The Impact of Regulation according to International law on economic growth in ECO countries

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Abstract

This paper investigates the long-run relationship between regulation and economic growth for a panel of ECO countries over the period 1990–2011 by employing the recently developed panel data unit root tests and the Pedroni panel data cointegration techniques. In particular, building effective regulatory structures in ECO countries is not simply an issue of the technical design of the most appropriate regulatory instruments; it is also concerned with the quality of supporting regulatory institutions and capacity. This paper explores the role of state regulation using an econometric model of the impact of regulation on growth. Furthermore, conditional on finding cointegration, the paper extends the literature by employing the Pedroni Panel Fully Modified Ordinary Least Squares (FMOLS) procedure to generate consistent estimates of the relevant panel variables. The results based on two different techniques of estimation suggest a strong causal link between regulatory quality and economic performance.

Keywords: Regulatory, Economic Growth, Panel Cointegration, ECO countries.

1. Introduction

The role of an effective regulatory regime in promoting economic growth and development has generated considerable interest among researchers and practitioners in recent years. Regulation can take many forms and the form of regulation policy adopted in developing countries has shifted over time (Minogue, 2005). From the 1960s to the 1980s, market failure was used to legitimize direct government involvement in productive activities in developing countries, by promoting industrialization through import substitution, investing directly in industry and agriculture, and by extending public ownership of enterprises. However, following the apparent success of market liberalization programmers in some developed countries, and the evidence of the failure of state-led economic planning in developing ones, the role of state regulation was redefined and narrowed to that of ensuring an undistorted policy environment in which efficient markets could operate. Deregulation was widely adopted, often as part of structural adjustment programmers, with the aim of reducing the "regulatory burden" on the market economy (Jalilian and et al, 2007).

Regulations are indispensable to the proper functioning of economies and societies. They underpin markets, protect the rights and safety of citizens and ensure the delivery of public goods and services. At the same time, regulations are rarely costless.

Businesses complain that red tape holds back competitiveness while citizens complain about the time that it takes to fill out government paperwork. More worrying still, regulations can be inconsistent with the achievement of policy objectives. They can have unintended consequences and they can become less effective or even redundant over time. The 2008 financial crisis and the ensuing and ongoing economic downturn are stark reminders of the consequence of regulatory failure.

The global economy, including the ECO region, showed considerable strength in 2003. Indeed, estimates suggest that regional GDP growth in 2003 will exceed the performance in 2002 (7.3 percent). Inflationary pressures have risen only slightly, despite higher commodity prices and volatility in the energy markets, as a result, monetary authorities virtually across the region have been able to maintain an environment of low interest rates. Buoyant global growth, already reflected in rising stock markets, is adding to business and consumer confidence and should translate into higher corporate investment activities in the region, thus providing a platform for faster growth in the medium term (Macro-Economic Overview of ECO Countries, 2002-2003).

The ECO region is geographically vast and well endowed with potential economic resources in different sectors, such as agriculture and arable land, energy and mining, human resources, and a vast strategic trading constituency. Yet, this inherent potential does not manifest itself in the form of reasonable levels of economic and social development in the ECO countries as a group. Despite many unfavorable factors, the economies of the region displayed impressive resilience since 2000. The economies of the member states were slightly affected by the global downturn in 2001 but GDP growth picked up in the region in 2002 and 2003. This was mainly on account of the recovery of Turkey from negative growth in 2001 and higher growth in Pakistan and the Iran. Concurrently, in other member states of ECO after the setbacks associated with their transition economies have achieved sound growth for a number of consecutive years. The already high rates of growth prevailing in countries such as Azerbaijan, Tajikistan, and Turkmenistan went up further in 2003. Kazakhstan continued to make progress in developing its energy resources and maintained its robust growth of recent years and Kyrgyzstan emerged smartly from negative growth while Uzbekistan improved upon its somewhat modest growth rate in 2002. Moreover, Afghanistan is also in progress to experience strong growth owing to the stimuli from reconstruction efforts, the resumption of agricultural growth, and the implementation of sound economic policies (Macro-Economic Overview of ECO Countries, 2002-2003).

