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Trade Liberalization, Economic Growth and Convergence: Evidence From East Asian Economies

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Abstract

In recent years most studies analyzing cross-country convergence have ignored the role of international trade, simply framing the analysis in a Solow world. These models then have very limited power in explaining the economic growth of East Asia, given that East Asian integration is largely due to the market-driven forces, trade induced by foreign direct investment (FDI). This paper investigates the interrelationship between regional integration and economic convergence by linking income convergence to intra-regional trade and FDI. A central focus of the model is on how the degree of market integration driven through trade and FDI interacts with income convergence among the East Asian countries during the period 1960-1996. We shed light on the significance of trade openness, liberalization and regional integration in contributing to cross-country income convergence.

• **JEL Classifications:** Trade liberalizon, Growth, FDI

• **Key Words:** F15

I. Introduction

In the past decades East Asia experienced not only strong economic performance, but also rapid and spontaneous integration. The most important evidence cited to support East Asian integration is its remarkably increasing interdependence among the East Asian economies[1] through trade and investment.

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Differing from the integration in Europe and North America, East Asian integration has occurred in the absence of a formal institutional framework, market-driven in nature. It is the international firms that create linkages across borders in their search for profitable opportunities through trade, foreign direct investment (FDI), technology contracts, and other arrangements in accordance with changes in comparative advantage and industrial upgrading in these economies. Policies such as preferential trading arrangements have traditionally not played much of a role in the integration of East Asian economies.[2] Such trends toward spontaneous regional integration result from progressive outward orientation of individual economies trade and investment policies and unilateral liberalization of goods and capital markets (Dobson and Chia, 1997).

How do the trade-FDI linkages drive regional integration and affect the income convergence? Most recent studies analyzing cross-country convergence have ignored the role of international trade and investment, simply framing the analysis in a Solow world. These models then have very limited power in explaining the East Asian economic dynamism, given that East Asian integration is largely due to the market-driven forces, trade induced by FDI. This paper aims at investigating the relationship between regional integration and economic convergence by taking account of trade and FDI. A central focus of the model is on how the degree of market integration driven through trade and FDI interacts with income convergence among the East Asian countries during the period 1960-1996. We shed light on the significance of trade openness, liberalization, FDI flows and regional integration in contributing to cross-country income convergence.

This paper is organized as follows. In section 2 we briefly discuss the concept of convergence and the theoretical framework for our empirical study. Sections 3 and 4 discuss the statistical model designed to test our hypothesis of convergence in East Asia, and the empirical results. In section 5 we test the proposition that East Asia will converge to the level of incomes in the lead country of Japan. And the final section concludes the paper.

[1]In this study, we define the East Asian economies as China, Hong Kong, Indonesia, Japan, South Korea, Malaysia, the Philippines, Singapore, Taiwan, and Thailand. The Asian NIEs include Hong Kong, South Korea, Singapore and Taiwan.

[2]For instance, although such arrangements have existed in the Association of Southeast Asian Nations (ASEAN) since 1977, the intra-ASEAN trade as a percentage of its total trade has barely increased from about 15% in 1976 to 17.7% in 1992 (Zhang and Ow, 1996). On the other hand, the fastest trade growth within the region has been the growth of trade with China since 1979, and this has occurred in the absence of formal trade arrangements.

II. The Theoretical Framework

One of the corollaries associated with the neoclassical growth models, such as Ramsey (1928), Solow (1956), Cass (1965), and Koopmans (1965), is that the growth rate of per capita income of an economy is inversely related to its starting level of per capita income. Thus, poor economies tend to grow faster than rich ones, so that the poor economies tend to catch up with the rich ones. In other words, there is a tendency for convergence in level of per capita income across economies in the long run.

The equation for testing convergence is derived from the neo-classical Solow type growth model incorporating a Cobb-Douglas production function with constant returns to scale. In essence it is a log-linear approximation of the transition path towards the steady-state value, and it can be written *à la* Barro and Sala-i-Martin (1991):

$$(1/T)log(y_{i,t}/y_{i,t-T})=\alpha-\{log\ (y_{i,t-T})\}(1-e^{-\beta T})(1/T)+other\ variables \qquad (1)$$

where $(y_{i,t-T})$ is GDP per capita in country i at the beginning of the interval, $(y_{i,t})$ is GDP per capita in country i at the end of the interval, T is the total length of the interval, β is the annual rate of convergence, and other variables are explanatory as well as dummy variables. If the rate of convergence is positive, i.e. $\beta>0$, then the data set is said to exhibit β-convergence. The higher the β value, the greater the responsiveness of the average growth rate to the gap with its steady state value, that is, the more rapid the convergence to the steady state. This outcome is referred to as *absolute β-convergence* in Barro and Sala-i-Martin (1991) because in the neoclassical model per capita incomes are supposed to converge irrespective of the structural characteristics of the economies in the sample. This compares with the *conditional β-convergence* (Barro and Sala-i-Martin, 1992; Sala-i-Martin, 1996) where per capita incomes of countries which display similar structural characteristics tend to converge in the long run irrespective of their initial level of output. The conditional convergence and the absolute convergence hypotheses coincide only if all the economies have the same steady state (Sala-i-Martin, 1996).

