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ESSAYS ON ECONOMIC DEVELOPMENT AND INTERNATIONAL ECONOMICS

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ABSTRACT

I once traveled to many places in northeast China with the curiosity and eagerness of a college student. A few years later, I was fortunate enough to have the opportunity to drive through about fifteen states in the U.S. It is astonishing whenever I compare the different scenes in these two countries, and I believe any person who came from the rest of the world would be amazed by the high living standards in urban as well as rural areas, by the convenient transportation and communication, and even by the spacious land itself. Some people in the U.S. may never realize that the comfort and privilege they took for granted are the dreams and lifelong goals of people on the other parts of the same planet. This is the initiation of my passion to write issues associated with economic development and international economics. The main purpose of this dissertation is to provide more understanding about certain factors that may play important roles in economic growth and development.

The first essay, "Financial Systems and Economic Development," investigates the relationships between financial systems and the levels of economic development. The econometric model measures the cross sectional heteroskedasticity and time wise autoregression. This chapter finds that financial systems are related to economic development, and financial institutions and markets perform differently at different income levels. The higher the income, the bigger the positive impacts of financial markets, and the higher the significance levels; while financial institutions have stronger impact in upper and lower-middle income countries. International trade and education are positively correlated with growth rate, but government consumption and inflation have negative impacts on long run economic growth.

The second essay is entitled "Regional Economic Integration in East Asia." This chapter reviews the theory and the history of regional economic integration, and investigates the problems and prospects in the integration process in East Asia. Based on theory, there is no real economic integration in East Asia so far, but we believe that there are tremendous potentials and bright prospects for regional economic integration. East Asian countries would gain from the future regional cooperation and integration, and China's active involvement would not only improve regional economic prosperity, but also increase political stability and balance the world power.

The third essay, "Infrastructure as a Determinant of Foreign Direct Investment Inflows," attempts to investigate the role of infrastructure on foreign direct investment inflows. A comprehensive physical and governance infrastructure index is constructed with principal component analysis. The cross section study suggests that both physical and governance infrastructures are positively related with FDI. The random effects panel model indicates that Governance infrastructure has positive and significant impact on FDI, while physical infrastructure has mixed results. Governance infrastructure is an important determinant of FDI inflows, and it is necessary to improve the quality of governance infrastructure in order to attract foreign investment.

Chapter One

Financial Systems and Economic Development

1.1. Introduction

The impact and evolution of financial systems have not drawn the attention of the development economists till the past decade. In the Handbook of Development Economics (Chenery and Srinivasan 1988), for example, financial systems are not even mentioned once in the thirty three chapters which cover topics from the structural transformation to human capital, from planning and resource allocation to international aspects. However, according to Meier (2001), financial systems have now become one of the central research topics in the field of development economics: "It will be especially important to achieve a better understanding of the evolution of financial institutions in the process of a country's development... The new generation might also gain significant insights from more attention to the history of the evolution of markets and economic institutions as integral components of the development process."

Financial systems could be broadly divided into two categories: bank-oriented institutions which include banks, pension funds, and insurance companies; and market-based financial markets which refer to the organized markets for securities such as stocks, bonds, futures and options.[1] The development of economic growth theories, especially market failures is the main reason for stressing the importance of financial systems. Asymmetric information, transaction costs, adverse selection and moral hazard not only challenge the classical analysis of capital markets, but also call for more efficient financial policies and institutional interventions (Stiglitz 1989). In most Less

[1] This paper follows Allen and Gale's (2000) definitions about financial institutions and markets.

Developed Countries (LDCs) where financial repressions are common phenomena, the design of a proper financial system becomes more relevant to economic development. In fact, economic development is a complicated process and is determined and influenced by many factors. Thus it is difficult to have any firm conclusion on the impact of an individual factor. Nonetheless, it is now accepted by most scholars that well functioning financial systems mobilize savings between savers and investors, allocate investment, supervise managers, and ameliorate risks (Levine 1997, Rajan and Zingales 1998, etc).

In a recently published book, Allen and Gale (2000) describe the historical development of financial systems in five major developed countries (DCs): the United Kingdom, United States, France, Germany and Japan. They admit that a wide range of different systems have existed in industrialized countries, but they leave the fundamental questions for future research: "(Financial institutions and financial markets) Which is the best system in particular circumstances, do financial systems make a substantial difference to economic welfare, or are they simply veils that have little effect?" Allen and Gale's study does not include any LDCs, though the questions they mentioned are more crucial to the developing world. After the Second World War, the previous colonies in Africa, Asia and South America gained independence, and most of these new nations either have poorly developed financial systems, or have to build them from scratch. In contrast for most industrialized countries, the history of financial development could be dated back to the mid-nineteenth century. If indeed there are advantageous financial systems associated with specific economic development circumstances, then LDCs could speed up their development process and reduce the increasing gap between the developed and developing worlds.