Growth in the region was achieved on the back of growing investor and consumer confidence that attracted enhanced external capital to resource-rich economies and facilitated greater macroeconomic stability, particularly exchange rate stability, as production increased and inflation declined virtually in most of the economies of the region.

ECO as a developing region has to manage to grow at a reasonable pace thus far through a combination of supportive domestic policies and greater international and intraregional trade. Sustaining growth in the region would depend on stimulating domestic demand. In other words, the growth stimulus from a rebound in world trade and hence from net exports is likely to be moderate among the ECO countries over the next years. In particular, much will depend on the course of commodity and energy prices over the coming months. The economic rebound in late 2002, combined with domestic policies, was expected to lead to a higher pace of growth in the region (Macro-Economic Overview of ECO Countries, 2002-2003).

Furthermore, ECO countries need to remain strongly committed to macroeconomic prudence, good governance, and flexibility in day-to-day economic management and be alert to unforeseen dangers. Simultaneously, Governments must facilitate structural change to enable their economies to maintain competitiveness in a globalizing world economy. For the long term, the greatest challenges for the ECO countries in particular emanate from meeting the Millennium Development Goals and agreements on sustainable development reached at the World Summit on Sustainable Development ((Macro-Economic Overview of ECO Countries, 2002-2003).

The rest of the paper is organised as follows. In section 2 the models used are presented. Section 4 deals with a descriptive analysis of the data and reports the regression results. The results confirm that the quality of state regulation impacts positively on economic growth. Finally, section 5 provides conclusions and the implications.

2. Methodology

2.1. The panel unit roots test

In order to investigate the possibility of panel cointegration, it is first necessary to determine the existence of unit roots in the data series. For this study we have chosen the Im, Pesaran and Shin (IPS), which is based on the well-known Dickey-Fuller procedure. Investigations into the unit root in panel data have recently attracted a lot of attention. Levine and Lin, (1993) proposes a panel-based ADF test that restricts parameters γ_i by keeping them identical across cross-sectional regions as follows:

$$\Delta y_{it} = \alpha_i + \gamma_i y_{it-1} + \sum_{j=1}^{k} \alpha_j \Delta y_{it-j} + e_{it} \quad (1)$$

where t =1,. . ., T time periods and i =1,. . .N members of the panel. LL tests the null hypothesis of γ_i=γ =0 for all i, against the alternate of $\gamma_1 = \gamma_2 \ldots = \gamma < 0$ for all i, with the test based on statistics $t_\gamma = \hat{\gamma}/s.e.(\hat{\gamma})$. One drawback is that c is restricted by being kept identical across regions under both the null and alternative hypotheses (see e.g. Lee, Chien-Chiang, 2005).

For the above reason, IPS (1997) relax the assumption of the identical first-order autoregressive coefficients of the LL test and allow γ varying across regions under the alternative hypothesis. IPS test the null hypothesis of $\gamma_i = 0$ for all i, against the alternate of $\gamma_i < 0$ for all i. The IPS test is based on the mean-group approach, which uses the average of the t_{γ_i} statistics to perform the following $\bar{Z}$ statistic:

$$\bar{Z} = \sqrt{N}(\bar{t} - E(\bar{t}))/\sqrt{Var(\bar{t})} \quad (2)$$

Where $\bar{t} = (\frac{1}{N})\sum_{i=1}^{N} t_{\gamma_i}$, the terms E($\bar{t}$) and Var($\bar{t}$) are, respectively, the mean and variance of each t_{γ_i} statistic, and they are generated by simulations and are tabulated in IPS (1997). The $\bar{Z}$ converges to a standard normal distribution. Based on Monte Carlo experiment results, IPS demonstrates that their test has more favorable finite sample properties than the LL test.

