

**Employment and Productivity Link:  
A Study on OIC Member Countries**

Selamah Abdullah Yusof\*

The relationship between employment and productivity is examined to determine if a tradeoff exists between the two variables. The study focuses on OIC member countries and applies time-series econometric techniques to analyze both the long-run and dynamic relationships. The results suggest that high levels of employment (or its growth) are linked with lower levels of productivity (or its growth) for 5 out of the 22 countries studied. Yemen is the only country that exhibits a positive relationship between employment and productivity. However, for this case, both these variable are endogenous which implies that other factors are driving the two variables. For other countries, a long-term employment-productivity relationship is not supported. The findings of the study can be useful in providing some observations to policy makers to improve the standard of living and achieving sustainable growth for their nations.

**INTRODUCTION**

The objective of any nation is to improve the standards of living and attain long-term sustainable growth. Both developed and developing countries focus on promoting higher productivity and creating employment opportunities to attain this objective (International Labour Organisation (ILO), 2005). However, a real concern is that increases in productivity may lead to destruction of jobs. Is there evidence of a long-term tradeoff between productivity and employment?

Theoretically, changes in productivity may affect employment in two opposite directions. Although the impact of an increase in productivity is to reduce the demand for labor as workers are more efficient, it also

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\* PhD. Associate Professor, International Islamic University, Malaysia.

leads to greater employment through an increase in production due to high productivity. The net impact of productivity on employment depends on the relative magnitude of the two opposing effects, which to some extent, hinges on the elasticity of demand.

The empirical evidence on the productivity-employment relationship produce mixed results. Beaudry and Collard (2002) use ordinary least squares and weighted least squares methods to show that the tradeoff between labor productivity growth and employment growth appears to have increased since 1960 for major industrial countries. Buchele and Christiansen (1999) explain that the inverse relationship between the two variables is due to the structure of labor market institutions. They argue that a more highly regulated institution as in Europe promotes productivity growth but inhibit employment growth, while a less regulated U.S. style labor markets may promote employment growth but have adverse effect on productivity.

Nordhaus (2005), on the other hand, also using least squares method finds a positive relationship between productivity growth and employment growth for the U.S. He attributes the positive relationship to the increase in demand elasticity since the U.S. is more open to international trade. His results are consistent with those of Cavelaars (2005) who finds that the tradeoff between productivity growth and employment growth has disappeared for the 25 OECD countries under study. Yet these findings differ from Appelbaum and Schettkat's (1995) in that although the correlation between employment and productivity growth for the industrialized economies is positive for earlier periods, Appelbaum and Schettkat find that the correlation has now becomes negative. They, in fact, maintain that the inverse relationship is due to the decline in demand price elasticity.

There have been other studies that focus on developing countries such as in ILO (2005) and Pieper (2004). ILO reports an inverse relationship between employment and productivity for countries in Sub-Saharan Africa, Latin America, Middle-East and North Africa is due to high population growths and growing informal economic activity. In contrast, economies in Asia and Pacific Rim experience a positive employment-productivity relationship. Pieper (2004) also observes high productivity growth rates and rapid employment expansion in South and East Asian

nations, and low productivity and employment growth for Sub-Saharan Africa.

The studies that have been discussed apply traditional statistical and econometric techniques to time-series data. These methods produce results which may be questionable if the underlying time series is not stationary. There are studies which take this into account and apply time-series econometric techniques such as stationarity, vector autoregressive (VAR) and cointegration in their analysis. For instance, Bender and Theodossiou (1995) focus on the U.S., Canada and EU countries and find cointegrating relationship between employment and productivity for the U.S., Canada and Italy. A different result is obtained by Christopoulos (2005) in which he applies a more recent technique in determining the link between productivity and employment. Using panel unit root and panel cointegration tests on 12 European Union countries, he finds that the data does not support a long-run relationship between the two variables. Hansen and Warne (2001) as well reject the hypothesis of cointegration between labor productivity and employment for Denmark. An analysis on South Africa for the period 1983-2002 by Wakeford (2004) also gives similar results in that unemployment is not connected to productivity.

These studies on the employment-productivity relationship which utilize time-series econometrics techniques are largely confined to the North American and European economies, with the exception of Wakeford (2004) which focuses on South Africa. This paper, instead, examines the relationship between productivity and employment, and their growth rates, for developing nations with special focus on OIC member countries. The analysis applies time series econometric techniques to ensure that results obtained are robust, and spurious relationships are not considered. The findings can be useful in providing some observations to policy makers of the OIC countries in their implementation and evaluation of labor policies in improving the standard of living and achieving sustainable growth.

