ECONOMIC CONVERGENCE: A PANEL ANALYSIS OF GROWTH VARIABLES IN SELECTED ASIAN AND LATIN AMERICAN COUNTRIES

1. Introduction

The dominance of the Chinese manufactured products in world markets during the last three decades and the economic accomplishments of other East Asian countries during the second half of the twentieth century led growth economists and others to probe into the policies followed by these countries. The World Bank research, *The East Asian Miracle-Economic Growth and Public Policy* (1993), had delineated the reasons behind the rapid development of those high performing Asian economies (HPAEs), Japan, Hong Kong, South Korea, Singapore, Taiwan, Indonesia, Malaysia and Thailand, which were closing the income gap with the industrialized countries of the West between 1960 and 1990. HPAEs grew more than twice as fast as the rest of East Asia, roughly three times as fast as Latin America and South Asia, and five times faster than Sub-Saharan Africa. Their growth rates were much higher than those of the Western industrial countries and the oil-rich Middle East. They accomplished this by reducing income inequality, increasing domestic savings and investment, having a successful demographic transition, improving the quality of human capital and sustaining an unusually stable macroeconomic performance. Their governments intervened systematically and followed successful import substitution industrial (ISI) policies. The high level of investments in applied research lead to productivity improvements.

There seems to be a consensus among economists about the right policies for economic development similar to those followed by the HPAEs. The most recent report by the World Bank's Commission on Growth and Development (2008), lists with few exceptions, those successful policies that appeared in the World Bank's 1993 report as recommended policies. In the latest report, there are two major differences in policies followed by the high-growth countries. The first one concerns the exchange rates. After the Uruguay Round Agreement and the establishment of the World Trade Organization (WTO), it has become very difficult for countries to pursue the

traditional industrial policies, and impossible to use protectionist trade measures. Thus, countries, like China and Viet Nam, have to hold their currencies undervalued to remain competitive in world markets and increase their foreign currency incomes. The other important policy difference is about the environment and the energy use that simply reflects the concerns about increasing pollution levels.

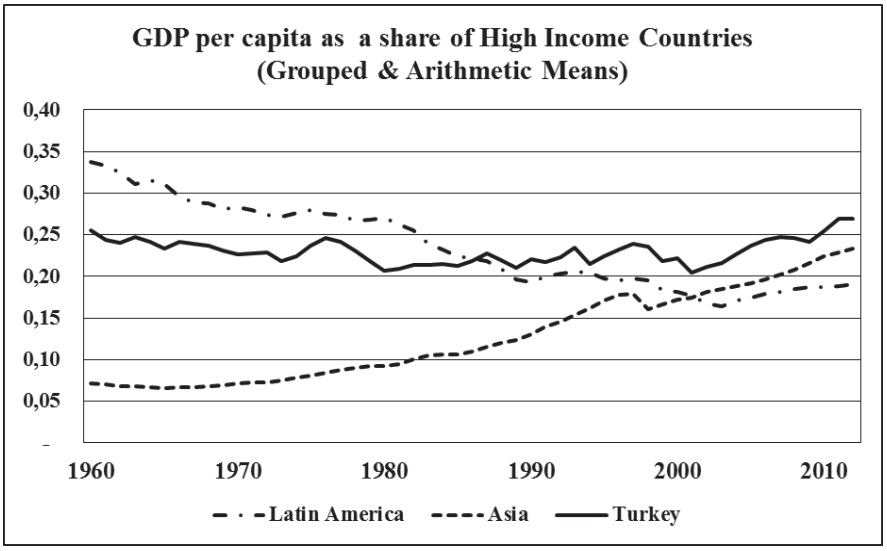
The purpose of this paper is to investigate some of the major factors that were considered to play an important role in the development of East Asian countries. A panel regression model examined a selection of five Asian countries (China, Indonesia, Malaysia, South Korea, and Thailand) and five Latin American countries (Argentina, Brazil, Colombia, Mexico, and Venezuela) together with Turkey, which, despite its geographical remoteness, is believed to resemble these Latin American countries in her recent development experience. The model included seven cross-sectional variables for 21 years from 1992 to 2012 inclusive.