The purpose of this research is to provide more understanding about financial systems and the level of economic development. We investigate whether financial intermediaries and markets have different characteristics among high, upper-middle, lower-middle and low income country groups.[2] Theoretically, financial systems should be positively correlated with real per capita Gross Domestic Product (GDP), which means the richer the country, the more active the institutions and markets. Furthermore, since mature financial markets require effective law enforcement and legal frameworks, convenient telecommunication and transportation structures, and a well-educated labor force, markets could be the privilege of most DCs. On the other hand, financial institutions such as banks and insurance companies should be more popular than markets in LDCs. If our empirical investigation is consistent with the theoretical hypothesis that financial systems are associated with development levels, it may be possible to form sound policy and design optimum strategies for countries under specific economic circumstances.

Our study includes 87 countries over a 24-year period from 1974 to 1997.[3] As far as we know, this is the first cross section and time series (pooled) examination on the relationships between financial systems and economic development stages using a large number of DCs and LDCs. The previous studies are dominated by cross section study (King and Levine 1993, Levine and Zervos 1998, Kunt and Maksimovic 1998, etc), country specific time series (Luintel and Khan 1999, Cetorelli and Gembera 2001, etc),

[2] The World Bank country classification is based on the 2000 Gross National Income per capita. It is calculated using the World Bank Atlas Method. The groups are: Low income, $755 or less; lower middle income, $756- $2,995; upper middle income, $2,996- $9,265; and high income, $9,266 or more. We also build dummy variables to represent different income groups, and empirically prove that it is legitimate to divide our sample into these 4 categories.

[3] Country name and group classifications are listed in Appendix A.

or pooled studies with a few well developed nations (Frankel and Montgomery 1991, Allen and Gale 2000, etc).

We construct a cross-sectionally heteroskedastic and timewise autoregressive model for the regression analysis: the disturbances are autoregressive, heteroskedastic and mutually independent. Again, this methodology is novel in the literature investigating the nexus of financial systems and economic development. The variables discussed by this paper are consistent with most previous research: economic development is measured by real per capita GDP growth rate, and it is determined by initial GDP level, financial institutions and markets, education, government consumption, international trade and inflation. We also include indicators of information and communication cost, political stability, and rule of law in the robustness tests.

Our findings suggest that financial systems are related to economic development. First of all, the higher the income, the bigger the positive impacts of financial markets, and the higher the significance levels. For high and upper-middle income countries, three different market indicators have positive and significant coefficients, but for lower-middle and low income countries, there are some negative coefficients, and most of the positive results are not significant at the conventional levels. Second, financial institutions play more important roles in upper and lower-middle income groups. However, in high and low income countries, the coefficients measuring the roles of financial institutions on economic growth are mixed and insignificant. A battery of sensitivity analysis does not change the basic patterns of financial systems among different income groups. We also strengthen the existing literature on the relationships between growth and other explanatory variables: international trade and education are

positively correlated with growth, while government consumption and inflation have negative impacts on economic growth.

The rest of the chapter is organized as follows: the next section reviews the literature; section III explains the theoretical background and the regression model; section IV describes data and summary statistics; section V summarizes the results, and section VI concludes.

1.2. Literature Review

This chapter is related to three streams of literature: first, research comparing financial systems, mainly institutions and markets; second, the relationship between finance and growth; and third, financial liberalization, deregulation and economic growth.

1.2.1. Financial Systems

Theoretically speaking, financial institutions and markets should have the same functions, and play a similar role in economic development. However, why some countries developed a bank-based financial system, while others have a market-based mechanism is unclear. Even in the same country, financial systems evolve dramatically. Is it possible to design a specific form of financial system that works better in a certain stage of economic development? In particular, banks in Japan perform differently from banks in the U.S. The questions remains as to what factors really matter for the success of financial institutions?

Levine (2002) empirically investigates the relationship between economic growth and financial systems. He constructs a broad dataset comparing the activity, size, and efficiency of stock markets versus banks in 48 countries over the 1980-95 period. The

cross-country regression analysis indicates that good financial systems positively influence economic growth, but neither banks nor stock markets are particularly better. A battery of sensitivity tests strongly supports the findings, and the author concludes that it is not very meaningful to distinguish either bank-based or market-based financial structures. Instead, people should focus on the law and legal enforcement mechanisms that facilitate financial development. One of the contributions of this study is that it expands the horizon to a group of diversified nations, such as Kenya, Peru, and Sri Lanka. In contrast most of the previous research either is narrowed down to a specific country study, or involves a few similar well-developed economies. However, the data assembly method and econometric technique adopted by Levine ignore the tremendous difference of the characteristics of financial systems in DCs and LDCs.

Choe and Moosa (1999) use the Korean experience examining the impacts of financial intermediaries and capital markets on economic growth. Their case study effectively avoids the measurement issue and country specific problem encountered by cross-country analysis. The time series investigation with non-nested model selection method proves that in South Korea, financial intermediaries are more important than capital markets in promoting economic growth. Their conclusion is consistent with Rajan and Zingales' (1999) argument that financial intermediaries perform better in most LDCs where the legal and institutional framework is less solid than that of DCs, and entrepreneurial experience is immature. Using an urban development point of view, Fujita (2000) argues that financial institutions suit Asian cities better. If Asian cities build the U.S. style financial structure, there could be more volatile crises and brutal adjustments.