## **METHOD AND DATA**

To establish the long-run behavior of employment and productivity, or their growth rates, we begin with the unit root tests for each series. The

order of integration of the variables are determined using the Dickey and Fuller (1979) ADF, Phillips-Perron (1988) PP and Kwiatkowski et al. (1992) KPSS tests. In addition, the autocorrelation functions are plotted for both levels and first-difference for a visual inspection and confirmation of the order of integration.

Next, we test for cointegration relation between two variables using the Johansen and Juselius method (Johansen, 1988; Johansen and Juselius, 1990; 1992) based on the trace statistic and maximum eigenvalue criteria if the order of integration of both variables are  $I(1)$ . To determine the lag length of the vector autoregressive model (VAR), we based it on the Akaike Information Criterion (AIC), Schwarz information Criterion (SC), sequential modified LR test statistic (LR), final prediction error (FPE) and Hanan-Quinn information criterion (HQ). The residuals of the model with the chosen lag are also inspected through the autocorrelation functions to ensure that they do not exhibit serial correlation. If the two variables are  $I(0)$ , then it is sufficient to apply ordinary least squares method to estimate the relationship between the two variables.

The dynamic relationships between the variables can be analyzed through the vector error correction model (VECM) once the existence of cointegration is established. The VECM allows us to determine the feedback effect and exogeneity of the variables. Diagnostic test is applied to the VECM to ensure that it is at least free from serial correlation.

This study does not utilize panel unit root and panel cointegration techniques since the focus is not on member countries as a whole. Rather, the objective is to examine the link between employment and productivity for individual country, and to determine if there are similarities or differences among countries. Furthermore, technically, although these techniques yield tests which are more powerful than the standard time-series techniques, they also suffer from potentially severe drawbacks (Stauss and Wohar, 2004). Among others are the difficulty in interpreting the null hypothesis, the lack of formal stability tests and the possibility of incorrect standard errors occurring when mixing stationary and nonstationary data.

The annual data from 1960 to 2004 for 22 OIC member countries – Algeria, Bahrain, Bangladesh, Cote d'Ivoire, Egypt, Indonesia, Iran, Iraq, Jordan, Kuwait, Malaysia, Morocco, Nigeria, Oman, Pakistan, Qatar, Saudi Arabia, Sudan, Syria, Turkey, United Arab Emirates (UAE) and Yemen – are obtained from *The Conference Board and Groningen Growth and Development Centre*.<sup>1</sup> Total civilian employment represents the employment variable, while productivity is measured by GDP per person employed in 1990 U.S. dollars. The logarithms of employment and productivity are used in the analysis. The growth rates are computed as the difference between current value and the value of the previous year, divided by the previous year value.

## EMPIRICAL RESULTS

Figures 1 and 2 (in Appendix) are given to provide some general observations of changes in productivity and employment for the 22 OIC member countries. In the pre-1990 period, Bahrain, Kuwait, Qatar and UAE recorded the highest average employment growths relative to other countries, but had negative average annual changes in productivity. Oman, on the other hand, registered the highest average productivity growth at about 8.45 percent. Bahrain, Kuwait and Qatar show improvements in productivity for the period 1990-2004 in which all recorded positive growth. Qatar and Kuwait, in fact, have the highest productivity growths among all member countries studied. UAE's productivity growth remains below zero, and it still maintains the highest employment growth. Iraq, Cote d'Ivoire, Algeria and Jordan also record negative average change in productivity for this period.

Given these observations, we proceed with the unit root tests. The results of the ADF, P-P and KPSS tests on the levels and first-differences of employment and productivity, and their growth rates for the 22 OIC member countries are given in Table 1 (in Appendix). The order of integration is based on the results of the three tests. If the results of the 3 tests differ, then autocorrelation functions are used to determine the order by observing whether the plots show a gradual decline or

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<sup>1</sup> *Total Economy Database, January 2006*, <http://www.ggdc.net>. The data for other member countries are either inadequate (for Central Asia countries) or not available (for others).

return to zero quickly. Based on the combined results from all the tests and autocorrelation functions, the suggested orders of integration for the variables are given in the last column of Table 1. Employment and productivity are both I(1) processes for Algeria, Indonesia, Kuwait, Malaysia, Morocco, Pakistan and Turkey. For other countries, the two variables are of different order, or are integrated of order 2 such as for Iran and Saudi Arabia. The results of the unit root test for productivity and employment growth are similar to those of employment and productivity. Countries for which employment and productivity are I(1) series have their growth variables as I(0), while for other countries, the order of integration of the growth variables is one less than the order of the levels variables.