If the dispersion of per capita incomes of a group of economies around the mean tends to decrease over time the group is supposed to display sigma convergence, *or σ-convergence.* Sala-i-Martin (1996) states that β-convergence is a necessary, but not a sufficient condition for σ-convergence: the latter relates to

whether or not the cross-country distribution of world income shrinks over time, and the former relates to the mobility of different individual economies given the distribution of world income.

How is trade liberalization correlated with economic convergence? Does international trade cause per capita income convergence across countries? The existing literature on this issue offers a mixed result. Grossman and Helpman (1991), Matsuyama (1992) and others have examined the relationship between trade openness and long-run growth and found that a country that is behind in technological development can be driven by trade to specialize in traditional goods and experience a reduction in its long-run rate of growth. Bernard and Jones (1996) provide some evidence that freer trade causes income to diverge across countries since "in the tradable-goods sectors, comparative advantage leads to specialization, and to the extent that countries are producing different goods, there is no a priori reason to expect the technologies of production to be the same or to converge over time" (p.1237). In contrast, Ben-David (1993, 1996) and Sachs and Warner (1995) have been among the first to present evidence linking trade to economic convergence. Ben-David (1993) analyzes the trade liberalization processes in Europe and North American, and finds that per capita income dispersion among liberalizing countries shrank after liberalization started. In Ben-David (1996), he finds that groups of relatively wealthy countries which trade significantly among each other tend to display significant per capita income conver-gence relative to the convergence patterns of randomly grouped countries in 1960-1989. With the classification of each country as either "open" or "closed" to inter-national trade, Sachs and Warner (1995) conclude that only the open economies display a strong tendency towards economic convergence, and that poor economies need to reduce trade barriers in order to catch up with rich economies.

III. Role of Trade and FDI in Economic Convergence

The essence of new growth theory is that human capital and technical progress are endogenous to the system, which are the important forces underlying economic growth and convergence. The adoption and accumulation of technologies determine relative output levels and growth rates. It is therefore crucial for the poor countries to acquire innovation, adoption and accumulation of technologies, learning by doing and learning by what others are doing, through proactively

promoting foreign trade and inward FDI, in order to catch up with the rich. Foreign trade provides the poor countries with a means of access to the new technologies, capital equipments, and new products in the world market which in turn spurs local firms to undertake innovative activities and enhance efficiency and competitiveness.

The major benefits of inward FDI conferred on host economies include a package of necessary capital, foreign exchange, technology, entrepreneurial and managerial skills, as well as gaining foreign market access. FDI is perceived as a conduit for an effective transfer of technology and human skills to host economies. Most importantly, through supplying foreign firms and establishing business linkages, local firms are able to learn by what foreign firms are doing and how to improve management efficiency and competitiveness in the market. Direct competition with foreign firms in producer and factor markets also promotes investment of local firms in human capital and research and development.

In order to test for the impact of foreign trade and FDI on economic convergence, we amend the standard equation of convergence to incorporate the variables of exports and FDI as proportions of GDP. Thus we rewrite equation (1) in the following form:

$$(1/T)log(y_{i,t}/y_{i,t-T})=\alpha-\{log\,(y_{i,t-T})\}(1-e^{-\beta T})(1/T)+\gamma log(X_{i,t}/GDP_{i,t}) +\eta log(FDI_{i,t}/GDP_{i,t})+\varepsilon_{i,t,t-T} \quad (2)$$

where $\varepsilon_{i,t,t-T}$ is a distributed lag of the error terms between t and t-T. Equation (2) argues that the degree of exposure to international trade and foreign investment plays a significant role in the convergence of per capita GDP across the economies. In particular, we postulate that with trade liberalization and favorable FDI policies in the East Asian economies during the past decades, the convergence of income per capita in the region will result. In the next section we test this proposition using data spanning from 1960 to 1996 for the ten East Asian economies. We will also shed light on the existence of convergence clubs in which some countries converge faster to the level of incomes in the lead country of Japan than the others.

IV. Empirical Evidence on East Asian Convergence

The major sources of data are IMF: International Statistical Statistics, various issues, UN: World Investment Report 1992-1996, and the Penn World Tables

(Mark 5.6). Due to the lack of government statistics of FDI data, we use the total outward FDI to Hong Kong by OECD countries as a proxy. We take 1985 as the base year for real per capita income in each economy. We use two groups of data in our estimation: annual data and panel data. Annual data refers to the average annual growth rate of per capita GDP for the period in 1960-1996 for all the ten East Asian economies. Panel data sets are obtained by dividing the time span into eight subperiods and pooling them in regressions. Panel data allows for fixed time effects. By pooling these subperiods in regression, we also increase substantially the number of samples which generate a large degree of freedom in estimation and render the estimation more reliable. It is assumed that all the subperiods have identical β coefficient (Barro and Sala-i-Martin, 1995).