Allen and Gale (1997) build an overlapping generation model to show that an intermediated financial system could eliminate non-diversifiable risk and achieve ex ante Pareto equilibrium; while in an economy with market only or mixed financial system, there is under-investment and inefficiency. Digging deeper into the myth of financial structures, Allen and Gale (2001) compare the current financial systems in Germany, France, Japan, the United Kingdom, and the United States. Furthermore, they discuss the historical development of financial structures in these countries. Their data support the fact that even among these five major developed countries, the financial systems are very different. Allen and Gale provide some interesting discussions about the pros and cons of banks and equity markets. Their discussion, however, is based on comparing various indicators instead of rigorous empirical analysis due to data limitation, measurement problems, and theoretical support in the evolution of financial structures. Allen and Gale's study focuses on developed countries, though they agree that little attention has been given to the interesting and important topic concerning the different financial characteristics between developed and emerging countries.

Frankel and Montgomery (1991) conclude that it is difficult to interpret quantitative data on banking systems, assuming any are available at all. Nonetheless they compare the national banking systems of four countries: Japan, Germany, the United Kingdom, and the United States. The authors discuss the banking structures, regulatory policies, degree of competition, relationships with customers and legal environment in each of these countries. They attempt to explain the relationship between bank performance and institutional structures. Unfortunately, the difficulty of measuring banking system performance and data limitations make it impossible to draw any solid conclusions.

Cetorelli and Gambera (2001) examine the impact of a single aspect of the banking system, the concentration ratio, on industry growth. Their empirical findings suggest that bank concentration has a negative effect on long run output growth. Furthermore, they find a heterogeneous effect on promoting the growth of industries that are more dependent on external finance.

In the past three decades, financial systems changed significantly in both DCs and LDCs. The transaction costs and asymmetric information have become cheaper and more available, but intermediaries still play very important roles in both traditional markets and new markets featuring financial futures and options (see Allen and Santomero, 1998). Levine (1997) points out that we still don't have adequate theoretical and empirical understanding of the emergence, development and implications of different financial systems.

1.2.2. Finance and Growth

This section mainly reviews relative recent literature as well as a few earlier previous works that are well cited by scholars. After a century long debate about the nexus between finance and growth, most researchers agree that finance and growth are positively related. Financial institutions and markets could improve total factor productivity by allocating savings and resources, supervising managers, ameliorating risks, facilitating technology innovation, and reducing transaction and information costs. Levine (1997) has an excellent survey providing both theoretical and empirical evidence on links between finance and growth.

Bencivenga and Smith (1991) construct a multiple assets endogenous growth model to demonstrate that financial intermediaries affect resource allocations by shifting the

composition of savings toward capital, and reducing socially unnecessary capital liquidation. These two channels both promote growth.

Barro (1991) tests the convergence hypothesis of neoclassical growth model with data from 98 countries between 1960 and 1985. His study indicates that the real per capita Gross Domestic Product (GDP) growth rate is positively related to initial human capital level, lower fertility rates, higher ratios of physical investment to GDP, and political stability; while negatively related to government consumption, market distortions, and initial level of real per capita GDP. Many scholars treat these "Barro Regressors" as the basic independent variables in the economic growth regression analysis. Levine and Zervos (1993) adopt the extreme-bounds-analysis to evaluate the "believability" of "Barro Regressors" and some other growth indicators. They find that a wide range of policy, fiscal, and monetary indicators have fragile relationships with long run economic growth. Notably, they find that the measurements of financial development are robustly correlated with economic development.

King and Levine (1993) construct financial intermediary development indicators and define economic growth indicators. These measurements are adopted by most finance and growth literature. The cross-country regression results indicate a strong positive correlation between finance and growth. Levine and Zervos (1998) build on King and Levine (1993) by broadening the financial development indicators to include stock markets and banks. Their cross-section study shows that both markets and intermediaries have positive impact on growth, and that stock markets provide different services from banks. The results are consistent with Hellwig's (1998) view that banks and markets are complements rather than substitutes: markets are made by intermediaries and

intermediaries rely on markets as well. Beck, Levine and Loayza (2000) adopt dynamic panel techniques to control for simultaneity bias and country specific effects. Their investigation supports the previous finding that the finance and growth have a robust, positive relationship.

Researchers have exacted tremendous effort to examine the direction of the causal effect between finance and growth, if any exists. There are time series (for example, see Luintel and Khan, 1999; Shan, Morris and Sun, 2001), firm level (see Rajan and Zingales 1998), and country case studies (see Koo and Kim, 1999). Unfortunately, this indicator is inconclusive since some of the results indicate that finance causes economic growth, and others imply a bi-directional causality.

1.2.3. Financial Liberalization

Financial liberalization and deregulation have spread to almost every continent since the 1980s. In the developing world such as East Asia and Latin America, financial liberalization contributes to substantial capital inflow, which helps many emerging markets such as South Korea and Taiwan take off and maintain impressive high growth rates for decades.