The analysis proceeds as follows. For member countries for which employment and productivity, and employment and productivity growth are integrated of the same order, we determine if each pair of the variables are cointegrated. For other countries, except Yemen, we examine the relationship between productivity and employment growth since they are of the same order. For Yemen, we study the productivity growth-employment relationship, instead, since they are both I(1) processes.

### 1. *Employment–Productivity Relationship*

Cointegration tests suggest a long-run relationship between employment and productivity for Algeria, but not for others.<sup>2</sup> We estimate the relationship for Algeria using a lag length of 1 for the VAR, based on the overall results obtained from AIC, SC, LR, FPE and HQ criteria. In addition, we examine the autocorrelation functions and Box-Pierce/Ljung-Box Q-statistics of the residuals with the optimal lag and they indicate the absence of serial correlation.

The long-term equilibrium equation is estimated to be  
 $\log(\textit{employment}) = 15.859 - 0.796\log(\textit{productivity})$ .

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<sup>2</sup> Cointegration tests are conducted for Algeria, Indonesia, Iran, Kuwait, Malaysia, Morocco, Pakistan, Saudi Arabia and Turkey. For other countries, employment and productivity are of different order of integration.

The coefficient of  $\log(\text{productivity})$  is significant ( $t$ -value of -2.285) which suggest a long-term tradeoff between productivity and employment for Algeria.

We proceed with the examination of the dynamic relationship between productivity and employment. The VECM is estimated and the results are shown in Table 2. The results suggest that employment is the variable that adjusts to maintain the cointegrating relationship in the model.

## 2. *Employment Growth–Productivity Growth Relationship*

The least squares regression estimates as given in Table 3 (in Appendix) indicate the presence of an inverse relationship between employment and productivity growth for Indonesia, Pakistan and Turkey, but not for Algeria, Kuwait, Malaysia and Morocco.<sup>3</sup> However, note that diagnostic tests reveal a problem of non-normality for some of the regressions which make the conclusions somewhat suspect since tests of significance become unreliable.

For Iran and Saudi Arabia, cointegration tests show that employment growth-productivity growth relationship exists only for Iran. Using the AIC, SC, LR, FPE and HQ criteria, the lag length of the VAR is equal to 2. In addition, the autocorrelation functions and Box-Pierce/Ljung-Box Q-statistics of the residuals with the optimal lag indicate the absence of serial correlation.

The estimated long-run equation is as follows:

$$\text{Employmentgrowth} = 0.032 - 0.137(\text{productivitygrowth}).$$

The significance of the estimated coefficient of  $\text{productivitygrowth}$  implies an inverse relationship between productivity and employment growth for Iran.<sup>4</sup> With regards to the short-run analysis, the findings

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<sup>3</sup> The OLS regressions for Algeria and Morocco indicate the presence of serial correlation. The regressions are re-estimated, correcting for serial correlation by assuming it is an AR(1) process. The corrected regression estimates for these two countries are given in Table 3. The regressions for other countries exhibit no serial correlation.

<sup>4</sup> The  $t$ -value is equal to -3.954.

indicate that employment growth exhibits strong exogeneity while productivity growth is the endogenous variable.<sup>5</sup>

### 3. *Employment Growth – Productivity Relationship*

We apply the Johansen-Juselius test of cointegration on employment growth and productivity for member countries of which the two series are integrated of the same order. The findings suggest that there is no link between employment growth and productivity for these countries – Bahrain, Bangladesh, Cote d’Ivoire, Egypt, Iraq, Jordan, Nigeria, Oman, Qatar, Sudan, Syria and United Arab Emirates.

### 4. *Employment – Productivity Growth Relationship*

Since the series for employment and productivity growth are both integrated of order 1 for Yemen, a test of cointegration is performed to determine the existence of relationship between the two variables. Both the trace and maximum eigenvalue tests suggest one cointegrating relation at the 5 percent level for VAR with lag length equals to one.