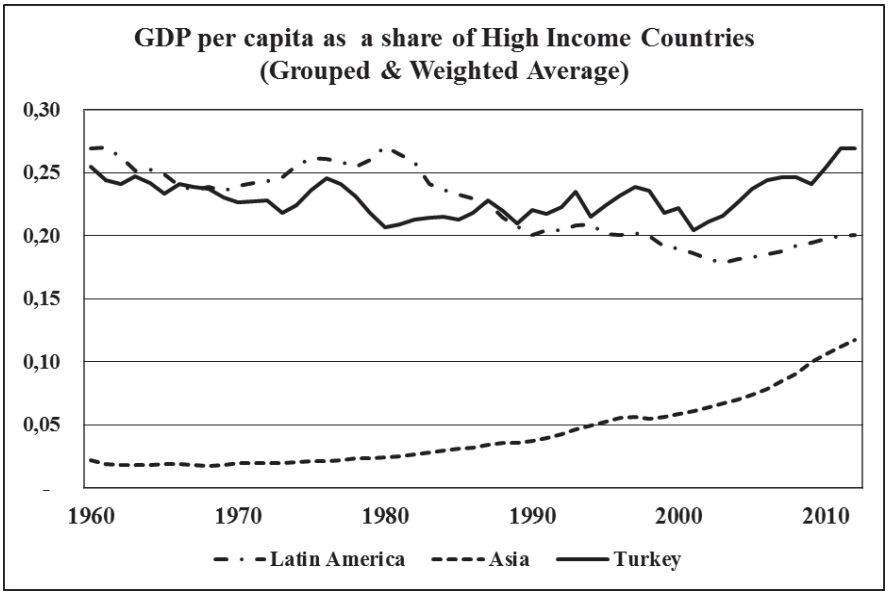
Figure 1 shows the *per capita* incomes of the selected countries (five Latin American and five Asian countries together with Turkey) as a percentage of the high income countries. As seen in the higher panel of the figure, the divergence of the Latin American countries increased during the 1980s, in their "lost decade", as the average *per capita* incomes dropped from almost 35 percent to less than 20 percent of that of the high income countries.

The growth expectations of the early 1990s seem to be not realized either. Yet, there are some improvements after 2003. Meanwhile, one can observe a steady trend of convergence in the income of the Asian countries, with a small decline during the crisis of 1997-98.

This continuous convergence is also clear when the *per capita* income of the groups are calculated as weighted averages, in the lower panel of the figure. Despite her impressive growth rates, China, which started with a very low *per capita* income in the 1970s, has still a lower income compared to the other Asian countries, and with her far larger population pulls down the population weighted average of Asia. Still, there is a marked convergence. It seems that the liberalization reforms of the 1980s in Turkey have not brought the benefits of economic growth that were promised by the Washington Consensus and the implementers of these policies in Turkey. The percentage has fluctuated between 20 and 25 percent over a long period of time.

FIGURE 1 - *GDP Per Capita Incomes as a Ratio of High Income Countries*





2. Growth policies for convergence

Studies by Stiglitz (2005), Rodrik (2011), McMillan and Rodrik (2011), Dorwick and DeLong (2001), Firebaugh (2000), Pritchette (1997), Ben-David (1997) and others examined the process of growth and development policies in a globalized world. In explaining the sustained growth performance in Asia, Jaumette and Spatafora (2007) have shown how those successful Asian countries benefitted from rapid increases in total factor productivity (TFP) as well as the fast accumulation of both physical and human capital in a strong institutional and policy environment. In Asia, the continued shift of resources from agriculture to manufacturing and services, and the continuing move within manufacturing toward higher value-added products supported rapid growth and led to convergence toward advanced-economy income levels.