Levine (2001) believes that liberalization accelerates economic growth by improving the functioning of domestic financial systems. Rivera-Batiz (2001) builds a general equilibrium, endogenous growth model incorporating corruption as an integral part of the government in a developing economy. The impact of financial liberalization in this study is ambiguous: gain or loss in long run economic growth depends on the amount of influx or flight of capital. Stiglitz (2000) argues that without an effective regulatory framework, financial liberalization is the core of instability and financial crises. Shleifer

and Vishny are two of the most prominent contemporary scholars connecting legal rules and financial development. Their cross-country studies show that countries with good investor protection and more effective law enforcement perform better at providing firms with external finance (See Shleifer, Vishny and etc. 1997, 1998). Demirguc-Kunt and Maksimovic (1998) also find that a well-developed legal system is important in promoting financial development and firm growth. Cho (1986) emphasizes that in most of the LDCs where mature securities markets are not in place, adverse selection and moral hazard prevent the ideal optimum result of liberalization; therefore governments should maintain some controls on the banking sectors.

1.3. Theoretical Background and Methodology

1.3.1. Theoretical Background

The extensive theoretical arguments about financial systems and economic development can be divided into two categories. The first one is associated with the Solow model (1957), endogenous or neoclassical growth theory, which emphasizes the function of capital accumulation, investment or entrepreneurship on long run economic growth. In an economy with well-developed financial systems, individuals have the incentive to save since financial investments offer them returns and the choice of diversified portfolios guarantee them easy asset liquidation. The pooling of household savings provides entrepreneurs with capital for investments that could benefit from economy of scales or technology innovation. Financial intermediaries not only raise savings rates, reducing unnecessary capital liquidation, but also increase the percentage of savings used for investment and improve the productivity of capital. (Pagano 1993; Bencivenga and Smith 1991).

The second category is closely related to the frictions of classical finance theory. The Arrow-Debreu-MacKenzie (ADM) model is based on complete, perfectly competitive markets. Unfortunately, this ideal world does not exist. As a matter of fact, information is asymmetrically distributed and costly, financial contracts create moral hazard and adverse selection problems, and managers and shareholders have to deal with incentive issues. Thus, it is unreasonable to believe that the free market would perform optimally, if it functions at all. Good financial systems arise to facilitate the trading, hedging, diversifying, and pooling of risk, and to monitor managers (Levine 1997). Stiglitz (1989) also points out that in LDCs, the lack of efficient financial systems is one of the main reasons for the dismal economic situation. According to Stiglitz, financial intermediaries are the central allocation, monitoring and accounting systems rather than passive conduits for capital.

1.3.2. Methodology

Our empirical analysis consists of four sets of regression analyses based on the four income groups. For each group, we adopt a cross-sectionally heteroskedastic and timewise autoregressive model. We assume the regression disturbances are autoregressive, heteroskedastic and mutually independent. The model in matrix form is

$$y_{it} = \beta_{it} X_{it} + \varepsilon_{it}$$

The error term has the following three characteristics:

Heteroskedasticity: $E(\varepsilon_{it}^2) = \sigma_i$

Cross section independence: $E(\varepsilon_{it}\varepsilon_{jt}) = 0$

Autocorrelation: $\varepsilon_{it} = \rho_i \varepsilon_{i,t-1} + \mu_{it}$

$\mu_{it} \sim N(0, \varphi_{ii})$, $i = 1,2,...,87$; $t = 1,2,...,6$.

Where y_{it} represents economic growth, X_{it} includes both financial markets and institutions measurements and an information set, such as School Enrollment, Government Consumption, Trade, and Inflation. The basic regression model could be written as

$$GDPperCapitaGrowthRate_{it} = \alpha + \beta_{1it} \ln(InitialrealPerCapitaGDP_{it}) + \beta_{2it} InstitutionMeasurement_{it} + \beta_{3it} MarketMeasurement_{it} + \beta_{4it} \ln(HumanCapital_{it}) + \beta_{5it} GovernmentConsumption_{it} + \beta_{6it} Trade_{it} + \beta_{7it} Inflation_{it} + \varepsilon_{it}$$

The logarithm of the number of TV or Newspaper per 1,000 people is also added into the information set as the proxy of information and communication costs in the robustness test. Although indicators such as the number of Internet servers or the cost of telephone calls are adopted by some researchers, they are not feasible in our study because of limited data sources in many developing countries.

1.4. Data and Summary Statistics

The data used in this chapter are from the World Bank's World Development Indicators (2001), the World Bank Financial Development and Structure dataset (1999), the World Bank Governance dataset and Penn World Table (6.1). The 87 nations included in the study are categorized into 4 groups: high, upper-middle, lower-middle and low income economies. The data are in both time series & cross-section and cross-section formats. For pooled data, we opt for four-year averages from 1974 to 1997[4] for the regression analysis. There are two explanations for this approach. First, yearly time spans are too short to be appropriate for studying economic development because short-term disturbances may influence the conclusion. Second, it is more accurate to use the

[4] The first observation for each group of stock market and financial institution indicators is based on 3-year average (1975-1977) due to data limitations.

average value to measure the financial development since some LDCs did not have data collecting mechanisms till recent years.