The long-run equilibrium equation is as follows:

$$\log(\text{employment}) = 6.958 + 36.095(\text{productivitygrowth}).$$

The error correction models for the two variables indicate that both employment and productivity growth are endogenous in that both variables adjust to maintain the cointegrating relationship.<sup>6</sup>

## **DISCUSSION AND CONCLUSION**

This paper examines the relationship between employment and productivity by applying time-series econometric techniques to 22 OIC member countries annual data from 1960 to 2004. The results suggest the existence of a long run relationship between productivity and

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<sup>5</sup> In the vector error correction model, both the error correction term and independent variable in the *employmentgrowth* equation are not significant, while the error correction term is significant with a *t*-value of -3.510 in the *productivitygrowth* equation.

<sup>6</sup> The coefficients of the error correction term are 0.005 and 0.009 with *t*-values 4.523 and 2.878 for *d(logemployment)* and *d(productivitygrowth)* equations, respectively.



employment (or their growth variables) for 6 of the 22 countries, namely, Algeria, Indonesia, Iran, Pakistan, Turkey and Yemen. For the rest of the 16 countries, no such relationship exists. With the exception of Yemen, the analysis suggests that there is a tradeoff between employment and productivity – a higher level of productivity (or productivity growth) can be achieved with a lower level of employment (or employment growth) for the 5 countries. Yemen, in contrast, exhibits a positive relationship between employment and productivity growth. However, both these variables are endogenously determined, which implies that other factors are driving the two variables. Yemen is one of the poorest countries in the Arab world with high unemployment rate. The structural adjustment program designed to modernize and streamline the economy may have an effect on both employment and productivity growth.

The results of this study are comparable with the findings of previous studies in that productivity–employment relationship exists for some countries, and not for others. For all countries, and especially for those that experience tradeoff between employment and productivity, labor market institutions must play a role and structural changes must be made to spur demand, both domestic as well as international, so that output growth increases and jobs will be created to meet the growing demand.

A related issue is poverty, as it is most relevant to OIC member countries. It has been mentioned that productivity growth is essential for poverty reduction (ILO, 2005). The challenge for member countries is to promote higher productivity growth for long-run sustainable growth while at the same time providing short- and medium-term solutions for providing labor with decent employment opportunities.

Productivity growth can be realized through investment in physical capital, research and development, as well as human capital (Corley, Michie and Oughton, 2002). Perhaps for the least developed nations, the focus should be on physical investment since it is the dominant determinant of productivity in both high tech and low tech industries. Member countries of which high tech industries are more developed can concentrate on R&D and human capital since these investments seem to have more significant effects in the high-tech industries.