A. β and σ Convergence:

Panels A and B of Table 1 show the nonlinear least squares estimates in the standard convergence equation (1) for the East Asian economies for various time periods using both annual and panel data. When the equation is estimated for the entire sample of the 10 economies utilizing annual data, the β coefficient is not only statistically insignificant, but also bears a negative sign. Similar result is produced when we exclude Japan or the Philippines from the model estimations. For the period from 1970 to 1996, the sign of the β coefficient changes to positive though still not significant. When the estimates reported in Panel B use the panel

Table 1. Estimations of Convergence

Data set	β coefficient	No. of obs.	R^2
Panel A: Annual Data Estimations:			
East Asia 10 (1960-1996)	–0.0002 (0.0003)	10	0.069
East Asia 10 (1970-1996)	0.00041(0.0073)	10	0.0004
EA excluding Japan, 1960-96	–0.0003(0.0002)***	9	0.084
EA excl. Philippines, 1960-96	–0.0002(0.00015)	9	0.17
NIEs and Japan 1960-1996	0.0105(0.0049)**	5	0.692
Panel B: Panel Data Estimations:			
East Asia 10 (1960-1996)	0.0042 (0.0029)***	80	0.03
East Asia 10 (1970-1996)	0.0111(0.0041)*	60	0.118
EA excluding Japan, 1960-96	0.0043(0.0034)	72	0.023
EA excl. Philippines, 1960-96	0.0062(0.0033)**	72	0.051
NIEs and Japan (1960-1996)	0.0161(0.0047)*	40	0.252

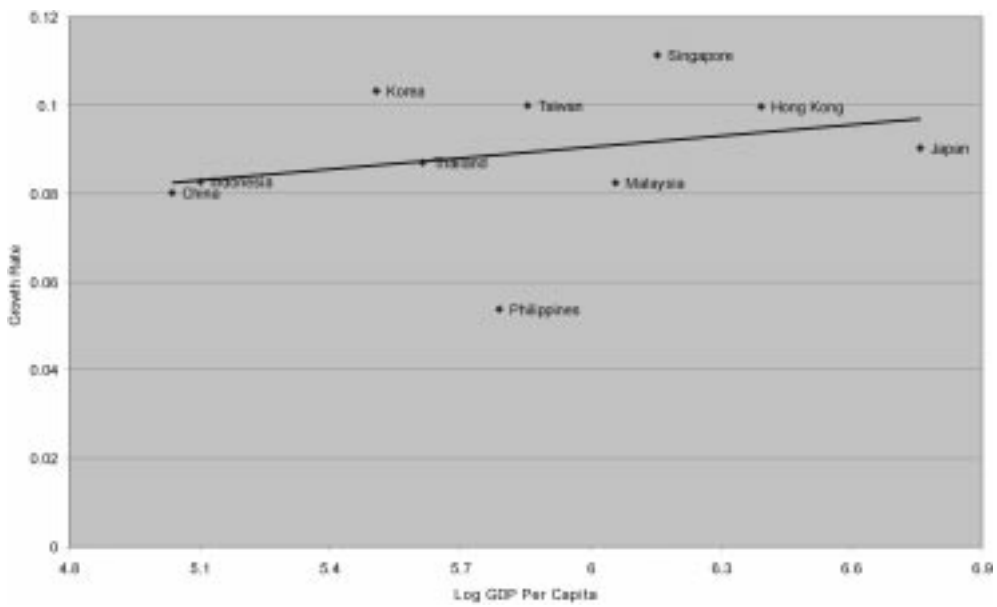
Notes: The regression uses non-linear least squares to estimate equation (1), and the constant that has been estimated is not reported in the table. Figures in parentheses are standard error. *(**, ***) indicates significance at the 1% (5%, 10%) significance level.

data sets, the sign of the β coefficient turns out to be positive and statistically significant. This seems to suggest that the East Asian economies have experienced β convergence at the speed of around 0.6% per annum in 1960-1996. This compares with the estimated speed of convergence of around 2% in the OECD countries (Sala-i-Martin, 1996).

The results in Table 1 suggest that the ten East Asian economies have experienced tendency to converge since 1970. When regression uses panel data, the estimated speed of convergence is β =0.011 and significant at the 1% level for the period in 1970-1996. Most notably, the four Asian NIEs and Japan have converged substantially in 1960-1996 at an estimated speed of convergence ranging from 1.1% to 1.6% per year using different data sets. We have tried to estimate the convergence equation for the subgroups of East Asia, but in none of the cases is convergence within the subgroup significantly found (Table 1). For comparison purpose, we also estimated the Ben-David version of the convergence model (Ben-David, 1993) and obtained similar results (available on request) to our panel data estimations.

We now analyse the existence of β-convergence across the sample period for the ten economies visually. In Figure 1, we put the log of GDP per capita in 1960 on the horizontal axis, and the average growth rate between 1960 and 1996 on the vertical axis. The figure shows that the relation between growth and the initial

Figure 1. Convergence across countries: 1960-1996.



level of income among the East Asian economies is positive, with a correlation coefficient of 0.2812. This is consistent with our earlier finding of lack of β convergence for the entire sample of East Asian economies. As a matter of fact, divergence within the East Asian group is most substantial during the 1960s (Figure 2). The correlation coefficient between the growth rate and the log of initial per capita GDP is 0.7858 in 1960-1970. Although it is still far from impressive, Figures 3 and 4 already show a sign of convergence for the East Asian

Figure 2. Convergence across countries: 1960-1970.