We define the economic development and financial system indicators; explain other explanatory variables and present summary statistics and correlations in the rest of this section. Meanwhile, a detailed data description is listed in the Appendix 1.2.

1.4.1. Economic Development Indicators

Economic development captures both wealth accumulation and distribution. For decades, measuring the wealth distribution has been a dilemma for economists. Undoubtedly, real per capita GDP and Gross National Product (GNP) growth rates indicate only economic growth. They are however, the best variables available given the time span and broad geographical regions covered by this chapter. Our analysis focuses on real per capita GDP growth rate, and treats the GNP growth rate as the alternative measurement in the robustness test. We also include the initial level of real per capita GDP as an independent variable to test the growth convergence effects.

1.4.2. Financial System Measurements

It has been a daunting challenge for researchers to compile any sound financial system measurements for developing countries. In most LDCs, informal institutions and markets such as credit unions and private moneylenders prevail in the rural areas; moreover, it is difficult to evaluate how important the informal sectors are. Financial systems also vary dramatically from country to country. The experience from one country could not be extended to another, making it difficult to generalize any

measurement to all developing countries[5]. We adopt the World Bank Financial Development and Structure Database (Beck, Demirguc-Kunt, and Levine, 2000), which is based on the International Monetary Fund's Financial Statistics and Emerging Market Database. Currently, it is the best financial system data source for LDCs, and it is frequently employed in the finance and growth literature.

Financial Institution development is measured by two indicators: ***Bank*** and ***Bank & Other Institutions***. ***Bank*** is defined as the ratio of claims on the private sector by deposit money banks and GDP; it concentrates on credit issued by intermediaries other than the central bank. ***Bank & Other Institutions*** is defined similar to ***Bank*** except that it includes claims by both deposit money banks and other financial institutions including savings banks, mortgage banks and finance companies, insurance companies, private pension and provident funds, pooled investment schemes and development banks. These two indicators measure the activity of financial institutions in one of its main functions: channeling savings to investors.

Financial Market is represented by stock markets. There are three indicators: ***Capitalization***, ***Value Traded*** and ***Turnover Ratio***. ***Capitalization*** equals the value of listed shares divided by GDP, indicating the size of the stock market. ***Value Traded*** measures the activity or liquidity of the stock markets, defined as total shares traded on the stock market exchange divided by GDP. ***Turnover Ratio*** is an efficiency indicator of the stock market; defined as the ratio of the value of total shares traded and market capitalization, measuring the activity or liquidity of a stock market relative to its size.

[5] Haggard and Lee (1995) provide some good examples of how different the financial systems and policies are in LDCs. Their investigations include Korea, Taiwan, Indonesia, Thailand, and the Philippines from East Asia, and Chile and Brazil from Latin America.

These financial system measurements are adopted and discussed by Levine and Zervos (1998) who average the data of 47 counties over the 1976-93 period. We expand both the sample size and time range, and more importantly, our pooled study also captures the dynamic change of financial systems over the decades.

1.4.3. Other Explanatory Variables

There are four conventional variables constituting the basic information set[6]: ***Secondary School Enrollment***, ***Government Consumption Expenditure***, ***International Trade***, and ***Inflation***. This chapter also includes the number of Newspapers or TVs in use per 1,000 people as a proximate indicator for the information cost in the sensitivity analyses. The previous literature used variables such as the number of patents granted each year or the research and development expenditure as the additional indicators to measure technology level, however, most developing countries do not have these data available at all, or only have a few observations in late 90s.

1.4.4. Summary Statistics

Tables 1.1 – 1.4 show the summary statistics for each income group. Financial systems show substantial differences among income groups, especially between high income countries, which are dominated by developed nations, and the rest of the LDCs. For example, the average level of ***Bank & Other Institutions*** is 0.79 in the high-income group, compared with 0.295, 0.302 and 0.166 in upper-middle, lower-middle, and low income countries, respectively. For the three LDCs groups, the financial system indicators have similar values in middle income countries, while for low income economies, the values reduce to about half of their counterparts.

[6] Most researchers adopted the variables discussed by Barro (1991) as the determinants of long run economic growth.

