

The Employment –Wage Relationship: Was Keynes right after all?*

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ABSTRACT:

This paper investigates the existence and direction of a relationship between real wages and employment. Using a panel from ten different OECD countries, from 1950 to 2005, it applies panel cointegration and causality methodology. This study finds statistical evidence for a long run relationship between these two variables. However, it firmly rejects the hypothesis that wages cause employment in the short-run. Thus the results support Keynes's view namely, real wages fall because employment increases, presumably via an increase in demand. The results imply that real wage reduction is not sufficient to induce an expansion of output and employment.

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KEY WORDS: Real wages; employment; panel cointegration; panel causality

1. INTRODUCTION

Classical and neoclassical economists, taking their point of departure from microeconomic developments, suggest that wage variations should be the mechanism for maintaining the right level of employment. They view the economy as a self-propelled and self-correcting mechanism and that flexibility of wages ensures a rapid process towards full employment. Say's law effectively rules out the possibility of unemployment. Hence in classical and neo-classical theory, there is a clear causal relationship from real wages to employment or unemployment level with wages to take the lead in the adjustment process towards full employment. By employing panel estimation techniques and international data, this study investigates the wage - employment relationship and evaluates the direction of the causation.

2. CLASSICAL & KEYNESIAN VIEWS ON WAGE-EMPLOYMENT RELATIONSHIP

Classical and neo-classical economic theory has evolved around the idea that competition very quickly adjusts wages so as to eliminate excess demand or supply in the labor market. Pigou argued¹ that “with perfectly free competition . . . there will always be at work a strong tendency for wage-rates to be so related to demand that everybody is employed . . . The implication is that such unemployment as exists at any time is due wholly to the fact that changes in demand conditions are continually taking place and that frictional resistances prevent the appropriate wage adjustments from being made instantaneously”². Thus, any given state of demand, is as

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¹ A discussion of these issues appears in Hansen (1953).

² Pigou (1933), p. 252.

good as any other state³ and a completely flexible wage policy would “abolish fluctuations of employment”⁴ as “...an all-round reduction in the rate of money wages might be expected to increase, and an all-round enhancement to diminish, the volume of employment”⁵. This view prevails almost unchanged in all versions of the Classical Theory. It suggests that there is an unambiguous and close relationship between real wages and employment level and that a decline in real wages should be expected to lead to an increase of the employment level. A corollary of this view is that if unemployment is persistent, this is the result of downward wage inflexibility, which prevents the unobstructed functioning of the self-correcting mechanisms in the labor market. Hence, persistent unemployment is caused by real wages been set “too high”. Therefore, the recommended policy prescription for any reduction of unemployment level is the reduction in wages. This wage reduction makes labor relatively cheaper and this is expected to induce employers to hire more labor.

In contrast, Keynes denied the existence of self-correcting market mechanisms that are capable of clearing the labor market in a competitive economy and asserted competition is not able to adjust the price of labor and thus eliminate excess supplies, or demands in the labor market. In his view there are circumstances in which reduction of money wage rates would not succeed in increasing aggregate demand for goods and services. Keynes argued production and employment would remain unchanged after the cut in wages⁶. Changes in wages have both income and cost effects. A reduction in real wages reduces the cost component in the profit calculations of employers. However, it also reduces income and real demand for workers since the money income of wage earners determines the total demand for consumers' goods. Therefore a reduction in real wages will increase employers' real income but, at the same time will influence workers' expenditures and thus, effective demand for output. If a firm cuts wages, the employer is able to expand output since variable costs are now lower but if money wage rates (under the pressure of competition in the labor market) fall all round, the money-demand function for goods (and therefore the demand function for labor) will also fall.⁷ Further, Kalecki (1939 and 1966) suggested uncertain future demand conditions following a reduction in a real wages should be expected to result in lack of incentives for employers to increase employment.

Given the level of employment, the marginal product, and therefore the real wage, is indeed uniquely determined, *ceteris paribus*. However, demand determines employment and employment determines that marginal product (i.e., the real wage), not the other way round. Under conditions of increasing marginal cost, if money wage rates are stable, employment could be raised, and as a result real wage rates would fall to a level consistent with the increased level of employment. Employment is not raised by a reduction of real wages but the process is the other way round namely, real wage rates fall because employment has been increased via an increase in demand. Thus, employment is not determined by the course of wages but by what happens in the goods market (Vercelli, 1991). Keynes as well as the Keynesians accepted the presence of an inverse relationship between real wages and employment, which was primarily

³ Pigou (1933), p. 252.