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Appendix

Figure 1: Average Annual Productivity and Employment Change 1961–1989

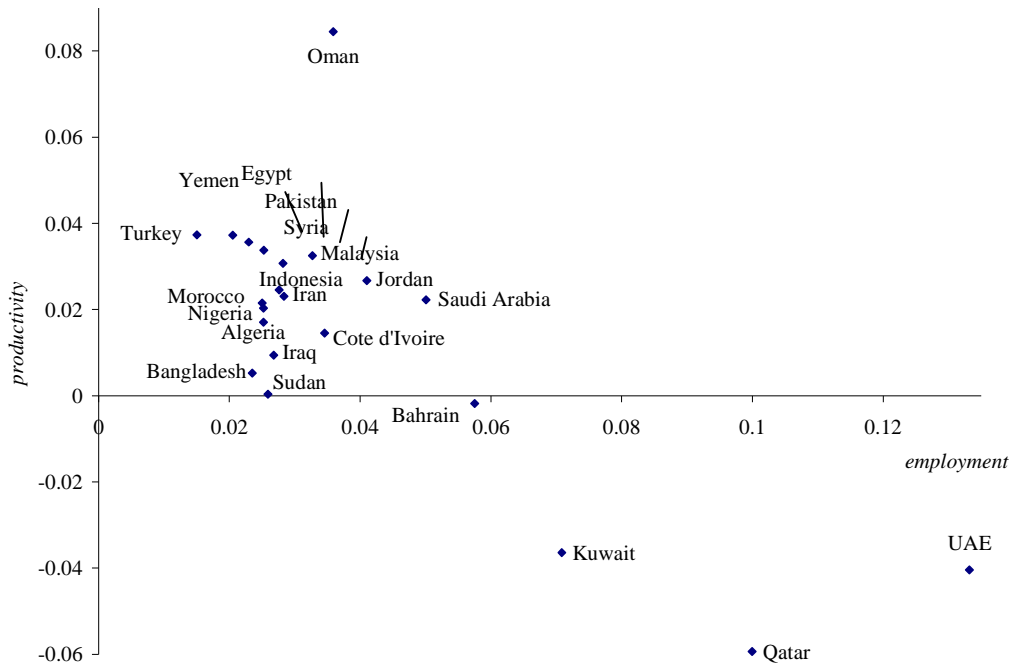
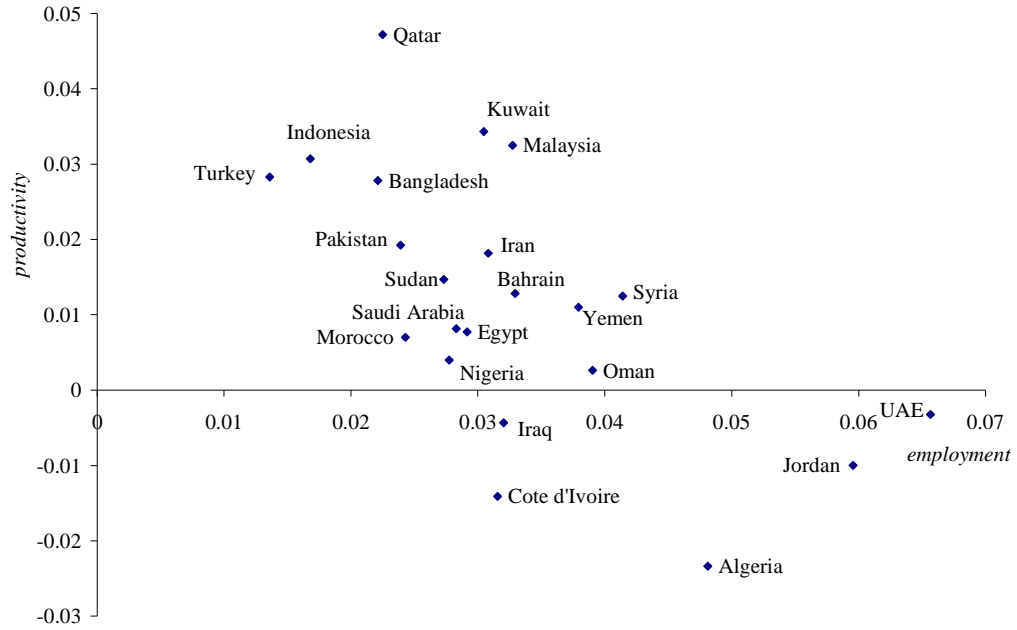


