, a negative causality from wages to productivity was found, while unemployment became almost divorced from the system. Wakeford (2004) found that though a long run relationship existed between real wages and productivity in South Africa, unemployment was apparently not connected to the two variables. In the short run, real wages had negative impact on productivity but not for the reverse case. Strauss and Wohar (2004) found the long-run relationship between real wages and productivity at the industry level for a group of manufacturing industries in the United States (U.S.) over the period 1956 – 1996, and the increases in productivity were associated with a less than unity increase in real wages. Using Geweke’s linear feedback technique, Meghan (2002) estimated the relationship between wages
and productivity for several industrialized countries to distinguish between conventional and efficiency wage behaviors. Results suggested that efficiency wages were being paid in Canada, Italy and the UK. In contrast, Sweden, the U.S. and France exhibited no efficiency wage setting, with very negligible wages and productivity feedback measures. The study also found that economic institutions such as worker unions played an important role on the wage-productivity settings for this group of industrialized countries. Scott and Meghan (2002) found that efficiency wage behavior had not been the norm in Japan from 1975 to 1997. Nevertheless, efficiency wage setting cannot be ruled out for some key areas of manufacturing in Japan.

There is a lack of empirical studies concerning the relationship between real wages and productivity in Malaysia. Ho and Yap (2001) analyzed both the long-run and short-run dynamics of wage formation in the Malaysian manufacturing industry as a whole and also for 13 selected sub-sectors of the industry using the Engle-Granger cointegration test. The main explanatory variables in the estimated long run wage equation for the entire manufacturing industry were labor productivity, unemployment rate and union density. They found a positive long run relationship between labor productivity and real wages and a negative relationship between unemployment and real wages, while no significant relationship of union density on real wages. Furthermore, the short-run dynamic model revealed a negative relationship between real wages and labor productivity suggesting labor productivity gains did not bring about higher wages in the short run. The main drawback of the methodology applied in this study is that the authors used Engle-Granger two step procedure to test the cointegration relationship among four variables, namely, real wages, productivity, unemployment and union density. As pointed out by Enders (2004), the Engle-Granger two-step procedure can identify only one long-run relationship with a maximum of two variables. And, in a set of four variables as

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5 However the authors ignored the insignificance of the error correction term in the short run model.
estimated by Ho and Yap (2001), it can, in fact, identify up to three long-run relationships.

Since the focus of this study is to examine the relationship between real wages and productivity, this study aims to apply the tri-variate model, namely, real wage, productivity and unemployment, as have been used in international literature (Alexander, 1993; Wakeford, 2004; Meghan, 2002; Scott and Meghan, 2002). In Malaysia, although the number of unions has increased over the years, data from the Ministry of Human Resources showed that union members constituted only 7.3% of the workforce in year 2005 compared to 15% in 1996. In addition, as pointed out by Ayadurai (1985), restrictions on labor to organize labor movement have resulted small and ineffective unions. Hence, it is not surprised that in Ho and Yap’s (2001) study, the variable on union density, which measures union power, was statistically insignificant both in the long run and short run cointegration models. Therefore, our study will not consider the union density variable in the model.

3. Data

The present study uses annual time series data from 1970 to 2005. The data for productivity and real wages were obtained from the Malaysia Productivity Council (MPC), while the source of unemployment data was from the Department of Statistics, Malaysia. We would have preferred to work with quarterly data so that the study has an adequate number of observations for analysis. However, quarterly time series data for the variables required in this study are not available.

Productivity is measured by real GDP per worker. As pointed by Wakeford (2004), the most appropriate concept of productivity in economics is marginal productivity or output per hour of labor input. However, such data is not available in Malaysia. Following the study by Alexander (1993) and Wakeford
(2004), this study resorts to the use of average labor productivity, which is real GDP divided by total employment.

Nominal wages are based on the aggregate wages of 10 economic sectors, namely, manufacturing, utilities, transportation, finance, government services, wholesale and retail trade, agriculture, construction, mining and other services. The wages are then deflated using the consumer price index to provide a measure of the workers’ real purchasing power otherwise known as real consumption wages (Wakeford, 2004). In this analysis, average (i.e. per worker) real wages are being considered.

The unemployment rate is measured according to the broad definition. All variables were transformed in logarithmic form so that coefficients can be interpreted as elasticities. The following notation is used for the three variables: LRW= log (average real wage), LPROD= log (average labor productivity), LU= log (unemployment rate).