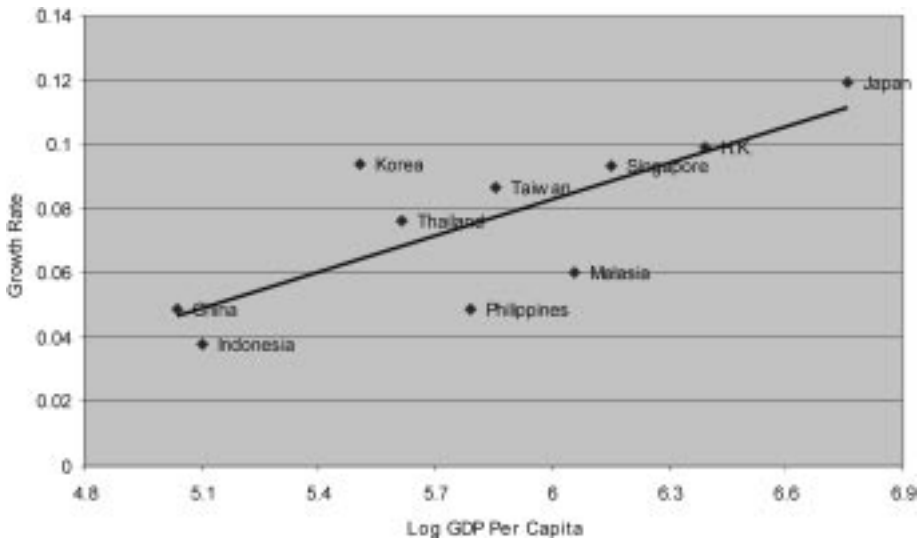
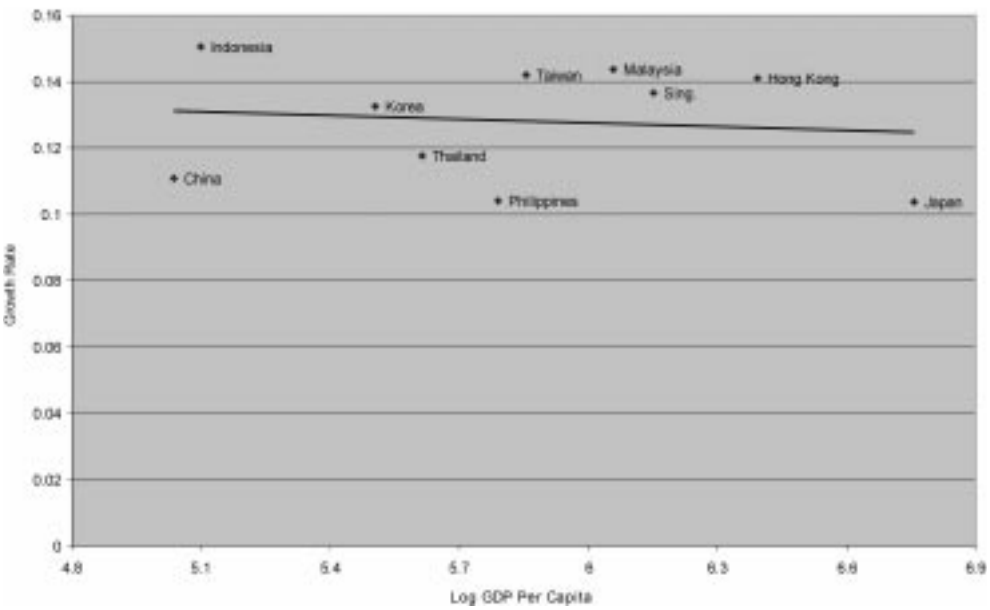


Figure 3. Convergence across countries: 1971-1980.



economies in the 1970s and in 1981-1996. The correlation between growth and the initial level of GDP per capita is –0.0564 in 1971-1980 and –0.0917 in 1981-1996, respectively.

To assess the extent to which there has been σ convergence across the East Asian economies, we display in Figures 5 and 6 the behaviour of the dispersion of GDP per capita for the entire sample and the subgroups of East Asian Economies. As seen in Figure 5, the dispersion of per capita GDP for East Asia 10 increased

Figure 4. Convergence across countries: 1981-1996.