Figure 2: Figure 1: Average Annual Productivity and Employment Change 1990–2000



**Table 1: Tests for Unit Roots – Augmented Dickey-Fuller Phillips-Perron and Kwiatkowski et al.**

		ADF-level	ADF-1 <sup>st</sup> diff	PP-level	PP-1 <sup>st</sup> diff	KPSS-level	KPSS-1 <sup>st</sup> diff	Order of Integration
Algeria	Logemp	-1.478 [0.822]	-1.711 [0.729]	-1.479 [0.822]	-1.711 [0.729]	0.212**	0.106	I(1)
	Logprod	-0.717 [0.965]	-7.130 [0.000]	-0.602 [0.974]	-7.362 [0.000]	0.211*	0.1123	I(1)
	Empgrowth	-1.690 [0.739]	-1.120 [0.913]	-1.690 [0.739]	-1.120 [0.913]	0.104		I(0)
	Prodgrowth	-7.397 [0.000]		-7.650 [0.000]		0.096		I(0)
Bahrain	Logemp	-1.500 [0.814]	-2.192 [0.482]	-0.965 [0.939]	-2.180 [0.488]	0.390**	0.353**	I(2)
	Logprod	-1.802 [0.687]	-5.660 [0.000]	-1.954 [0.610]	-5.654 [0.000]	0.112		I(1)
	Empgrowth	-1.649 [0.756]	-5.412 [0.000]	-1.764 [0.705]	-5.424 [0.000]	0.150*	0.075	I(1)
	Prodgrowth	-5.538 [0.000]		-5.531 [0.000]		0.209*		I(0)
Bangladesh	Logemp	-3.044 [0.133]	-1.413 [0.843]	-2.397 [0.376]	-1.468 [0.825]	0.117**	0.460**	I(2)
	Logprod	-0.697 [0.967]	-3.554 [0.049]	-0.511 [0.979]	-7.368 [0.000]	0.204*	0.110	I(1)
	Empgrowth	-1.421 [0.841]	-6.254 [0.000]	-1.474 [0.823]	-6.254 [0.000]	0.188*	0.068	I(1)
	Prodgrowth	-3.546 [0.050]		-7.826 [0.000]		0.128		I(0)
Cote d'Ivoire	Logemp	-0.987 [0.935]	-1.166 [0.905]	0.834 [1.000]	-1.287 [0.878]	0.175*	0.125	I(2)
	Logprod	-2.249 [0.451]	-5.734 [0.000]	-2.274 [0.439]	-5.729 [0.000]	0.199*	0.116	I(1)
	Empgrowth	-1.193 [0.900]	-5.917 [0.000]	-1.340 [0.864]	-5.917 [0.000]	0.135		I(1)
	Prodgrowth	-5.813 [0.000]		-5.809 [0.000]		0.118		I(0)
Egypt	Logemp	-0.244 [0.990]	-2.021 [0.574]	0.975 [1.000]	-2.176 [0.491]	0.216*	0.114	I(2)
	Logprod	-1.549 [0.797]	-3.211 [0.096]	-1.088 [0.920]	-3.262 [0.087]	0.155*	0.095	I(1)
	Empgrowth	-2.014 [0.578]	-5.866 [0.000]	-2.168 [0.495]	-5.858 [0.000]	0.114		I(1)
	Prodgrowth	-3.186 [0.101]	-6.982 [0.000]	-3.238 [0.091]	-9.421 [0.000]	0.097		I(1)
Indonesia	Logemp	-1.902 [0.637]	-8.269 [0.000]	-1.732 [0.720]	-8.505 [0.000]	0.122		I(1)
	Logprod	-2.157 [0.501]	-5.148 [0.001]	-2.446 [0.352]	-5.127 [0.001]	0.062		I(1)
	Empgrowth	-8.211 [0.000]		-8.436 [0.000]		0.142		I(0)
	Prodgrowth	-5.082		-5.061		0.084		I(0)

		[0.000]		[0.000]				
Iran	Logemp	-2.698 [0.243]	-2.508 [0.323]	-2.021 [0.574]	-5.352 [0.000]	0.131		I(2)
	Logprod	-2.446 [0.352]	-3.327 [0.076]	-2.033 [0.568]	-3.3.0 [0.066]	0.154*	0.127	I(2)
	Empgrowth	-2.524 [0.316]	-13.190 [0.000]	-5.378 [0.000]		0.096		I(1)
	Prodgrowth	-3.402 [0.064]	-7.088 [0.000]	-3.449 [0.058]	-9.010 [0.000]	0.123		I(1)
Iraq	Logemp	-1.942 [0.615]	-2.714 [0.237]	-1.688 [0.740]	-2.714 [0.237]	0.204*	0.065	I(2)
	Logprod	-1.752 [0.711]	-7.067 [0.000]	-1.814 [0.681]	-7.136 [0.000]	0.177*		I(1)
	Empgrowth	-2.678 [0.250]	-6.711 [0.000]	-2.678 [0.250]	-6.772 [0.000]	0.065		I(1)
	Prodgrowth	-6.823 [0.000]		-7.048 [0.000]		0.138		I(0)
Jordan	Logemp	-1.709 [0.730]	-3.117 [0.115]	-1.374 [0.855]	-3.062 [0.128]	0.160*	0.106	I(2)
	Logprod	-2.290 [0.430]	-2.181 [0.487]	-1.491 [0.818]	-5.684 [0.000]	0.156*	0.076	I(1)
	Empgrowth	-3.198 [0.098]	-8.853 [0.000]	-3.144 [0.109]	-9.302 [0.000]	0.105		I(1)
	Prodgrowth	-2.175 [0.491]	-15.502 [0.000]	-5.705 [0.000]		0.076		I(0)
Kuwait	Logemp	-1.743 [0.715]	-6.313 [0.000]	-1.743 [0.715]	-6.313 [0.000]	0.191*	0.069	I(1)
	Logprod	-20.88 [0.538]	-4.697 [0.003]	-1.448 [0.832]	-4.512 [0.004]	0.113		I(1)
	Empgrowth	-6.235 [0.000]		-6.235 [0.000]		0.071		I(0)
	Prodgrowth	-4.854 [0.001]		-4.692 [0.003]		0.077		I(0)
Malaysia	Logemp	-2.432 [0.359]	-6.254 [0.000]	-2.437 [0.356]	-7.310 [0.000]	0.103		I(1)
	Logprod	-2.156 [0.501]	-5.925 [0.000]	-2.313 [0.419]	-5.933 [0.000]	0.056		I(1)
	Empgrowth	-6.234 [0.000]		-7.321 [0.000]		0.084		I(0)
	Prodgrowth	-5.887 [0.000]		-5.895 [0.000]		0.061		I(0)
Morocco	Logemp	-2.456 [0.348]	-20.810 [0.000]	-2.390 [0.379]	-2.368 [0.390]	0.102		I(1)
	Logprod	-1.231 [0.891]	-12.095 [0.000]	-1.831 [0.673]	-12.095 [0.000]	0.211*	0.065	I(1)
	Empgrowth	-20.854 [0.000]		-2.351 [0.399]	-6.870 [0.000]	0.146		I(0)
	Prodgrowth	-12.177 [0.000]		-12.398 [0.000]		0.063		I(0)
Nigeria	Logemp	-2.612 [0.277]	-1.780 [0.697]	-3.048 [0.131]	-2.063 [0.551]	0.201*	0.128	I(2)
	Logprod	-2.527	-3.178	-1.771	-4.043	0.147*	0.074	I(1)