⁴ Pigou, (1927), p. 284

⁵ Pigou (1937), p.405. Pigou did discuss several institutional factors which prevented the labour market from functioning according to the classical competitive model (Pigou, 1945, p.48).

⁶ An exposition of Keynes view can be found in Tobin (1984).

⁷ Interestingly, Clower (1970) indicates that if all firms follow suit, the problem of unemployment may still remain.

due to the presence of diminishing returns to labor over the short-run (Minsky, 1975). In addition, certain studies argue that wage-taking firms have to operate under an infinitely elastic labor supply curve resulting in a rejection of the argument that wage adjustments can render an effect on employment adjustments (see Hamermesh and Pfann, 1996, for an extensive review of the literature). In general, there is no accepted consensus about the impact of wages changes on employment. The lack of this consensus is primarily due to the fact that wages are considered not only as a cost factor for firms but also as a substantial component of aggregate income as well as of aggregate demand, although this view is not generally accepted in modern macroeconomics. Certain approaches, however, give emphasis on the demand side repercussions of wage increases (Appelbaum and Schettkat, 1999; Jerger and Michaelis, 2003). According to these approaches, wage changes seem to have a significant impact on employment.

Studies find conflicting evidence for the employment-real wages relationship for different countries. For example, Arestis and Mariscal (1994), Carruth and Schnabel (1993), Smith and Hagan (1993), and Suedekum and Blien (2004) find a significantly negative relationship between wages and employment for the UK, West Germany and Australia, respectively. On the other hand, no consistent relation is found between the variables in Darby and Wren-Lewis (1993) and Bender and Theodossiou (1999), for the UK, in Nymoen (1989) and Nymoen (1994) for Norway and Finland, respectively. Finally, Danthine and Kurmann (2004), propose a Fair Wage model and also provide evidence in favor of a near-zero correlation between employment and wages.

By applying panel cointegration methodology, this study intends to contribute to the empirical knowledge by investigating the direction of the relationship between real wages and employment. Various economists (Blanchard and Katz, 1992; Decressin and Fatas, 1995; Martin and Tyler, 2000) have argued time series analysis, in addition to the low number of available observations problem, is not capable of capturing great wage differences associated with certain individual countries.

3. THE DATA

The data used in this study to explore the employment-real wages relationship for different countries comes from various sources. The time period under examination is from 1950 to 2005 for the following countries: Canada, Denmark, France, Germany, Italy, the Netherlands, Norway, Sweden, the United Kingdom and the United States. Annual data on the following variables were obtained: Wages are proxied by the manufacturing hourly compensation index based on the country's national currency. Data come from the US Department of Labor, Bureau of Labor Statistics (BLS). The index was set in real terms by dividing it by the GDP deflator, which is considered as a more appropriate index than the consumer price index (CPI) since it includes prices of investment goods as well as prices of consumer goods including indirect taxes; therefore, it is able to capture the main developments in domestic price behavior. Moreover, it is able to accommodate the relevant comparisons for the supply decisions of domestic industrial firms between the prices of output and variable cost, i.e. wages.⁸ The data come from the IMF International Financial Statistics. In addition, since the wage variable measures manufacturing

⁸ Kalecki (1966, p.60) points out "... it is generally known that the prices of raw materials fluctuate more strongly than wages and the prices of manufactured goods. But it is also clear that the ratio of wages of the British worker to the prices of Brazilian coffee is rather irrelevant to the conditions of industrial production in Great Britain."

wages, an index of manufacturing employment is used. The data also come from the US Department of Labor, Bureau of Labor Statistics (BLS).