Table 1.1: Summary Statistics: High Income Countries (Annual Averages 1974-97)

	Mean	Median	Maximum	Minimum	Standard Deviation	Obser-vations
GDP per capita Growth Rate	0.023679	0.018731	0.065142	0.002635	0.016015	27
Bank & Other Institutions	0.791182	0.741078	1.634056	0.213162	0.37166	27
Bank	0.59763	0.54035	1.390905	0.213162	0.291196	27
Capitalization	0.37522	0.237519	1.391485	0.037824	0.329084	27
Value Traded	0.177086	0.141112	0.935407	0.007331	0.198078	27
Turnover Ratio	0.420062	0.332643	1.759028	0.084051	0.332223	27

Table 1.2: Summary Statistics: Upper-middle Income Countries (Annual Ave. 1974-97)

	Mean	Median	Maximum	Minimum	Standard Deviation	Obser-vations
GDP per capita Growth Rate	0.012737	0.012598	0.051765	-0.0379	0.020637	21
Bank & Other Institutions	0.29475	0.276113	0.727422	0.000282	0.188215	20
Bank	0.244703	0.22158	0.556419	0.000282	0.156739	20
Capitalization	0.180421	0.086697	1.120824	0.008642	0.248299	21
Value Traded	0.044675	0.011434	0.43032	0.000577	0.09243	21
Turnover Ratio	0.285515	0.214767	1.283398	0.009891	0.334496	21

Table 1.3: Summary Statistics: Lower-middle Income Countries (Annual Ave. 1974-97)

	Mean	Median	Maximum	Minimum	Standard Deviation	Obser-vations
GDP per capita Growth Rate	0.013869	0.009656	0.06873	-0.0081	0.018538	26
Bank & Other Institutions	0.301772	0.254918	0.841756	0.073464	0.210916	26
Bank	0.249899	0.202663	0.841756	0.073464	0.180625	26
Capitalization	0.140383	0.071019	1.200647	0.002947	0.247161	25
Value Traded	0.030981	0.011066	0.163648	0.000115	0.044775	26
Turnover Ratio	0.2844	0.122446	1.957446	0.007917	0.423743	26

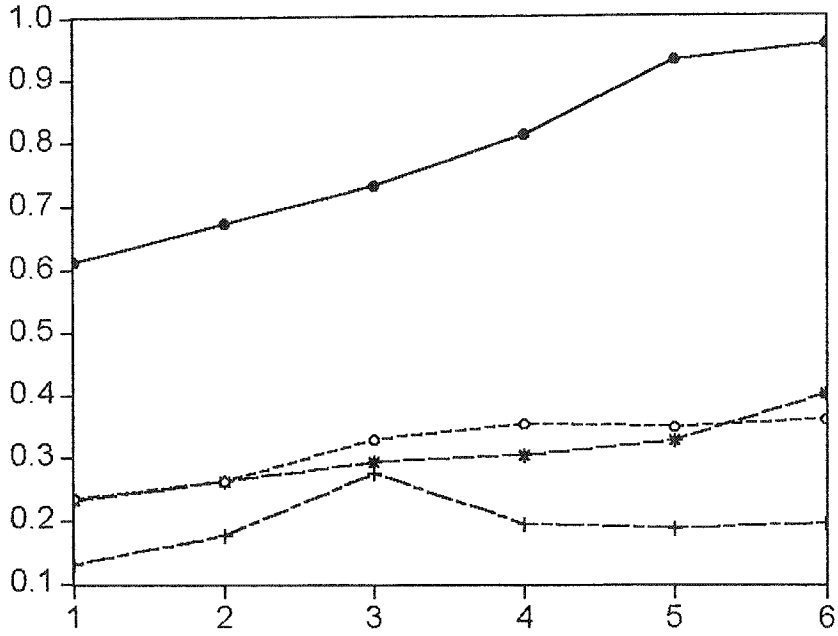
Table 1.4: Summary Statistics: Low Income Countries (Annual Ave. 1974-97)

	Mean	Median	Maximum	Minimum	Standard Deviation	Obser-vations
GDP per capita Growth Rate	-0.000308	0.003165	0.049009	-0.110408	0.038345	13
Bank & Other Institutions	0.165561	0.143837	0.336208	0.025386	0.098375	13
Bank	0.148496	0.138027	0.336208	0.025386	0.090123	13
Capitalization	0.073123	0.07423	0.150194	0.001351	0.045287	13
Value Traded	0.010817	0.003497	0.042473	0.000421	0.013995	13
Turnover Ratio	0.139865	0.051892	0.504524	0.008594	0.156096	13

The different characteristics between DCs and LDCs are enhanced by figures 1.1 – 1.5. We graph the two financial institution measurements, ***Bank*** and ***Bank & Other Institutions***, and three financial market indicators, ***Capitalization***, ***Value Traded*** and ***Turnover Ratio*** separately. These figures emphasize the comparisons between developed and developing countries, and represent the dynamic changes by the four-year averages from 1974 to 1997.