Weiss (2005) explains how the "miracle economies" (South Korea, Taiwan, Hong Kong and Singapore) benefitted from an old-style industrial policy (targeting specific industries to promote, using of directed credit and subsidizing policy, import controls, export subsidies, and copying of foreign technology), but their experience could not serve as an example to today's lower income and emerging economies because of their WTO membership which rules out the selective policy interventions used in the past. However, there is still room for government intervention to support the industrial sector by focusing on measures such as infrastructure provision, particularly related to information technology, education and skill development and fostering innovation in frontier technologies.

Several authors compared East Asian and Latin American economic development during the past few decades. Greffi (2007) finds the outward- versus inward-oriented development policies as a

> "false dilemma" and proposes "a more comprehensive approach that sees countries as occupying differentiated roles in the world economy requiring a combination of export industries as well as those producing for domestic markets".

Kay (2002) investigated the possible reasons why East Asia rapidly overtook Latin America although the latter started to industrialize many decades before the East Asian newly industrialized countries (NICs). He focuses on three factors to explain the performance differences between the two groups of countries; (i) South Korea's and Taiwan's superior state capacity and policy performance, (ii) Latin

America's failure to create an agrarian structure more conducive to growth with equity, (iii) the Asian countries' greater ability to design an appropriate industrial policy as well as to bring about a more positive interaction between agriculture and industry.

Others (Lederman *et al*., 2007) tried to gauge the impact of China's and India's rapid economic growth with high amounts of exports that are expected to have a negative effect on the Latin American manufacturing and service sector. They found that the two "Asian giants" had positive impacts at the aggregate level in Latin American countries, such as a large variety of cheap Chinese intermediate goods positively affecting Latin American countries' competitiveness in third markets, together with some negative impacts at the industry level. Their recommendation to Latin America is to reshuffle their development policy priorities in response to the emergence of China and India in global markets.

Weeks (2000) also compared Latin American development with that of a selection of East and Southeast Asian countries (the so-called HPAEs). His findings indicate that the two groups had quite similar growth performances between 1960 and 1975. Although the HPAEs had lower growth rates in the 1980s than in the 1970s, the growth rate of the Latin American Countries collapsed in the 1980s. This poor performance after 1980 was related to the debt service burden of the countries which was managed according to the "Washington Consensus" strategy with emphasis on demand compression and open markets.

Stiglitz (2005) has also criticized the Washington Consensus policies that were imposed on the borrowing countries from the International Monetary Fund (IMF). He has argued that there was a clear connection between the dismal performance (with income *per capita* stagnating or declining) and the policies that were pursued in the 1990s. The United States and other developed countries resort increasingly to non-tariff protectionist measures, such as voluntary export restraints and anti dumping duties, while they continue to promote free trade and globalization in developing countries. The global trade regime is beset by inequalities both in services and merchandise trade as well as the intellectual property regime. Stiglitz (2006) also argues that while the United States and other developed countries accomplished their development by employing industrial policies (even with the modern internet being created by the US government), they bar the developing countries' use of industrial policies through international organizations, especially the World Trade Organization (WTO) membership. Since the government

plays a central role in the economy, especially in correcting the failures in financial markets, the decision it makes in areas such as education, research and infrastructure building is pivotal in shaping the economy and its competitiveness. According to Stiglitz (2005, 26), the East Asian countries were successful, because they

> "realized that what separated them from the more developed countries was not just a gap in capital, but a gap in knowledge, and they worked hard, and successfully, to bring modern technology to their societies".

McMillan and Rodrik (2011) examined the structural change in 38 countries as they grew and incurred productivity changes between 1990 and 2005. They argue that developing economies have been characterized by large productivity gaps among different parts of the economy, and if they are able to move labor and other resources from less productive to more productive activities, the economy grows even if there is no productivity growth within sectors. They found in their empirical work that high-growth Asian countries experienced substantial growth-enhancing structural change while in Latin American and Sub-Saharan African countries, broad patterns of structural change were responsible for reducing rather than increasing economic growth since 1990. They also identified three factors that influenced structural change and productivity growth: while countries with a large share of natural resources in their exports experienced smaller productivity-enhancing structural change, countries that maintained undervalued currencies and had flexible labor markets went through greater growth-enhancing structural change.