Finally, as the goal of this study is to net out the effects of increased productivity on wages, the manufacturing value added per hour index in the national currency of the country is also used.⁹ The data also come from the US Department of Labor, Bureau of Labor Statistics (BLS). Once the variable is in nominal terms, it was deflated in the same way as the wage measure. Once again, for the deflation process the GDP deflator was used because the CPI does not contain the change in prices of imported goods, which are not part of the output used in measuring value added. By contrast, the GDP deflator measures price changes of domestically produced goods. Throughout the paper, small letters indicate variables in logs (Mehra, 1991; Darrat, 1994), i.e. real wages (*rw*), manufacturing employment (*memp*), and manufacturing value added per hour (*rvam*).¹⁰

4. EMPIRICAL ANALYSIS

4.1 *Dynamic Heterogeneity*

An issue that is of concern is the heterogeneity of the countries included in this dataset. In particular, the effects on the wage – employment relationship of different macroeconomic policies implemented across countries through time, as well as the effects of the institutional frameworks of each country such as the relative generosity in the unemployment compensation and in welfare or unemployment insurance programs, the trade union bargaining power, the employment frameworks and employment contracts and the evolution and variation of all the above through time for each of the countries under consideration. Because of this, the coefficients in the estimated relationships will be biased due to a heterogeneity bias. In the statistical framework of this study, these issues can be resolved by first testing for heterogeneity and then by controlling for it through appropriate techniques.

The dynamic heterogeneity, i.e. variation of the intercept over countries and time, across a cross-section of the relevant variables can be assessed in a number of ways. In the first step, an Augmented Dickey-Fuller (ADF) equation for each relationship in the panel is estimated; then the hypothesis of whether regression parameters are equal across these equations is tested. Next, a similar test of parameter equality is performed by estimating an *n*-order autoregressive model for each relationship under study. Standard Chow-type F tests under the null of parameter equality across all relationships are performed. If the results reject the null, this indicates heterogeneity in cross-sectional parameters. Finally, homogeneity error variance across groups is examined as another measure of dynamic heterogeneity. White's tests for group-wise heteroscedasticity are employed to serve this objective. Results are reported in Table 1 for the relationships between wages and employment as well as between wages, employment and value added, given the fact that there may be productivity factors affecting wages, value added should be controlled for in the wages-employment relationship. The results indicate the relationships under investigation are characterized by heterogeneity of dynamics and error variance across groups.

⁹ As in Bender and Theodosiou (1999) and see also, Kalecki (1966) for a theoretical discussion.

¹⁰ RATS, Version 4.2 software was used in the empirical analysis.

Table 1. Tests of Dynamic Heterogeneity Across Groups

	ADF(3)	AR(4)	WHITE'S TEST
Wages-Employment	18.73*	14.39*	39.37*
Wages-Employment-Value Added	16.61*	13.44*	35.63*

* Significant at 1%.

Notes: The ADF(3) column reports the parameter equality test (F test) across all relationships in the panel. The AR(3) column reports the F test of parameter equality conducted in a fourth-order autoregressive model of the relationships under study. Finally, the White's test reports White's test of equality of variances across the investigated relationships in the panel. The White's test was computed by regressing the squared residual of the ADF(3) regression on the original regressor(s) and its (their) square(s). The test statistic is $(NT) \times R^2$, which is χ^2 distributed with the number of regressors in the second regression as the degrees of freedom.

4.2 Panel Integration Analysis

Table 2. Panel Unit Root Tests

Variables	Without Trend	With Trend
rw	-1.21(4)	-1.37(5)
Δ rw	-4.52(3)*	-5.19(4)*
memp	-1.22(3)	-1.41(4)
Δ memp	-5.11(3)*	-5.48(3)*
rvam	-1.19(4)	-1.36(5)
Δ rvam	-4.11(3)*	-4.59(3)*

* Significant at 1%.

Notes: Figures in brackets denote the number of lags in the augmented term that ensures white-noise residuals. As in Darrat (1994), the optimal lag length was determined through the Akaike information Criterion (AIC) and the Schwarz-Bayes Information Criterion (SBIC).

The null hypothesis of non-stationarity versus the alternative that the variable is stationary is tested using the group mean panel unit root test (or “t-bar” test) of Im, *et al.* (1995, 1997). This test is based on the ADF statistic for each country (Dickey and Fuller, 1981) and allows each member of the cross section to have a different autoregressive root and different autocorrelation structures under the alternative hypothesis. The results are reported without and with a trend and are presented in Table 2. The hypothesis that variables rw, memp, and rvam (in levels) contain a unit root cannot be rejected at the 1% significant level. When first differences are used, unit root non-stationarity is rejected at the 1% significant level, suggesting that the variables under study

are I(1) variables. These results open the possibility of cointegration among certain variables commensurate on the testable hypothesis.