Hadri (2000) argues differently that the null should be reversed to be the stationary hypothesis in order to have a stronger power test. Hadri's (2000) Lagrange multiplier (LM) statistic can be written as (Lee, Chien-Chiang, 2005):

$$\widehat{LM} = 1/N \sum_{i=1}^{N} \left(\frac{\frac{1}{T^2}\sum_{t=1}^{T} S_{it}^2}{\hat{\sigma}_\varepsilon^2} \right), \quad S_{it} = \sum_{j=1}^{t} \widehat{\varepsilon_{ij}} \quad (3)$$

Where $\hat{\sigma}_\varepsilon^2$ is the consistent Newey and West (1987) estimate of the long-run variance of disturbance terms.

The next step is to test for the existence of a long-run cointegration among GDP and the independent variables using panel cointegration tests suggested by Pedroni (1999 and 2004). The panel cointegration tests Pedroni (1999) considers the following time series panel regression;

$$y_{it} = \alpha_{it} + \delta_{it}\, t + X_i B_i + e_{it} \quad (4)$$

Where y_{it} and X_{it} are the observable variables with dimension of $(N * T) \times 1$ and $(N * T) \times m$, respectively. He develops asymptotic and finite-sample properties of testing statistics to examine the null hypothesis of non-cointegration in the panel. The tests allow for heterogeneity among individual members of the panel, including heterogeneity in both the long-run cointegrating vectors and in the dynamics, since there is no reason to believe that all parameters are the same across countries (see e.g. Lee, Chien-Chiang, 2005).

Two types of tests are suggested by Pedroni. The first type is based on the within dimension approach, which includes four statistics. They are panel υ-statistic, panel ρ statistic, panel PP-statistic, and panel ADF-statistic. These statistics pool the autoregressive coefficients across different members for the unit root tests on the estimated residuals.

The second test by Pedroni is based on the between-dimension approach, which includes three statistics. They are group ρ statistic, group PP-statistic, and group ADF-statistic. These statistics are based on estimators that simply average the individually estimated coefficients for each member. Following Pedroni (1999), the heterogeneous panel and heterogeneous group mean panel cointegration statistics are calculated as follows (see e.g. Lee, Chien-Chiang, 2005).

Panel υ-statistic:

$$Z_\nu = \left(\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\,\hat{e}_{it-1}^{2}\right)^{-1}$$

Panel ρ-statistic:

$$Z_\rho = \left(\hat{\sigma}^2\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\,\hat{e}_{it-1}^{2}\right)^{-1/2}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\left(\hat{e}_{it-1}\Delta\hat{e}_{it}-\hat{\lambda}_i\right)$$

Panel ADF-statistic:

$$Z_t^{*} = \left(\tilde{s}^{*2}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\,\hat{e}_{it-1}^{*2}\right)^{-1/2}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\,\hat{e}_{it-1}^{*}\Delta\hat{e}_{it}^{*}$$

Group ρ-statistic:

$$\tilde{Z}_\rho = \sum_{i=1}^{N}\left(\sum_{t=1}^{T}\hat{e}_{it-1}^{2}\right)^{-1}\sum_{t=1}^{T}\left(\hat{e}_{it-1}\Delta\hat{e}_{it}-\hat{\lambda}_i\right)$$

Group PP-statistic:

$$\tilde{Z}_t = \sum_{i=1}^{N}\left(\hat{\sigma}^2 \sum_{t=1}^{T} \hat{e}_{it-1}^2\right)^{-1/2} \sum_{t=1}^{T}(\hat{e}_{it-1}\Delta\hat{e}_{it} - \hat{\lambda}_i)$$

Group ADF-statistic:

$$\tilde{Z}_t^* = \sum_{i=1}^{N}\left(\sum_{t=1}^{T} \hat{s}_i^2 \hat{e}_{it-1}^{*2}\right)^{-1/2} \sum_{t=1}^{T}(\hat{e}_{it-1}^*\Delta\hat{e}_{it}^*)$$