Rodrik (2011) maintains that convergence can be easy if an economy is able to push its resources (labor in particular) into the "convergence sectors" or "escalator industries" which are the tradable industries (manufacturing in particular). Once a country gets a toehold in one of these industries, there is an automatic tendency for productivity in these industries to converge to the frontier, thus changing their comparative advantage.

That is why the converging Asian countries were following unorthodox policies to promote their tradable industries, such as undervalued currencies, industrial policies and heavy state intervention in addition to the orthodox ones, such as maintaining stable macroeconomic environments, investment in human capital, and emphasis on exports. Sustained high-growth in developing countries requires pro-active policies that foster structural transformation and give rise to new industries.

3. The data and the model

In this study, we try to detect the major policy variables that influence economic growth in the selected 11 emerging economies. First a panel data analysis has been carried out for the 11 countries, followed by separate analyses for five Latin American and five Asian countries. We also included Turkey in those two groups to see the impact on the results of the two groups. The number of countries was limited by the availability of data in some cases, and by the differences in country characteristics. Due to the World Bank's discrimination against Taiwan for political reasons, data for this country could not be found in the *World Development Indicators* (WDI) series that was used in this study. Two developed city states, Hong Kong and Singapore, are not included because of their population and land (without a rural area) sizes. Their inclusion in the analysis does not seem appropriate.

The cross sectional variables are:

- educational expenditures as a percentage of gross national income (GNI),
- external debt stocks as a percentage of GNI,
- gross fixed capital formation as a percentage of gross domestic product (GDP),
- gross savings as a percentage of GDP,
- GDP deflator (annual percentage),
- manufacturing value added as a percentage of GDP,
- trade openness index (trade as a percentage of GDP).

The dependent variable is the GDP growth rate. The data on these variables are extracted from the WDI series with the exception of external debt. The external debt data for South Korea are from the Economist Intelligence Unit Country Reports for various years.

Table 1 gives a summary of the descriptive statistics. The twenty-one-year averages of the dependent and the independent variables are displayed. China has the highest growth rate followed by Malaysia, South Korea, Indonesia and Thailand. Educational expenditures are generally higher in the Latin American countries than they are in the Asian countries with the exception of Malaysia. Since the external debt in some of these Asian countries have increased after the 1997 financial crisis, the foreign debt averages are quite high for Indonesia and Malaysia. The savings, fixed capital formation and the manufacturing value-added rates are much higher in the Asian countries than they are in the Latin American countries and Turkey.

Because of the very high price increases in the 1990s, inflation

TABLE 1 - *The Twenty-one Year Averages of the Dependent and Independent Variables*

	GDPGR	EDUCAT	EXDEBT	GFIXCAP	GSAVING	INFLATON	MANUFCT	TRADE
Argentina	4.00	4.44	55.74	16.30	8.15	10.02	18.30	26.22
Brazil	3.06	4.55	28.01	17.58	16.36	259.74	18.01	22.45
Colombia	3.63	3.38	29.73	19.79	16.56	13.09	15.54	35.65
Mexico	2.78	4.69	29.91	20.14	20.16	11.59	18.62	50.89
Venezuela, RB	2.69	4.43	38.58	20.95	29.16	33.43	16.47	50.58
Indonesia	4.78	1.76	63.00	25.74	26.19	13.53	26.01	58.04
Korea, Rep.	5.09	3.57	29.20	31.36	33.41	3.42	27.23	72.02
China	10.38	1.78	13.12	38.26	45.02	5.52	32.57	49.06
Malaysia	5.71	4.40	42.40	28.13	35.51	3.90	27.29	187.61
Thailand	4.25	3.81	48.32	29.06	31.20	3.22	32.76	118.56
Turkey	4.17	2.72	43.56	21.10	17.71	43.40	20.73	46.88

Source: The World Bank (2014), World Development Indicators.

rate averages are much higher in the Latin American countries and Turkey than in Asian countries. The trade openness index is also higher in the Asian countries than in the others, the two highest numbers belonging to Malaysia and Thailand.