		[0.315]	[0.103]	[0.702]	[0.014]			
	Empgrowth	-1.755 [0.709]	-5.182 [0.000]	-2.056 [0.555]	-5.182 [0.001]	0.128		I(1)
	Prodgrowth	-3.167 [0.105]	-7.607 [0.000]	-3.963 [0.018]		0.075		I(0)
		ADF- level	ADF-1 <sup>st</sup> diff	PP-level	PP-1 <sup>st</sup> diff	KPSS- level	KPSS-1 <sup>st</sup> diff	Order of Integration
Oman	Logemp	-3.161 [0.106]	-2.524 [0.316]	-2.337 [0.406]	-2.485 [0.334]	0.095		I(2)
	Logprod	-1.420 [0.841]	-3.897 [0.021]	-1.660 [0.752]	-3.492 [0.053]	0.176*	0.043	I(1)
	Empgrowth	-2.530 [0.313]	-5.316 [0.000]	-2.489 [0.332]	-9.568 [0.000]	0.132		I(1)
	Prodgrowth	-4.238 [0.010]		-3.344 [0.073]	-13.573 [0.000]	0.045		I(0)
Pakistan	Logemp	-2.292 [0.429]	-6.192 [0.000]	-2.292 [0.429]	-6.227 [0.000]	0.137		I(1)
	Logprod	-1.213 [0.895]	-6.721 [0.000]	-1.279 [0.880]	-6.730 [0.000]	0.094		I(1)
	Empgrowth	-6.166 [0.000]		-6.198 [0.000]		0.077		I(0)
	Prodgrowth	-6.757 [0.000]		-6.766 [0.000]		0.120		I(0)
Qatar	Logemp	-0.766 [0.961]	-3.060 [0.129]	0.131 [0.997]	-2.164 [0.497]	0.209*	0.076	I(2)
	Logprod	-1.069 [0.923]	-3.596 [0.042]	-0.931 [0.943]	-3.548 [0.047]	0.113		I(1)
	Empgrowth	-3.104 [0.119]	-4.451 [0.005]	-2.167 [0.495]	-4.486 [0.005]	0.074		I(1)
	Prodgrowth	-3.764 [0.029]		-3.730 [0.031]		0.123*	0.500	I(0)
Saudi Arabia	Logemp	-2.821 [0.198]	-1.561 [0.792]	-1.087 [0.920]	-1.720 [0.725]	0.143		I(2)
	Logprod	-2.220 [0.467]	-3.333 [0.075]	-2.078 [0.543]	-3.347 [0.072]	0.179*	0.122	I(2)
	Empgrowth	-1.552 [0.795]	-5.842 [0.000]	-1.711 [0.729]	-5.838 [0.000]	0.152*	0.086	I(1)
	Prodgrowth	-3.330 [0.075]	-7.164 [0.000]	-3.334 [0.074]	-8.115 [0.000]	0.121		I(1)
Sudan	Logemp	-4.155 [0.012]	-2.057 [0.552]	-2.839 [0.192]	-2.217 [0.469]	0.111		I(2)
	Logprod	-1.730 [0.721]	-5.581 [0.000]	-2.041 [0.563]	-5.520 [0.000]	0.084		I(1)
	Empgrowth	-2.002 [0.581]	-3.011 [0.143]	-2.217 [0.468]	-4.096 [0.013]	0.123		I(1)
	Prodgrowth	-5.497 [0.000]		-5.413 [0.000]		0.095		I(0)
Syria	Logemp	-2.147 [0.506]	-2.609 [0.279]	-1.650 [0.756]	-2.723 [0.233]	0.215*	0.065	I(2)
	Logprod	-1.569 [0.789]	-7.674 [0.000]	-1.540 [0.800]	-7.689 [0.000]	0.182*	0.050	I(1)
	Empgrowth	-2.609	-6.733	-2.724	-6.733	0.064		I(1)