Here, $\hat{e}_{it}$ is the estimated residual from Eq. (4) and $\hat{L}_{11i}^2$ is the estimated long-run covariance matrix for $\Delta\hat{e}_{it}$. Similarly, $\hat{\sigma}_i^2$ and $\hat{s}_i^2$ ($\hat{s}_i^{*2}$) are, respectively, the long-run and contemporaneous variances for individual i. The other terms are properly defined in Pedroni (1999) with the appropriate lag length determined by the Newey–West method. All seven tests are distributed as being standard normal asymptotically. This requires a standardisation based on the moments of the underlying Brownian motion function. The panel m-statistic is a one-sided test where large positive values reject the null of no cointegration. The remaining statistics diverge to negative infinitely, which means that large negative values reject the null. The critical values are also tabulated by Pedroni (1999) (see e.g. Lee, Chien-Chiang, 2005).

In the presence of unit root variables, the effect of superconsistency may not dominate the endogeneity effect of the regressors if OLS is employed. Pedroni (2000) shows how FMOLS can be modified to make an inference in being cointegrated with the heterogeneous dynamic. In the FMOLS setting, non-parametric techniques are exploited to transform the residuals from the cointegration regression and can get rid of nuisance parameters (see e.g. Lee, Chien-Chiang, 2005).

3. Empirical results and discussion

Our study uses annual time series for the ECO countries. We choose these countries because their economic structures are the same in respect of consumption, production and export. Data for the regulatory quality measures were set out in Kauffman et al (2005) and are available for downloading from the World Bank web site. As discussed earlier, the two regulation indicators used from this study are regulatory quality (RQ) and government effectiveness (GE) measures. Other data required for the regression analysis is Trade, government expenditure and inflation that were taken from the World Bank's World Development Indicators. The empirical period depends on the availability of data, where the time period used is 1990–2011. All variables used are in natural logarithms.

Table 1 presents the panel unit root tests. At a 5% significance level, all statistic of the level model confirm that three series have a panel unit root. Using these results, we proceed to test GDP, regulatory quality (RQ), government effectiveness (GE), Trade (TR), government expenditure (G) and inflation (P) for cointegration in order to determine if there is a long-run relationship to control for in the econometric specification. Table 1, presents the results of the panel unit root test at level indicating that all variables are $I(1)$ in the constant plus time trend of the panel unit root regression. Therefore, we can conclude that most of the variables are non-stationary in with and without time trend specifications at level by applying the Panel unit root test which is also applied for heterogeneous panel to test the series for the presence of a unit root. The results of the panel unit root tests confirm that the variables are non-stationary at level.

We can conclude that the results of panel unit root tests reported in Table1 support the hypothesis of a unit root in all variables across countries, as well as the hypothesis of zero order integration in first differences. At most of the 1 percent significance level, we found that all tests statistics in both with and without trends significantly confirm that all series strongly reject the unit root null. Given the results of IPS test, it is possible to apply panel cointegration method in order to test for the existence of the stable long-run relation among the variables.
We first implement the following equation:

$$GDP_{it} = \alpha_i + \delta_i t + \beta_i RQ_{it} + c_i GE_{it} + \theta_i TR_{it} + \vartheta_i G_{it} + \varphi_i P_{it} + \varepsilon_{it} \quad (5)$$

Where it allows for cointegrating vectors of differing magnitudes between countries, as well as country (α) and time (δ) fixed effects. Table 2 reports the panel cointegration estimation results. For the all statistics significantly we cannot reject the null of no cointegration. Thus, it cannot be seen that the GDP, regulatory quality (RQ), government effectiveness (GE), Trade (TR), government expenditure (G) and inflation (P) move together in the long run. That is, there is a long-run steady state relationship between economic growth and regulatory for a cross-section of countries. However, in the long run regulatory has a significant impact on economic growth. The next step is an estimation of such a relationship.

Table 3 reports the results of the individual and panel FMOLS. The panel estimators with and without common time dummies are shown at the bottom of the table. The coefficients of regulatory quality (RQ), government effectiveness (GE), Trade (TR), government expenditure (G) and inflation (P) are statistically significant at the 5% level, and the effect is positive as expected by the theory. The elasticity of regulatory with respect to GDP are significantly smaller than 1. This implies in short run, regulatory is an important ingredient for economic development.