Economists emphasize the importance of public expenditures, especially on education for sustainable growth. As public spending on education increases the quality of human capital, it is assumed to contribute positively to GDP. Increases in savings and investments are also expected to have a positive impact on GDP. Since a high inflation rate is considered to be an indicator of poor macroeconomic performance, it is expected to have a negative influence on economic growth.

Manufacturing value-added is also positively correlated with the GDP. A high amount of external debt and debt service burden is not desirable as it leads to lower capital formation. Therefore, we expect to see a negative correlation between debt and GDP growth. Economists with a liberal view (especially those Washington Consensus economists) advocate the necessity of trade openness as a precondition for economic development. As they believe that the open economies will grow faster, the trade openness variable has also been added to the model. One can consider these seven cross-sectional (independent) variables as among the most important indicators of economic growth.

Derviş (2012) finds a trend of "new convergence" as the average *per capita* incomes in emerging market and developing economies, taken as a whole, began to grow much faster than in the advanced economies since roughly 1990. The growth performance of the HPAEs as a good example for such countries and the "lost decade" behind the Latin American countries may signify a period of new momentum for growth in the developing world. This paper also takes the last two decades (1992-2012) as its study period to see the above specified variables' impact on economic growth.

The panel regression equation for the seven cross-section variables is

$$Y_{it} = \alpha_i + \beta_{1i}X_{it} + \beta_{2i}X_{it} + \beta_{3i}X_{it} + \beta_{4i}X_{it} + \beta_{5i}X_{it} + \beta_{6i}X_{it} + \beta_{7i}X_{it} + u_{it} \quad (1)$$

The Hausman test has shown that the fixed effect model would yield inconsistent estimators. Therefore, with the random effect model being employed here, we tested the equation:

$$Y_{it} = \beta_{1i}X_{it} + \beta_{2i}X_{it} + \beta_{3i}X_{it} + \beta_{4i}X_{it} + \beta_{5i}X_{it} + \beta_{6i}X_{it} + \beta_{7i}X_{it} + \alpha_i + u_{i+}\varepsilon_{it} \quad (2)$$

or inserting the variable names,

$$Y_{it} = \beta_{1i}EDU_{it} + \beta_{2i}EXD_{it} + \beta_{3i}GFI_{it} + \beta_{4i}GS_{it} + \beta_{5i}INF_{it} + \beta_{6i}MAN_{it} + \beta_{7i}TR_{it} + \alpha_i + u_{i+}\varepsilon_{it}$$

4. Results

An augmented Dickey-Fuller (DF) test was performed to check the stationarity assumption of the regression residuals. According to the DF test results, as p-values for trend are very small (<.001) for the Tau and Rho test statistic, the null hypothesis of unit root is rejected for all α levels.

Thus, the data are stationary and can be analyzed by using a time trend in the regression model. For separate analyses for five Latin American and five Asian countries (whether Turkey is included or not in these separate analyses), the AR(0) model has been used. Since the p-value for AR(1) is smaller than a 5% significance level only when we use all the 11 countries together, the AR(1) model can be employed. For an AR(1) process with a positive Rho (φ), only the initial condition and the noise term contribute to the output. But, as the Rho (φ) value is close to zero, (-0.1914), the process will still look like white noise. Therefore, the models are not autoregressive.

The results of the econometric tests (run by the SAS 9.2 package program) for the whole data set (11 countries) are summarized in Table 2. As seen in the table, the most meaningful and strongest impact on growth is displayed by the external debt variable (EXD). When the external debt of a nation increases its negative impact on growth seems inevitable. As expected, the investment variable (GFI) is also significant at a 0.05 percent level, showing the positive contribution of investments on economic growth. The manufacturing value-added variable is also significant, but at a 10 percent level.

The education (EDU) coefficient has the unexpected sign. Spending on education would not lead to lower economic growth, but it means that there is no relationship between education and growth for at least some of the countries. Spending on education contributes to economic growth if it is compatible with work that people do after school. In many developing countries, there are universities that educate students to become aerospace engineers. When these students graduate, they cannot find jobs in their own countries, and they try to emigrate to some industrialized countries. If these people, including many arts and science graduates, cannot move to other countries, they may have to accept jobs that are irrelevant to their education, including menial work. Without relevant or appropriate employment, irrelevant and inappropriate education typically leads to waste in human capital formation, and brain drain.