4.3 Panel Cointegration Analysis

Once the order of stationarity has been established, we can move to a panel cointegration approach, developed by Pedroni (1999). The panel cointegration technique makes use of a residual-based ADF test. The specific cointegrating relationships estimated are:

Panel 1. Wages and employment relationship

$$rw_{it} = \beta_{1i} mem_{it} + \varepsilon_{1it} \quad (1)$$

Panel 2. Wages, employment and value added relationship

$$rw_{it} = \beta_{2i} mem_{it} + \beta_{3i} rvam_{it} + \varepsilon_{2it} \quad (2)$$

where i runs from 1 to N countries and t runs from 1 to T observations. The terms ε_{1it} and ε_{2it} estimate the deviation from the modelled long-run relationship. If the series are cointegrated, this term will be a stationary variable. In other words, stationarity can be achieved by establishing whether ρ_{is} in:

$$\varepsilon_{1it} = \rho_i \varepsilon_{1i(t-1)} + \xi_{1it} \quad (3)$$

and

$$\varepsilon_{2it} = \rho_i \varepsilon_{2i(t-1)} + \xi_{2it} \quad (4)$$

are unity. The null hypothesis, associated with Pedroni's test procedure is that $\rho_{is} = 1$. In other words, the null hypothesis associated with Pedroni's test procedure is equivalent to testing the null of non-stationarity (no cointegration) for all i . Pedroni (1997, 1999) developed four panel cointegration statistics and three group mean panel cointegration statistics. The Pedroni cointegration results are reported in Table 3. The results reject the null hypothesis of no cointegration, confirming that in both testable relationships the panel is stationary. In other words, the results indicate that commensurate on the hypothesis tested the variables share a long-run cointegrating relationship. Conclusively, these findings provide considerable support to a strong long-run relationship between wages and employment¹¹.

¹¹ This finding contradicts Bender and Theodossiou (1999). It should be borne in mind that the panel methodology used in this paper is more sensitive in identifying cointegrating vectors. This is fortunate since it offers the opportunity to examine the issue of causation.

Table 3. Panel Cointegration Tests

Panel 1. Wages - employment relationship	
Panel v-stat	3.10756*
Panel rho-stat	-3.24212*
Panel pp-stat	-2.82747*
Panel adf-stat	-2.37493*
Group rho-stat	-3.08129*
Group pp-stat	-3.34468*
Group adf-stat	-2.21111*
Panel 2. Wages - employment - value added relationship	
Panel v-stat	2.90022*
Panel rho-stat	-2.36925*
Panel pp-stat	-2.48437*
Panel adf-stat	-3.64246*
Group rho-stat	-3.37872*
Group pp-stat	-3.53898*
Group adf-stat	-3.91826*

Notes: * Rejection of the null hypothesis of no cointegration at 1%.

4.4 Panel Causality

As cointegration is confirmed, we proceed to estimate causality using the Pooled Mean Group (PMG) estimator of Pesaran, Shin and Smith (1999) to account for the panel data causal relationships. This estimator is suitable when variables are cointegrated. This provides justification for examining the direction of the causal links among the variables under consideration through an error correction VAR (ECVAR) model. The model includes the leads of the regressor.

Panel 1. Wages and employment

Considering that the cointegrating equation is:

$$rw_{it} = \theta_{0i} + \theta_{1i} memp_{it} + u_{it} \quad (5)$$

and the associated augmented-by-leads autoregressive distributed lag (ARDL) equations are described by a (1,1,1) model:

$$rw_{it} = \mu_i + \delta_{10i} memp_{it} + \delta_{11i} memp_{i,t-1} + \delta_{12i} rw_{i,t-1} + v_{1it} \quad (6)$$

and

$$\text{memp}_{it} = \mu_i + \delta_{20i} \text{rw}_{it} + \delta_{21i} \text{rw}_{i,t-1} + \delta_{22i} \text{memp}_{i,t-1} + v_{2it} \quad (7)$$

the error correction equations yield:

$$\Delta \text{rw}_{it} = \varphi_1 (\text{rw}_{i,t} - \theta_{0i} - \theta_{1i} \text{memp}_{it}) - \delta_{30i} \Delta \text{memp}_{it} + \eta_{1it} \quad (8)$$

and

$$\Delta \text{memp}_{it} = \varphi_2 (\text{memp}_{i,t} - \theta_{0i} - \theta_{1i} \text{rw}_{it}) - \delta_{40i} \Delta \text{rw}_{it} + \eta_{2it} \quad (9)$$

memp → rw φ_1 coefficient = - 0.047, asymptotic t-statistic: -3.59[p-value=0.00]
LM = 1.237[p-value=0.17] RESET = 0.783[p-value=0.25] HE = 0.826[p-value=0.21]

rw → memp φ_2 coefficient = - 0.012, asymptotic t-statistic: -0.67[p-value=0.54]
LM = 1.058[p-value=0.15] RESET = 0.639[p-value=0.28] HE = 0.592[p-value=0.33]

where LM is a serial correlation test, RESET is a misspecification test, and HE is a heteroskedasticity test. The diagnostic figures indicate a satisfactory estimated model.