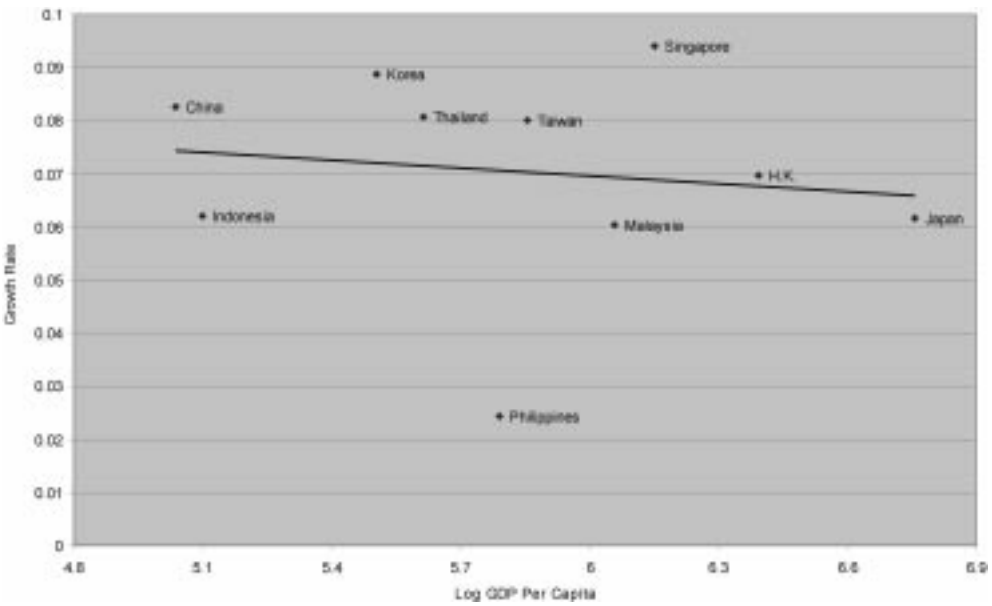
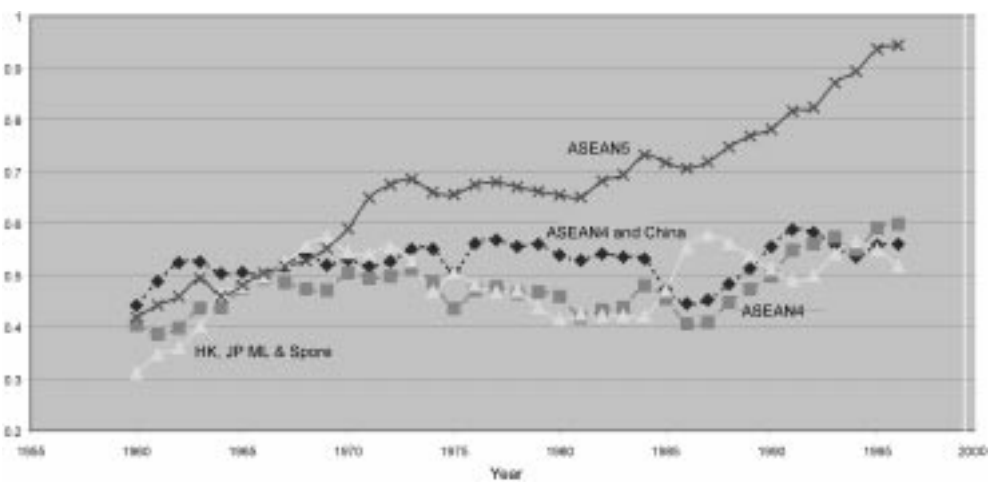


Figure 5. The Dispersion of GDP per capita: East Asian 10, and NIEs4 and Japan.

rapidly from 0.2355 in 1960 to 0.3588 in 1973, and then fluctuated around this value until the mid-1980s. After 1985, it rose again to 0.40 in 1991 and remained till 1995 before it dropped to 0.39 in 1996. For the subgroup of the four Asian NIEs and Japan, the dispersion of GDP per capita increased in the 1960s and then decreased dramatically until 1991 before increased again in the subsequent years. However, Figure 5 does show an overall downward trend in the cross-economy standard deviation for per capita GDP in the NIEs and Japan from 1960 to 1996. For the rest of East Asia, there is no a clear tendency of σ convergence during the sample period (Figure 6). It is noted that the reduction in cross-economy dispersion of income over time in ASEAN4 and China was not clearly determined up to the early 1980s. A substantial σ divergence was the dominant phenomenon for these economies in 1986-1992. There are two major factors responsible for this divergence: the 1985 economic recession in some ASEAN economies and Chinas rapid economic growth during the period. Since then, the degree of cross-economy income inequality tends to decrease over time. As a matter of fact, ASEAN4 as a subgroup show a similar dispersion pattern of per capita GDP to the subgroup of ASEAN4 and China. For ASEAN5, there is a clear trend of σ divergence during the sample period. Thus, Singapore is the major driving force for the degree of cross-country income inequality in ASEAN.

In line with our late analysis of convergence clubs, we have also plotted the dispersion of GDP per capita among the economies of Hong Kong, Japan, Malaysia and Singapore in Figure 6. These economies show a σ divergence trend in the 1960s, and afterwards a rapid convergence in GDP per capita until the mid

Figure 6. The Dispersion of GDP per capita by subgroups



1980s. The rising of dispersion of GDP per capita since 1985 is apparently a reflection of the economic recession that occurred in Singapore and Malaysia in 1985 and 1986. The rapid economic growth since then has led these economies to convergence in the late 1980s and 1990s.