The negative sign of the savings coefficient can also be explainable. In spite of low savings, investments in a country may be high because

TABLE 2 - *Test Results for Eleven Countries*

Variable	Coefficient Estimate	Standard Error	t-value
EDU	-0.88244	0.3477	-2.54
EXD	-0.07207	0.0142	-5.09
GFI	0.16502	0.0567	2.91
GS	-0.08406	0.0478	-1.76
INF	-0.00052	0.0012	-0.42
MAN	0.153153	0.0802	1.91
TRO	0.001678	0.0107	0.16

of foreign direct investment and speculative (portfolio) inflows. This is sometimes the case in the non-Asian countries of our sample. The inclusion of the inflation rate as a measure of macroeconomic instability may be debatable. However, many economists consider it to be the result of poor macroeconomic policies, even though it is associated with expansionary policies in many cases. Thus, it is not implausible to see no influence of this factor on growth.

The trade coefficient is not significant either. The World Bank economists always recommend the liberalization of trade and financial markets, and exalt the East Asian countries for so doing. But, these countries had even higher growth rates when they were following industrial policies three decades ago. A country may open itself up to the outside world, without achieving a sustainable growth. Turkey may be an example in this respect. The country has followed more liberal policies than the HPAEs since 1980, and liberalized its financial markets even before the European countries, but failed to attain the sustainable high growth rates of the Asian countries.

Separate tests have been carried out for the Latin American group and the Asian group. As seen in Table 3, the most meaningful coefficients for the five Latin American countries were the external debt (at a 10 percent level), educational expenditure (at a 5 percent level) and the manufacturing value-added (at a 5 percent level). The debt coefficient was relatively small. Since the random effect model was not appropriate for the group of five Asian countries, a fixed

effect model has been employed. Again, the most significant factor is the external debt (at a 0.05 percent level). The results show that the most important factor that influenced the economic growth in these countries was the existence of external debt.

When Turkey was included, in turn, to these two groups (making six countries in each group), the external debt was again the most significant variable. In the Five-Asia plus Turkey group, external debt (at a 5 percent level) and fixed capital formation (at a 1 percent level) were the significant estimators. For the Five-Latin plus Turkey group, the only meaningful coefficient was the external debt (at a 5 percent level).

TABLE 3 - *Test Results for the Asian and Latin American Groups*

Variable	Asian Group		Latin American Group	
	Coef.	t-value	Coef.	t-value
EDU	0.061867	0.11	-1.22688	-2.28
EXD	-0.05743	-3.11	-0.0406	-1.77
GFI	0.081657	1.57	0.10604	0.62
GS	0.055386	0.69	-0.05445	-0.89
INF	-0.04966	-1.26	-0.00128	-0.81
MAN	0.244374	1.26	0.431915	2.35
TRO	-0.01462	-0.64	0.011413	0.27

5. CONCLUSIONS

The rapid development of the HPAEs between 1960 and 1990 was seen as a "miracle" by some commentators, and the successful policies followed by these countries were recommended to other developing countries by the economists of the major international institutions. The HPAEs achieved their successful growth by devising policies to increase not simply their GDPs, but the welfare of their

nation. They created an effective system of public administration, provided efficient education for their people, increased life expectancy by giving free basic health care to their nation, reduced population growth and improved the income distribution. They carried out land reform and invested significantly in rural infrastructure. Governments intervened systematically and planned investments together with business people. The presence of a well-educated and competent bureaucracy insulated from the political process helped avoiding rent seeking activities. Towards the end of this period, they adopted more liberal export-promotion policies and increased their foreign currency incomes. These were desirable developments for any developing country around the world. The Latin American countries and some others have been criticized for undergoing opposite developments. Some of these Latin American countries which were quite successful with their import substitution industrialization (ISI) policies, had achieved high growth rates in earlier decades. However, their ISI policies were not as refined as the policies followed in Asia. Between 1960 and 1974 (the year that the negative impact of the first oil crisis was felt), the Brazilian economy grew at an average of 7.6 percent. During the same period, Mexico had a respectable 6.76 percent growth rate, and Colombia had 5.62 percent (World Bank, 2014).