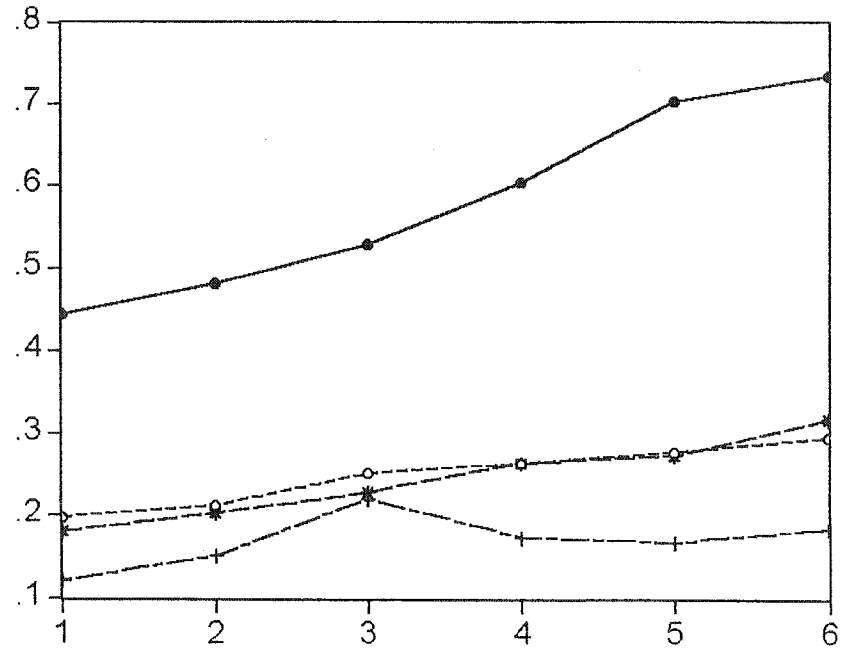
Figures 1.1 and 1.2 indicate that in developed countries, the claims on the private sector by deposit money banks and other financial institutions increased by more than 50% in the 24 years period. Meanwhile, the gap between developed and developing countries also increased dramatically. In developing countries, the performance of the financial institutions in lower-middle income countries caught up with those of upper-middle income countries in the 90s, though in the 70s and 80s, the scenarios were the opposite. Figures 1.3 to 1.5 represent the changes of the stock market size, activity, and efficiency. High income countries experienced 300% and 400% increase in ***Capitalization*** and ***Value Traded***, respectively. However, LDCs showed relatively insignificant improvements in financial market performances.

Figure 1.1: Development of ***Bank & Other Institutions***



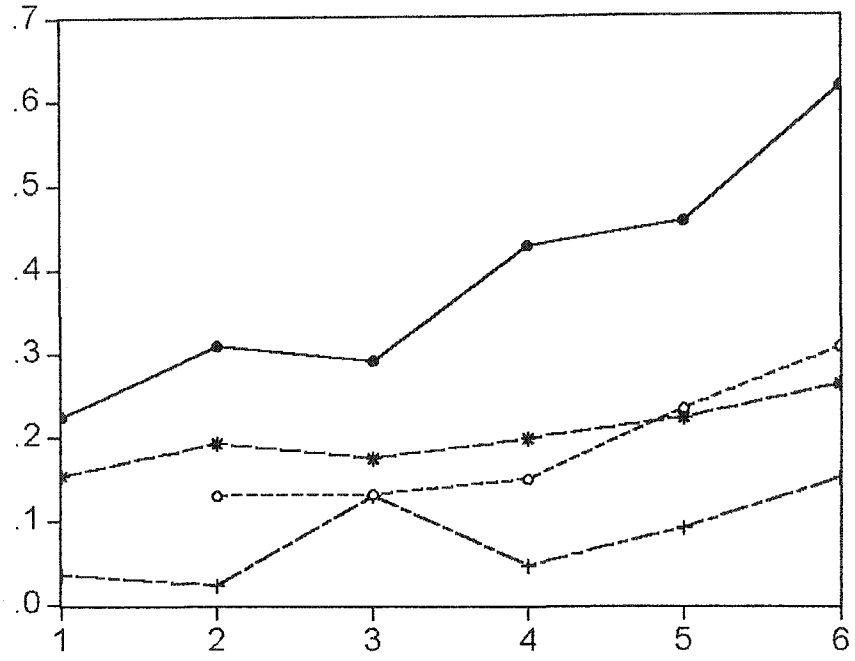
Note: This graph plots the four-year average of ***Bank & Other Institutions,*** the Private Credit by Deposit Money Banks and Other Financial Institutions as the percentage of GDP. Numbers 1 to 6 on the horizontal axis represent 74-77, 78-81, 82-85, 86-89, 90-93, 94-97, respectively. —•— High Income ---◦--- Upper-middle Income —*— Lower-middle Income —+— Low Income. The symbols for the other figures are similarly defined.