Figure 1 presents the plots of real wages, productivity and unemployment in logarithmic form so that the evidence of trends and structural breaks can be identified. Real wages and productivity displayed a positive trend, interrupted by several shocks, with productivity rising more steeply than real wages. There was a small spike in the real wages series during the early 1980s due to tight labor market situations and a sharp increase in fiscal pump-priming to insulate the Malaysian economy from the global recession. It was followed by small dips in

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6 If the nominal wage is deflated by producer price index, the real wage is known as real product wage which provides a measure of the labor cost of production.

7 Feldstein (2008) commented it is better to compare the productivity rise with the increase of total compensation rather than with the increase of the wages. With the rise in fringe benefits and other non cash payments, wages have not risen as rapidly as total compensation. Nonetheless, such data is not available in Malaysia.

8 It is noted that Alexander (1993) and Wakeford (2004) only transformed real wages and productivity into logarithms, while unemployment was retained as a percentage. In this study, we transformed all the variables into logarithmic form to ensure that all variables are unit free. The data for the unemployment data is annual. The highest value of the unemployment rate throughout the sample size is 7.7% while the lowest is 2.4%. Hence, the values of the logarithm of the unemployment rate are all positive.
1995 and 1996, the period before the 1997 Asian Currency Crisis. Since then, real wages had risen considerably. The productivity series displayed a broadly similar though smoother pattern. It rose fairly consistently from 1970 to 1996 before having a minor downswing in 1997 during the Asian Currency Crisis.

The unemployment series seemed to move closely with real wage in the 1970s and early 1980s. Unemployment rose when real wage was the lowest in 1974, and vice versa, unemployment went down when the real wage was high in 1982. After 1987, there was a steady decline in the unemployment rates till 1997. This was attributed to the economic transformation that had taken place where the manufacturing sector replaced the agriculture sector as a major source of employment in the economy. During this period too, the labor market experienced a shortage of labor, and the country was forced to allow the influx of foreign labor. Nevertheless, the outbreak of the Asian Currency Crisis in 1997 led to an increase in unemployment rates with rampant retrenchment of workers and restructuring of firms taking place.

Log of labor productivity, real wages and unemployment

Figure 1: Real Wages, Productivity and Unemployment, 1970 - 2005
4. Methodology and Empirical Results

A common practice prior in performing cointegration test is to determine the stationarity of the series or its degree of integration, \( I(d) \). Augmented Dickey Fuller (ADF) and Phillips and Perron (PP) tests were then applied to all series to determine their order of integration. It is important to note that these tests assume no structural breaks.  

Table 1 presents the results of ADF and PP tests for a unit root for each individual series. The regressions were run with trend for real wages and productivity series, and without trend for unemployment series. It is found that the null hypothesis of unit roots cannot be rejected at conventional significance levels, and therefore it can be concluded that all series are non-stationary in level, but are stationary in first difference. Therefore, all series are \( I(1) \).

<table>
<thead>
<tr>
<th>Series</th>
<th>ADF</th>
<th>PP</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In levels</td>
<td>in first differences</td>
<td>In levels</td>
<td>in first differences</td>
</tr>
<tr>
<td>LRW</td>
<td>-2.14</td>
<td>-8.93***</td>
<td>-3.32</td>
<td>-8.93***</td>
</tr>
<tr>
<td>LPROD</td>
<td>-1.61</td>
<td>-4.92***</td>
<td>-1.80</td>
<td>-6.13***</td>
</tr>
<tr>
<td>LU</td>
<td>-1.15</td>
<td>-7.02***</td>
<td>-1.55</td>
<td>-6.89***</td>
</tr>
</tbody>
</table>

Note: The ADF test is based on the following model: \( \Delta x_t = \beta_0 + \beta_1 x_{t-1} + \sum_{i=1}^{k} \beta_i \Delta x_{t-i} + \epsilon_t \)

The PP test is based on the following model: \( x_t = \beta_0 + \beta_1 x_{t-1} + \epsilon_t \)