B. Role of Trade and FDI in Convergence

We now turn to the study of the role of foreign trade and FDI in cross-economy income convergence. We use annual average value of FDI and exports as a proportion of GDP of each individual economy in our estimations to reflect the effects of trade and FDI liberalization in these economies. We first estimate equation (2) by focusing on the impact of FDI on cross-economy income

Table 2. Estimations of Convergence with FDI and Exports as Additional Variables

Data set	β coefficient	Exports	FDI	R^2
Panel A: Annual Data:				
East Asia 10 (1960-1996)	–0.0034 (0.006)	0.0282(0.0086)*	–0.0104(0.006)***	0.657
East Asia 10 (1970-1996)	–0.008(0.0056)***	0.0228(0.009)**	–0.0033(0.007)	0.678
EA10 excl. Japan, 1960-96	–0.003(0.0072)	0.030(0.011)**	–0.013(0.0104)	0.659
EA10 excl. Philippines, 1960-96	–0.0034(0.0069)	0.0298(0.0105)*	–0.011(0.007)***	0.631
NIEs and Japan 1960-1996	0.0108(0.0016)*	0.0022(0.0008)**	0.0002(0.0002)	0.989
Panel B: Panel Data:	0.0036 (0.0055)	0.024 (0.011)**	–0.0085(0.006)***	0.128
East Asia 10 (1960-1996)	–0.001(0.0057)	0.0338(0.0116)*	–0.0113(0.0064)**	0.218
East Asia 10 (1970-1996)	0.0034(0.006)	0.029(0.014)**	–0.0136(0.0106)	0.137
EA10 excl. Japan, 1960-96	0.0028(0.0057)	0.0245(0.013)**	–0.0084(0.007)	0.109
EA10 excl. Philippines, 1960-96	0.0289(0.008)*	0.0325(0.014)**	–0.008(0.005)***	0.467
NIEs and Japan (1960-1996)	–0.0034 (0.006)	0.0282(0.0086)*	–0.0104(0.006)***	0.657

Notes: The regression uses non-linear least squares to estimate equation (2), and the constant that has been estimated is not reported in the table. The number of observations in each estimation is the same as the ones reported in Table 1. Figures in parentheses are standard error. *Indicates significance at the 1% significance level, **Indicate significance at the 5% significance level, and ***Indicate significance at the 10% significance level.

convergence using both annual and panel data sets. The results (available on request) do not indicate that East Asian economies significantly converge over the entire sample period. For the subgroup of Asian NIEs and Japan, the inclusion of FDI as an additional variable has not only produced a significant positive coefficient of FDI, but also led to a slight increase in the magnitude of β coefficient. The effects of FDI in other subgroups are not statistically significant.

Table 2 presents the estimates using both annual and panel data sets. When both FDI and exports are included in the estimations, the estimated β coefficient remains insignificant, but is substantially higher than in the previous case for the entire sample period. As seen in Panel B, the β coefficient is positive and more than doubled comparing with the coefficient in Table 1. For the period from 1970 to 1996, the estimated β coefficients in both panels show a negative sign and significant at the 10% level using annual data. Exports have a positive and significant coefficient in both panels which confirm the positive impact of trade liberalization on the cross-economy income inequality over time. However, the estimated coefficients of FDI are negatively signed. One possible explanation is that the kind of FDI that some of the East Asian developing economies attracted is essentially of the tariff jumping variety which may result in immiserizing growth in the host economies (Bhagwati, 1973). Moreover, of the total FDI flows in these economies, the bulk are injected in the labour-intensive industries with low value-added which in most cases are the industries and sectors that the source countries have been losing comparative advantage relative to the host countries (Zhang and Ow, 1996). It is more evidenced that FDI in these industries is less likely to speed up the catching up of these economies to the target economies because investment in the latter economies focuses on high value-added and capital and technology-intensive manufactures. Chinas recent move towards the policy of selective FDI is basically a response to this issue. Finally, the complementary feature of exports and FDI is another factor to explain the negative impact of FDI on economic convergence.

In contrast to the case of the whole sample group, FDI and exports not only play a crucial role in the economic development of Asian NIEs and Japan, but also exhibit a much larger impact on these economies income convergence than without them. With the inclusion of exports and FDI, the speed of convergence within Asian NIEs and Japan is β =0.0289, or 2.89% annually with a significance level of 1%. This to a certain extent explains the role of free trade in promoting growth and income convergence.

Table 3. Estimations of the Direct Impact of FDI and Exports on Convergence

Data set	Constant	Exports	FDI	R^2 (SEE)	F-stat
East Asia 10, 1960-1996	0.0853 (0.007)*	0.0554 (0.021)**	–0.334 (0.194)***	0.529 (0.016)	3.926
NIEs and Japan, 1960-1996	0.109 (0.004)*	0.0134 (0.009)***	–0.0598 (0.076)	0.624 (0.0047)	1.659
ASEAN4 and China, 60-96	0.044 (0.01)*	0.0327 (0.061)	–0.0671 (0.542)	0.336 (0.016)	0.506

Notes: The regression uses ordinary least squares to estimate b as a function of FDI and exports as proportions of GDP. Figures in parentheses are standard error. *Indicates significance at the 1% significant level. **Indicates significance at the 5% significant level. ***Indicates significance at the 10% significant level.

The role of foreign trade in promoting convergence is further ascertained when we try to estimate the direct impact of exports and FDI on the β-coefficient. This is done by first estimating recursively the standard convergence model, and then using the recursive coefficients of β to estimate β as a function of FDI and exports as proportions of GDP. The empirical results, as shown in Table 5, confirm our earlier conclusion that exports have a positive, significant impact on the β convergence, while FDI negatively affects the β convergence, for the whole sample period of the ten East Asian economies. Though not significant, it is seen that the negative influence of FDI on convergence is smaller in the sub-group of Japan and NIEs 4 than that in the group of ASEAN 4 and China.