The FMOLS estimates of the elasticity of regulatory quality with respect to GDP range from 0.28 (Afghanistan) to 0.81 (Turkey). The coefficient of government effectiveness (GE), Trade (TR), government expenditure (G) and inflation (P) are positive and statistically significant in all countries; that is, an increase in this variable tends to promote GDP.

Once the three variables are cointegrated, the next step is to implement the Granger causality test. We use a panel-based error correction model to account for the long-run relationship using the two-step procedure from Engle and Granger (1987). The first step is the estimation of the long-run model for Eq. (5) in order to obtain the estimated residuals,

Having considered the issue of convergence and considered the possible relative effects of regulation and governance issues more generally on growth, Tables 3 report results based on the formal analysis of the data. The results address the main focus of the research, the impact of regulation on the growth in GDP per capita. The results reported in Table 3 are based on the model specified in equation (5) using FMOLS, as detailed above. The economic variables in the full set of regressions tested included the variables derived from the model itself, as specified in equation (5), and measures for general inflation, trade, government expenditure, as well as the regional dummies. However, all variables proved to be statistically insignificant at the 5% level. The inflation variable was found to be statistically significant and negative, suggesting that unstable macroeconomic conditions have a negative effect on economic growth.

4. Conclusion

This paper employs data on ECO countries from 1990 to 2011 to examine the relationship between GDP and regulatory. The panel cointegration and the resulting panel-based error correction models are conducted to answer the question. The full-modified OLS deals with the problem of endogeneity. Our evidence shows results suggesting that there is a long run steady-state relationship between regulatory and GDP for a cross-section of countries.

The provision of a regulatory regime that promotes rather than constrains economic growth is an important part of good governance. The ability of the state to provide effective regulatory institutions can be expected to be a determinant of how well markets and the economy perform. The impact of regulatory institutions on economic growth will depend on both the efficiency of the regulatory policies and instruments that are used and the quality of the governance processes that are practiced by the regulatory authorities, as discussed in the early part of the paper.

This paper has tested the hypothesis that the efficiency and quality of regulation affects the economic performance of an economy. Two proxies for regulatory effectiveness were included separately and then combined as determinants of economic growth performance, using panel data methods. The results from modelling suggest a strong causal link between regulatory quality and economic growth and confirm that the standard of regulation matters for economic performance.

Reference

1. Engle, R., Granger, C., 1987. Cointegration and error correction: representation, estimation, and testing. Econometrica, 55, 257-276.

2. Hadri, K., 2000. Testing for stationarity in heterogeneous panel data. Econometrics Journal, 3, 148-161.
3. Im, K.S., Pesaran, M.H., Shin, Y., 1997. Testing for unit roots in heterogeneous panels. Working paper. University of Cambridge.
4. Johansen, S., 1988. Statistical analysis of cointegration vectors. Journal of Economic Dynamics and Control, 12, 231-254.
5. Kraft, J., Kraft, A., 1978. On the relationship between energy and GNP. Journal of Energy and Development, 3, 401-403.
6. Jalilian, Hossein, Kirkpatrick, Colin and Parker, David, 2007. The Impact of Regulation on Economic Growth in Developing Countries: A Cross-Country Analysis", journal of World Development, Vol. 35, pp. 87-103.
7. Lee, Chien-Chiang, 2005. Energy consumption and GDP in developing countries: A cointegrated panel analysis, Energy Economics, Elsevier, 27, 415-427.
8. Lee, C.H., Huang, B.N., 2002. The relationship between exports and economic growth in East Asian countries: a multivariate threshold autoregressive approach. Journal of Economic Development, 27, 45–68.
9. Levine, A., Lin, C.F., 1993. Unit root tests in panel data: asymptotic and finite sample properties, working paper. Department of Economics, University of California at San Diego.
10. Macro-Economic Overview of ECO Countries, 2002-2003.
11. Minogue M., 2005. Apples and Oranges – Comparing International Experiences in Regulatory Reform, Occasional Lecture 13, Bath: Centre for the Study of Regulated Industries, University of Bath
12. Newey, W., West, K., 1987. A simple positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. Econometrica, 69, 1519-1554.
13. Pedroni, P., 1999. Critical values for cointegration tests in heterogeneous panels with multiple regressors. Oxford Bulletin of Economics and Statistics, 61, 653-670.
14. Pedroni, P., 2000. Full modified OLS for heterogeneous cointegrated panels. Nonstationary Panels Panel Cointegration and Dynamic Panels, Advances in Econometrics, 15. JAI Press, pp. 93–130.
15. Pierse, R.G., Shell, A.J., 1995. Temporal aggregation and the power of tests for unit root. Journal of Econometrics, 65, 335–345.
16. World Bank, 2012, Development Challenges in the New Century Washington DC, the World Bank.