9 The paper has cautiously considered the concerns of structural break(s) in the unit tests. Conventional unit root tests (i.e. ADF, PP, and so on) are not taken into account for variables that have undergone structural changes, and the power to reject the unit root null declines. However, the results of Bai and Perron (1998, 2003) test for structural breaks detection are inconclusive. For example, although the supF\(_T(K)\) tests, UDmax and WDmax tests are significant for \( k \) between 1 to 4 and conclude that at least one break is present for all series, the sequential procedure (using a 5% significance level) and the BIC and LWZ select 0 breaks (BIC selects 2 breaks for the LRW series). Given the documented facts that the sequential procedure perform better than other tests, we conclude in favor of no break for all series. For comparison purposes, the paper also implemented unit root and cointegration tests which take into account of structural break such as unit root tests proposed by Lanne et al. (2002) and Saikkonen and Lutkepohl (2002). In general, the empirical results for unit root and cointegration tests are consistent with the alternative specifications which allow for possible structural break(s).
Constant and time trend have been included into the unit root equation for LRW and LPROD data (in level). For first-differenced data, the unit root equation was estimated without a time trend. For the ADF test, the optimum lag (.) is selected based on Akaike Information Criterion (0 to 4 lags). For the PP test, the lag truncation of four was used for the Bartlett kernel based on the Newey-West adjusted variance estimators. *** denotes rejection of the unit root null at the 1% level, based on MacKinnon’s (1991) critical values.

**Cointegration Test**

The next step is to apply the Johansen multivariate cointegration procedure to test whether there is a cointegrating vector(s) among the non-stationary series. To do so, the Johansen test can be applied to test for the presence of a cointegrating vector among the non-stationary series as suggested by Johansen and Juselius (1990). The assumption imposed on the cointegration equations is linear deterministic trend with an intercept in data. Table 2 reports the estimated trace and maximum test statistics. Overall, the cointegration test results confirm that there exists at least one cointegrating relationship among the three variables. This allows one to estimate the long-run relationship and the Error Correction Models (ECMs).

**Table 2: Johansen Multivariate Cointegration Test**

<table>
<thead>
<tr>
<th>Hypothesized number of CE</th>
<th>Trend and Intercep</th>
<th>5% critical value</th>
<th>5% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \lambda_{\text{trace}} ) statistics</td>
<td>( \lambda_{\text{Max}} ) statistics</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>47.89**</td>
<td>42.91</td>
<td>27.12**</td>
</tr>
<tr>
<td>At most 1</td>
<td>20.77</td>
<td>25.87</td>
<td>15.56</td>
</tr>
<tr>
<td>At most 2</td>
<td>5.21</td>
<td>12.52</td>
<td>5.21</td>
</tr>
</tbody>
</table>

Note: ** denotes significance at 5%

The long-run equilibrium vector is estimated to be \( Z=LRW-1.28LPROD+0.067LU \) which is shown in Table 3, column 2. The coefficient of LPROD has a standard error of 0.054 and is therefore significant at 1 percent level of significance, while the coefficient of LU has a standard error of 0.051 and is clearly insignificant. The result is tested further via an over-identifying restriction (that the coefficient of LU = 0), which produces a \( \chi^2 \) statistic of 1.71 which is not significant (p=0.1907). The evidence suggests that LU is not part of
the long-run relationship. Hence, a cointegration test for the bivariate relationship between LRW and LPROD should be conducted. Applying the same methodology as before, the estimated trace test statistics (see Table 4) show the existence of a single cointegrating vector. The trace and maximum tests clearly indicate a single cointegrating vector at the 5 per cent level of significance.\(^{10}\)

Table 3: Ordinary Least Squares estimation for long-run elasticity parameters

<table>
<thead>
<tr>
<th>Regressor</th>
<th>LRW</th>
<th>LRW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-1.139***</td>
<td>-0.882***</td>
</tr>
<tr>
<td></td>
<td>(0.215)</td>
<td>(0.088)</td>
</tr>
<tr>
<td>LPROD</td>
<td>1.280***</td>
<td>1.223***</td>
</tr>
<tr>
<td></td>
<td>(0.054)</td>
<td>(0.033)</td>
</tr>
<tr>
<td>LU</td>
<td>0.067</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.051)</td>
<td></td>
</tr>
<tr>
<td>(R^2)</td>
<td>0.977</td>
<td>0.976</td>
</tr>
<tr>
<td>Adjusted (R^2)</td>
<td>0.976</td>
<td>0.975</td>
</tr>
<tr>
<td>Durbin-Watson Statistic</td>
<td>1.731</td>
<td>1.610</td>
</tr>
<tr>
<td>(F)-statistic (p-value)</td>
<td>717.265 (0.000)</td>
<td>1403.4 (0.000)</td>
</tr>
</tbody>
</table>

Note: *** denotes level of significance at 1%.