V. A Test of Convergence Club

In order to test the proposition that the four Asian NIEs converge faster to the income level in the lead country of Japan than the rest, we adopt a cubic equation which has been formulated by Chatterji (1992). This is to allow the existence of mul-tiple convergence equilibria among the economies. We estimate the following model:

$$Z_t = a_1 Z_{t-1} + a_2 Z_{t-1}^2 + a_3 Z_{t-1}^3 \quad (3)$$

where Z_t = the logarithm of per capita GDP(Japan) in 1996 minus the logarithm of per capita GDP of country i in 1996; and Z_{t-1}= the logarithm of per capita GDP(Japan) in 1960 minus the logarithm of per capita GDP of country i in 1960. If coefficient a_1 is less than one and coefficient a_2 as well as coefficient a_3 are equal to zero, then there is a strong convergence to the per capita income of the

lead country by all economies. If coefficient a_3 is equal to zero, and coefficients a_1 as well as a_2 are positive, then some countries converge strongly to the leader and form an exclusive convergence club from which the remaining countries are excluded. If coefficients a_1, a_2 and a_3 are all non-zero, then an inferior and a superior club can be identified. Estimation of equation (3) relating the gap in 1996 to the gap in 1960 with 9 observations gives the following results (standard errors are reported in the parentheses):

$$Z_{1996}=0.3485^{*}\ Z_{1960}+1.1811^{*}Z_{1960}^{2}-0.4161^{*}\ Z_{1960}^{3} \qquad (4)$$
$$(0.25) \qquad (0.645) \qquad (0.301)$$

$$R^2_{adjusted}=0.501, SER=0.477$$

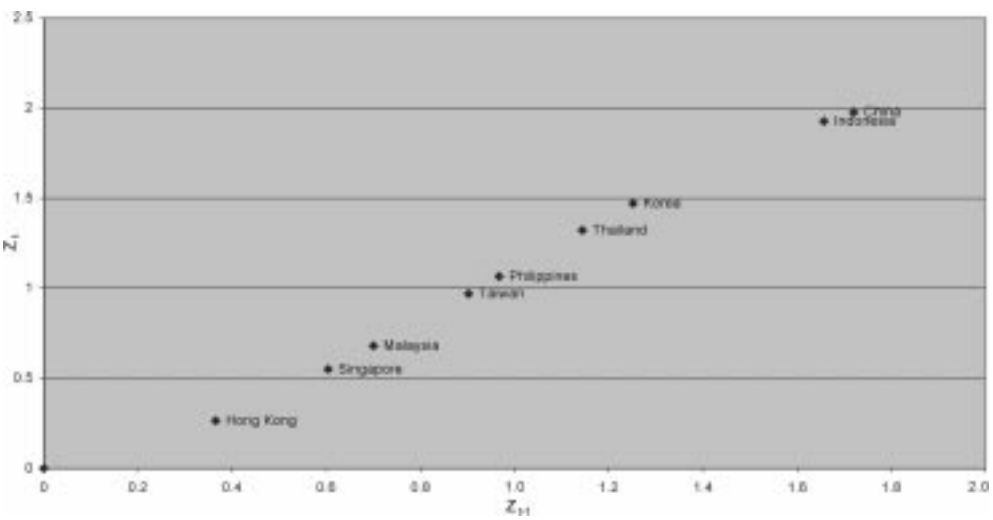
We also estimated equation (3) using panel data (with 72 observations) to incorporate the dynamics, and the results are as follows with standard errors in the parentheses:

$$Z_t=0.8157^{*}\ Z_{t-1}+0.2685^{*}Z_{t-1}^{2}-0.0842^{*}\ Z_{t-1}^{3} \qquad (5)$$
$$(0.155) \qquad (0.193) \qquad (0.057)$$

$$R^2_{adjusted}=0.934,\ SE=0.186$$

It shows that the estimates in equation (5) using panel data are better determined than those in equation (4). Since all three coefficients are significant at least at a 10% significant level, an inferior club and a super club must exist. Figures 7 and 8 represent the results from equations (4) and (5), respectively. It is interesting to