		[0.278]	[0.000]	[0.233]	[0.000]			
	Prodgrowth	-7.607 [0.000]		-7.609 [0.000]		0.056		I(0)
Turkey	Logemp	-2.687 [0.247]	-7.187 [0.000]	-2.706 [0.239]	-7.191 [0.000]	0.081		I(1)
	Logprod	-2.343 [0.403]	-8.665 [0.000]	-2.204 [0.475]	-9.533 [0.000]	0.194*	0.074	I(1)
	Empgrowth	-7.178 [0.000]		-7.182 [0.000]		0.100		I(0)
	Prodgrowth	-8.654 [0.000]		-9.307 [0.000]		0.063		I(0)
UAE	Logemp	-1.930 [0.622]	-1.776 [0.691]	-0.778 [0.960]	-1.910 [0.632]	0.209*	0.096	I(2)
	Logprod	-1.121 [0.914]	-5.746 [0.000]	-1.293 [0.877]	-5.751 [0.000]	0.156*	0.082	I(1)
	Empgrowth	-1.716 [0.727]	-7.057 [0.000]	-1.880 [0.647]	-7.019 [0.000]	0.096		I(1)
	Prodgrowth	-5.685 [0.000]		-5.655 [0.000]		0.076		I(0)
Yemen	Logemp	-1.385 [0.852]	-4.402 [0.006]	-1.417 [0.842]	-4.479 [0.005]	0.204*	0.116	I(1)
	Logprod	-2.624 [0.273]	-3.356 [0.071]	-1.108 [0.919]	-3.356 [0.071]	0.180*	0.092	I(2)
	Empgrowth	-4.505 [0.004]		-4.585 [0.004]		0.115		I(0)
	Prodgrowth	-3.352 [0.072]	-5.000 [0.001]	-3.351 [0.072]	-8.262 [0.000]	0.092		I(1)

Note: \* and \*\* denote significance at the 5 and 1 percent levels, respectively; *p*-values are in square brackets.

**Table 2: Error Correction Models for Employment and Productivity (Algeria)**

n=53 Regressor	Dependent Variable	
	<i>dlogemployment</i>	<i>dlogproductivity</i>
Constant	0.032** (12.350)	0.003 (0.224)
<i>ect</i> (-1)	0.0306** (5.888)	-0.044 (-1.972)
<i>R</i> -squared	0.452158	0.084714
Adjusted <i>R</i> -squared	0.439114	0.062922
<i>F</i> -statistic	34.66442	3.887319
Standard error	0.017306	0.074799

Note: \*\* denotes significant at the 1 percent level; *t*-statistics are in parentheses.

**Table 3: Least Squares Regression – Dependent Variable:  
*Employment Growth***

	Constant	<i>Productivity Growth</i>	R-squared	Diagnostic tests
Algeria	0.245 (0.092)	-0.041 (0.164)	0.372	Non-normality
Indonesia	0.029 (0.000)	-0.206 (0.010)	0.149	Non-normality
Kuwait	-0.026 (0.503)	-0.026 (0.938)	0.000	Non-normality
Malaysia	0.032 (0.000)	0.007 (0.930)	0.000	Non-normality
Morocco	0.026 (0.000)	0.002 (0.735)	0.001	Normality
Pakistan	0.037 (0.000)	-0.422 (0.000)	0.501	Normality
Turkey	0.022 (0.000)	-0.224 (0.000)	0.342	Normality

Note: *p*-values are in parentheses.