Table 4: Johansen multivariate cointegration test

<table>
<thead>
<tr>
<th>Hypothesized number of CE</th>
<th>(\lambda_{\text{trace}}) statistics</th>
<th>5% critical value</th>
<th>(\lambda_{\text{Max}}) statistics</th>
<th>5% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>24.38**</td>
<td>18.39</td>
<td>22.16**</td>
<td>17.15</td>
</tr>
<tr>
<td>At most 1</td>
<td>2.22</td>
<td>3.84</td>
<td>2.22</td>
<td>3.84</td>
</tr>
</tbody>
</table>

Note: ** denotes level of significance at 5%

The long-run equilibrium vector is estimated as \(Z=LRW-1.223LPROD\) (Table 3, column 3). The standard error of the coefficient of LPROD is 0.033 implying a high degree of significance level. This implies that for every 1 per cent rise in productivity, real wage rises by 1.223 per cent in the long run.

\(^{10}\) We also ran the two-step Engle-Granger (1987) cointegration test. The ADF t-statistics for the residuals from the cointegration equations (both for the constant or constant and time trend) lie below the 1\% and 5\% critical value, indicating the null hypothesis of no cointegration can be rejected.
**Error Correction Model**

If the economic time series are found to be cointegrated, an econometric framework for an ECM representation can be specified. The error-correction process can reconcile the long-run equilibrium with disequilibrium behavior in the short-run, which allows testing for short-term or dynamic causality.

The ECM specification can be written as follows:

\[
\Delta LRW_t = a - \lambda ECT_{t-1} + \sum_{j=0}^{p} b_j \Delta PROD_{t-j} + \sum_{j=0}^{q} c_j \Delta LRW_{t-j} + \epsilon_t
\]

\[
\Delta PROD_t = a - \lambda ECT_{t-1} + \sum_{j=1}^{p} b_j \Delta PROD_{t-j} + \sum_{j=1}^{q} c_j \Delta LRW_{t-j} + \epsilon_t
\]

where \( \Delta \) is the first-order differencing operator and \( ECT_{t-1} \) stands for the previous period’s error-correction term generated from a cointegrating equation using OLS estimator.\(^{11}\)

The main problem with the above equation is the choice of lag length. Given the study has only 36 observations, and to save degrees of freedom, a maximum lag length of four is imposed on the ECM.\(^{12}\) The model with four lags is more general than the specific model without lags. The most parsimonious model is narrowed down on the basis of “general to specific” modeling paradigm using the individual t-test. Regressors with small absolute t-values are eliminated sequentially until all absolute t-values were greater than a threshold value. Note that only a single regressor is eliminated in each step. Then new t-values are computed for the reduced form.

\(^{11}\) Since the model is left with two variables, hence, it is safe to use OLS as an estimation technique.

\(^{12}\) As a general rule, an optimal lag length of four quarters is sufficient in an empirical study when annual data are being used.
The results of the ECM estimations are reported in Table 6. The DLPROD model is very badly specified; none of the lagged of the DLW and DLPROD (including the error correction term) is significant in the model, but the DLRW model has reasonable explanatory power. The F-statistic for the DLRW model is significant and the model passes all of the conventional tests for serial correlation, functional form and residual normality. The Cusum plot reveals stability of parameters in the equation. All the Quandt-Andrew Unknow Breakpoint Tests (i.e. Maximum LR F-statistic, Exp LR F-statistic, or Ave LR F-statistic) do no reject the null hypothesis of no structural break within the sample size tested.

It can be seen that in the DLRW model, the error correction term is significant at 1 per cent level but not the error correction term in the DLPROD model. This implies that real wages adjust back towards long-run equilibrium (but not productivity) following a shock. The coefficient of the error correction term in the DLRW model is quite large, indicating a fairly rapid adjustment of real wage to equilibrium.

The significance of the 4\textsuperscript{th} lag of the productivity term in the DLRW model and the positive coefficient imply that productivity Granger causes real wages, supporting the marginal productivity theory as discussed in Section 2. The relatively long lags suggest that changes in productivity are not immediately reflected in real wages. This evidence conforms to the observation by Feldstein (2008), who used a longer data set from 1947 till 2006, that changes in productivity were not immediately reflected in wages or total compensation per hour in US.

Conversely, for the DLPROD model, none of the lagged of real wages and productivity is significant, which implies that real wage has no impact on productivity in the short run.
In sum, the econometric evidence suggests the following dynamic causal system: productivity impacts on real wages positively but real wages have no effect on productivity. The adjustment to equilibrium occurs through wages only but not productivity.