This study's finding of external debt as the most important factor on growth is both surprising and instructive. It is surprising because one expects to see other factors tested here (or similar ones) playing a role in economic growth. The growth economists emphasize that the high growth and convergence are conditional depending "on things that economies do and get right" (Rodrik, 2012).

Kunio (1994) also maintained that the one important condition was the transformation of the economy from low value-added products to high value-added ones, and that requires (i) disciplined and educated workers, (ii) good personnel management, (iii) high capital investment, and (iv) ability to develop technology, as it happened in Japan. It is instructive because it means that countries should stay away from the policies that eventually make them borrow from the outside. Week's (2000) study of growth in Latin America and the HPAEs had also found the debt service burden as a major determinant of slower growth in Latin America. After analyzing the evidence that shows how the growth performance of both groups differed, he tested a growth model (in the basic Harrod-Domar framework) that included four economic and one dummy variable for the 1970-1995 period. Of these the debt-service variable came

out to be the most significant one at a 1 percent confidence level. It is known that the Latin Americans and many other developing countries have had large amounts of external debt as a consequence of the populist policies they had followed before. Thus, the most important issue may be the improvement of the political system that would restrict the governments' ability to use populist policies and crony capitalism.

Filiz Karaman
Yıldız Technical University, Istanbul, Turkey

E. Tomris Aydogan
Yeditepe University, Istanbul, Turkey

V. Necla Geyikdagi
Yeditepe University, Istanbul, Turkey

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ABSTRACT

This paper tries to investigate some of the major factors considered to be of importance for economic development. Five countries from Asia (China, Indonesia, Malaysia, South Korea and Thailand) and five from Latin America (Argentina, Brazil, Colombia, Mexico and Venezuela) with the addition of Turkey, believed to resemble these Latin American countries in her development experience, were examined by a panel regression analysis. The model included seven cross-sectional variables (educational expenditures, external debt, gross capital formation, savings, GDP deflator, manufacturing value added and trade openness) for 21 years from 1992 to 2012 inclusive. The test results indicate that the most important factor influencing the economic growth of these countries was their external debt which possibly prevents or delays the convergence of the borrowing countries' incomes with those of the high income countries. The gross capital formation and the manufacturing value-added variables were also significant, though, to a lesser extent.

Keywords: Economic Convergence, Panel Analysis, Asia, Latin America
JEL Classification: O20, O47, O53, O54, O57

RIASSUNTO

Convergenza economica: un'analisi panel di variabili di crescita in una selezione di paesi asiatici e dell'America del Sud

Questo studio ha lo scopo di esaminare alcuni dei maggiori fattori considerati importanti per lo sviluppo economico. Cinque paesi asiatici (Cina, Indonesia, Malesia, Corea del Sud e Tailandia) e cinque dell'America Latina (Argentina, Brasile, Colombia, Messico e Venezuela) più la Turchia, in quanto la sua esperienza di sviluppo è ritenuta simile ai paesi del sud America presi in considerazione, sono stati esaminati attraverso una analisi *panel regression*. Il modello ha incluso sette variabili trasversali (spesa per l'istruzione, debito estero, formazione del capitale lordo, risparmio, deflazione del PIL, valore aggiunto della produzione e apertura commerciale) per un periodo di 21 anni, 1992-2012. I risultati dei test indicano che il fattore più importante che influenza la crescita economica di questi paesi è il loro debito estero, che talvolta previene o ritarda la convergenza dei redditi dei paesi debitori con quelli dei paesi ad alto reddito. La formazione del capitale lordo e il valore aggiunto del settore manifatturiero risultano anch'essi significativi, seppure in misura inferiore.