Figure 7. Convergence Clubs

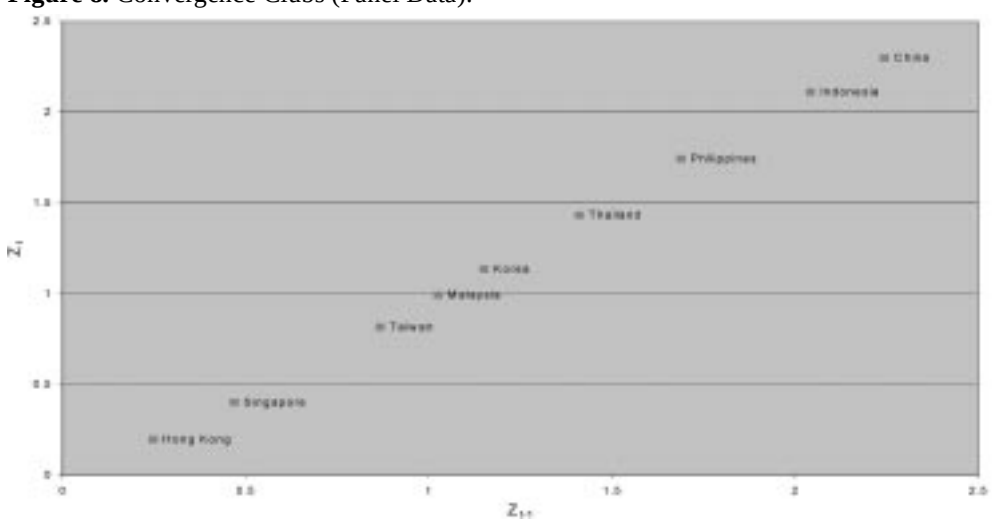


note that both figures indicate the three equilibria implicit in equation (3) labelled E_1, E_2, and E_3, but differ in which clubs the marginal economies have to be included. E_1 is the high equilibrium, representing strong convergence, and E_3 the low equilibrium representing low convergence. The middle equilibrium E_2 is unstable, indicating no convergence.

As shown in Figure 7, those economies with an initial gap of income less than Z_{t-1}=0.71 tend to converge toward the high equilibrium at E_1, however, those economies with an initial gap greater than 0.71 tend to converge toward the low equilibrium at E_3. This contrasts with a cutoff point of 1.15 as represented in Figure 8 based on panel data. Consequently, we observe two mutually exclusive convergence clubs: one for the "rich" economies and one for the "poor" where the cutoff point between the two is the initial gap of 0.71 (1.15 in the case of panel data estimation). In other words, those economies whose initial per capita GDP is about half (one third in the panel data case) or more of that of the lead country (Japan) belong to the high convergence club.[3] Apparently estimates in equation (4) conclude three economies in the high club, namely Hong Kong, Singapore and Malaysia, in which Malaysia is in the marginal case, while the results based on panel data estimation show that Korea and Taiwan are also the members of the "rich club". These economies in the high club tend to enjoy the same per capita GDP as Japan in the long run.

On the other hand, those economies with an initial per capita GDP less than half

Figure 8. Convergence Clubs (Panel Data).



[3]The natural logarithm of 2 (3.15) is approximately 0.71 (1.15).

(or one third in the panel data case) of the lead country belong to the low convergence club. These economies tend to converge toward another steady-state characterized by an initial per capita GDP approximately one-seventh (one-twelfth in the case of panel data estimation) that of the lead country (Japan).[4] The economies that belong to the low convergence club include China, Indonesia, Korea, the Philippines, Taiwan and Thailand (China, Indonesia, the Philippines, and Thailand in the second case). It is surprising to note that Korea is a member of the low convergence club or only a marginal member of the high club. Some special factors are clearly needed to account satisfactorily for the growth performance of Korea economy.

Our findings lend some support to the proposition that a liberal trade regime promotes convergence. In the high convergence club, it is noted that all the members pursue export promotion or liberal trade policies, while in the low club, inward looking import-substitution policies are still by and large the important policies pursued by some economies. This seems to be consistent with Sachs and Warner (1995) who show that the open group displays convergence, while the closed group does not.

VI. Conclusion

In this study, we have examined the interrelationship between regional integration and economic convergence in the East Asian economies by linking income convergence to foreign trade and FDI. Our results show that convergence within the 10 East Asian economies is very weak for the entire sample period of 1960-1996. With the inclusion of FDI and exports as additional variables, there is not much improvement in income convergence within the group. One possible explanation is that the kind of FDI that some of the East Asian developing economies attracted is mainly in labour-intensive industries with low value-added, and is essentially of the tariff jumping variety which may result in immiserizing growth in the host economies. However, there is a tendency for convergence in East Asia since 1970. This is supported by the estimated speed of convergence which is β =0.0111 and significant at the 1% level when panel data are utilized.

Most notably, the four Asian NIEs and Japan have converged substantially in 1960-1996, with the estimated speed of convergence ranging from 1.1% to 1.6%

[4]The natural logarithm of 7 (12) is approximately 2 (2.5).

per year depending on whether the annual or panel data are utilized. FDI and exports not only play a crucial role in the economic development of Asian NIEs and Japan, but also exhibit a much larger impact on these economies convergence than without them. With the inclusion of exports and FDI, the speed of convergence within Asian NIEs and Japan is β=0.0289, or 2.89% annually with a significance level of 1% when the panel data are utilized. This to a certain extent explains the role of free trade in promoting growth and income convergence. Finally, our results from estimating a cubic equation *à la* Chaterji (1992) imply that East Asia has been forming two convergence clubs, i.e. a high convergence club and a low convergence club. Those economies whose initial per capita GDP is half (one third in the panel data case) or more of that of the lead country (Japan) form the high convergence club, while those economies whose initial per capita GDP which is less than half (or one third) of the lead country belong to the low convergence club. Our results seem to suggest that in the long run the economies in the high convergence club tend to enjoy the same level of per capita GDP as Japan, while those in the low convergence club tend to converge towards another steady-state characterized by an initial per capita GDP approximately one-seventh (one-twelfth in the case of panel data estimation) that of the lead country (Japan). This has important implication for an economy when forming its development policy to catch up on its target leaders.

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