Table 6: Error Correction Models for Real Wage and Productivity

<table>
<thead>
<tr>
<th>Regressor</th>
<th>DLRW</th>
<th>DLPROD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.015</td>
<td>0.031***</td>
</tr>
<tr>
<td></td>
<td>(0.015)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>ECT(-1)</td>
<td>-0.917***</td>
<td>-0.011</td>
</tr>
<tr>
<td></td>
<td>(0.162)</td>
<td>(0.075)</td>
</tr>
<tr>
<td>DLPROD(-4)</td>
<td>0.724***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.352)</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.519</td>
<td>0.0007</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.485</td>
<td>-0.029</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td>2.10</td>
<td>2.273</td>
</tr>
<tr>
<td>F-statistics</td>
<td>15.15 (0.000)</td>
<td>3.552 (0.029)</td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>1.19 (0.551)</td>
<td>2.201 (0.332)</td>
</tr>
<tr>
<td>Q-statistics</td>
<td>14.43 (0.532)</td>
<td>21.32 (0.161)</td>
</tr>
<tr>
<td>LM test: F-statistics</td>
<td>0.851 (0.438)</td>
<td>0.995 (0.381)</td>
</tr>
<tr>
<td>Ramsey’s RESET: F-statistics(p-value)</td>
<td>1.491 (0.244)</td>
<td>0.561 (0.576)</td>
</tr>
<tr>
<td>Quandt-Andrew</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown Breakpoint Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum LR F-statistic</td>
<td>2.658 (0.933)</td>
<td>2.159 (0.981)</td>
</tr>
<tr>
<td>Exp LR F-statistic</td>
<td>0.442 (0.904)</td>
<td>0.447 (0.900)</td>
</tr>
<tr>
<td>Ave LR F-statistic</td>
<td>0.718 (0.911)</td>
<td>0.793 (0.878)</td>
</tr>
<tr>
<td>CUSUM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CUSUM 5% Significance
5. Conclusions and Policy Implications

This study provides new empirical evidence on the productivity-wage-unemployment nexus from the macroeconomic perspective using Malaysia as a case. In light of its current experience of relative high level of productivity coupled with tight labor market and rising wages, this area of empirical investigation is useful especially for the Malaysian government to design appropriate strategies to enhance the country’s productivity and international competitiveness. With the emergence of low-wage countries such as the People’s Republic of China, India and Vietnam, to name a few, in an increasingly global competitive environment, the findings can provide important implications for policy formulation and analysis of human resource development and labor market.

The key findings show that there exists a long-run equilibrium (cointegrating) relationship between real wages and productivity from 1970 to 2005, despite the fact that unemployment appears to be dichotomized from this equilibrium relationship. Although labor productivity is an important long-run factor in determining real wages, the productivity elasticity of real wages is greater than 1 (i.e. real wages are very responsive to a change in labor productivity), signaling the labor productivity gains lag behind the increase in real wages. As pointed out...
by Rahman and Yussof (2003,) the labor market competitiveness has an impact on FDI in Malaysia. In this regard, an increase in unit labor cost, which is caused by high productivity elasticity of real wages, is one of the main factors behind the decrease in FDI inflows into the country. In fact, the entry of low-wage countries is also posing further threat to the country’s comparative advantage in labor-intensive manufacturing, which used to be one of the major recipients of FDI in the region.

Moreover, the plausible explanations for the phenomenon that unemployment has negligible effect on real wages are as follows: (1): there is a lack of wage underbidding when the unemployed are willing to work for lower wages than the incumbent workers as put forward by the insider-outsider theory of the labor market (see Lindbeck and Snower, 1988); (2) the labor market in Malaysia has been enjoying near full employment with unemployment rate as low as 2.5 per cent during study period. Even though the labor market is tight, the sizeable recruitments of cheap foreign workers from neighboring countries tend to cushion the pressure of the tight labor market that it exerts on the real wages. This is why the low level of unemployment does not seem to have significant negative long-run effect on real wages.

To be more resilient to the rising wages and productivity gap (as indicated by the high productivity elasticity of real wages), the skill of the workforce should be enhanced in order to develop a pool of highly-skilled knowledge workers, which is critical to raising the nation’s labor productivity. This productivity enhancement strategy is a way forward to ease the shortage of skilled workers in the long run, which is in line with the human capital development thrust prescribed by the Ninth Malaysia Plan. To support these efforts, it is timely for Malaysian industries to move upstream to produce high value-added skill- and technology-intensive products particularly when their comparative advantage in

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13 This document is the Government’s blueprint for national development for the period 2006-2010.
producing labor-intensive products have been eroded by entry of low-wage countries.
References