The error-correction coefficients (φ s) are negative and statistically significant, indicating that real wages do not cause employment while employment does cause real wages, i.e. there are no feedback effects between real wages and employment.

Panel 2. Wages, employment, and real value-added

Having established that real wages are cointegrated with employment, and real value-added, it is also appropriate to examine the associated multivariate causality relationship (only the real wages and employment equations are reported, while the remaining equations are available upon request). Considering that the cointegrating equation is:

$$\text{rw}_{it} = \theta_{0i} + \theta_{1i} \text{memp}_{it} + \theta_{2i} \text{rvam}_{it} + u_{it} \quad (10)$$

and the associated ARDL equations are also described by a (1,1,1) model:

$$\text{rw}_{it} = \mu_i + \delta_{10i} \text{memp}_{it} + \delta_{11i} \text{memp}_{i,t-1} + \delta_{12i} \text{rvam}_{it} + \delta_{13i} \text{rvam}_{i,t-1} + \delta_{14i} \text{rw}_{i,t-1} + \varepsilon_{1it} \quad (11)$$

and

$$\text{memp}_{it} = \mu_i + \delta_{20i} \text{rw}_{it} + \delta_{21i} \text{rw}_{i,t-1} + \delta_{22i} \text{rvam}_{it} + \delta_{23i} \text{rvam}_{i,t-1} + \delta_{24i} \text{memp}_{i,t-1} + \varepsilon_{2it} \quad (12)$$

the error correction equations yield:

$$\Delta rw_{it} = \varphi (rw_{i,t} - \theta_{0i} - \theta_{1i} \text{memp}_{it} - \theta_{2i} \text{rvam}_{it}) - \delta_{30i} \Delta \text{memp}_{it} - \delta_{40i} \Delta \text{rvam}_{it} + \varepsilon_{3it} \quad (13)$$

and

$$\Delta \text{memp}_{it} = \varphi (\text{memp}_{i,t} - \theta_{0i} - \theta_{1i} rw_{it} - \theta_{2i} \text{rvam}_{it}) - \delta_{50i} \Delta rw_{it} - \delta_{60i} \Delta \text{rvam}_{it} + \varepsilon_{4it} \quad (14)$$

memp→rw φ coefficient = - 0.039, asymptotic t-statistic: -7.11[p-value=0.00]
 LM = 1.487[p-value=0.14] RESET = 1.096[p-value=0.19] HE = 0.448[p-value=0.32]

rw→memp φ coefficient = - 0.015, asymptotic t-statistic: -1.21[p-value=0.36]
 LM = 0.577[p-value=0.26] RESET = 0.469[p-value=0.33] HE = 0.651[p-value=0.23]

The error-correction coefficients (φ s) are again negative but not both statistically significant, indicating that only employment causes real wages, while the vice versa is not true.

5. CONCLUSIONS

This paper investigates the existence and direction of a relationship between real wages and employment. Using a panel from ten different OECD countries, from 1950 to 2005, it applies panel cointegration methodologies. In contrast to earlier studies, this paper finds statistical evidence for a relationship between these real wages and employment variables. However, it firmly rejects the hypothesis that wages cause employment. Thus, employment is not raised by cutting real wages. Rather, it is the other way round: real wage rates fall because employment has been increased via an increase in demand. The results seem to be consistent with the view that demand-side interventions are far more appropriate for fighting unemployment (Phelps, 1994). Moreover, the results are quite similar to those reached by Topel (1986), Belzil (2000) and Buchinsky *et al.* (2003) in which wages respond to labor demand and consequently to aggregate demand shocks. By contrast, the empirical findings are in contrast with those reached by Russell and Tease (1988). Real wage rates are not determined by the wage bargain; only the money wage is so determined. On the evidence presented in this study it appears that Keynes was right after all.

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