Table 1 – Panel unit root tests

Variable	LL		IPS		Hadri	
	No time effects	Time fixed effects	No time effects	Time fixed effects	No time effects	Time fixed effects
GDP	-2.69	0.90	-1.32	-1.41	6.70	5.00
RQ	-2.29	-2.50	-2.29	-2.48	3.36	3.98
GE	0.61	2.87	0.87	-1.29	5.56	3.70
TR	-2.87	-1.99	-1.53	-1.24	4.86	6.22
G	-2.34	-2.24	-1.39	-2.12	5.57	5.03
P	-2.07	-2.53	-1.24	-1.42	4.76	3.98

All variables are in natural logarithms.

Data Source: World Development Indicators (2012), we use the Eviews to estimate this value.

Table 2- Panel cointegration tests

	No time effects	Time fixed effects
Panel variance	1.18	1.67
Panel ρ	-1.34	0.98
Panel PP	-1.53	-1.22
Panel ADF	-2.22	-2.30
Group ρ	-0.75	1.54
Group PP	-1.32	-1.33
Group ADF	-2.25	-2.42

Statistics are asymptotically distributed as normal. The variance ratio test is right-sided, while the others are left - sided, we use the Eviews to estimate this value.

Table 3- Full modified OLS estimates (dependent variable is GDP)

Country groupings	RQ	GE	TR	G	P
Iran	0.53 (6.00)	0.38 (2.21)	0.27 (2.21)	0.29 (2.21)	-0.11 (-2.21)
Kazakhstan	0.31 (4.34)	0.29 (3.20)	0.31 (2.21)	0.26 (2.19)	-0.10 (-1.89)
Azerbaijan	0.44 (4.32)	0.32 (2.49)	0.33 (2.53)	0.31 (2.11)	-0.06 (-2.10)
Turkmenistan	0.31 (3.10)	0.20 (2.63)	0.21 (2.78)	0.19 (3.13)	-0.05 (-1.87)
Afghanistan	0.28 (2.19)	0.10 (1.42)	0.15 (1.11)	0.17 (2.12)	-0.09 (-2.03)
Tajikistan	0.31 (2.25)	0.20 (2.44)	0.18 (2.89)	0.31 (3.10)	-0.08 (-3.19)
Pakistan	0.33 (2.34)	0.21 (2.19)	0.22 (2.88)	0.30 (3.01)	-0.07 (-3.67)
Turkey	0.81 (2.15)	0.22 (3.10)	0.38 (2.18)	0.34 (3.02)	-0.05 (-3.12)
Uzbekistan	0.68 (3.18)	0.28 (2.19)	0.32 (2.54)	0.28 (2.87)	-0.11 (-3.11)
Kyrgyz Republic	0.40 (2.19)	0.27 (2.73)	0.37 (2.66)	0.26 (2.99)	-0.15 (-2.59)
Panel (without time dummies)	0.62 (5.29)	0.30 (4.19)	0.35 (3.10)	0.29 (2.12)	-0.10 (-4.21)
Panel (with time dummies)	0.60 (4.54)	0.36 (5.24)	0.38 (5.11)	0.32 (4.23)	-0.11 (-3.04)

Data Source: World Development Indicators (2012), we use the Eviews to estimate this value.