Figure 1.2: Development of ***Bank***



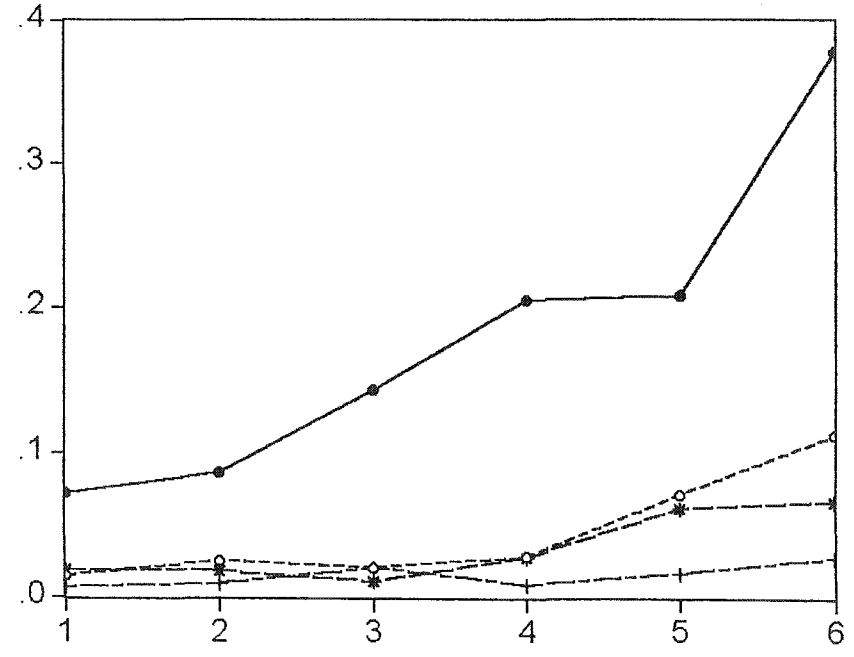
Note: This graph plots the four-year average of ***Bank,*** the Private Credit by Deposit Money Banks as the percentage of GDP. The axes and symbols are the same with Figure 1.1.

Figure 1.3: Development of ***Capitalization***



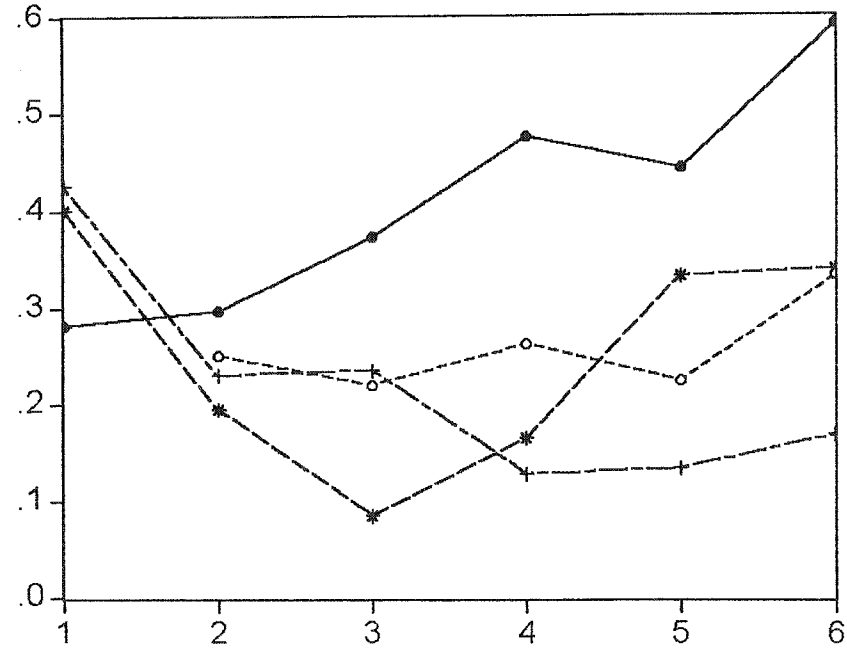
Note: This graph plots the four-year average of ***Capitalization,*** the value of listed shares divided by Gross Domestic Product, indicating the size of the stock market. The axes and symbols are the same with Figure 1.1.

Figure 1.4: Development of ***Value Traded***



Note: This graph plots the four-year average of ***Value Traded,*** the total shares traded on the stock market exchange divided by Gross Domestic Product, measuring the activity or liquidity of the stock markets. The axes and symbols are the same with Figure 1.1.

Figure 1.5: The Development of ***Turnover Ratio***



Note: This graph plots the four-year average of ***Turnover Ratio,*** the efficiency indicator of the stock market; defined as the ratio of the value of total shares traded and market capitalization, measuring the activity or liquidity of a stock market relative to its size. The axes and symbols are the same with Figure 1.1.

Tables 1.5 – 1.8 present the correlation matrixes for the four income groups. There are some interesting similarities and differences among income groups.

First, because of the statistical measurement method, ***Bank & Other Institutions*** and ***Bank*** are highly correlated for all the income groups. For example, the correlation coefficient for high income countries is 0.8114; for upper-middle, lower-middle, and low income groups is 0.8574, 0.9565 and 0.9358, respectively.

Second, ***Capitalization***, the indicator for the stock market size, has strong correlation with financial institutions measurements for high and upper-middle income countries. The four coefficients are all above 0.5236. For the lower-middle income group, the coefficients decrease slightly, but still are greater than 0.3754. The high correlation between ***Capitalization*** and ***Bank & Other Institutions*** or ***Bank*** further indicates that financial institutions and financial markets are complements, just as Hellwig (1998)

argued that markets and intermediaries rely on each other. For the low income group, one of the two coefficients showed negative sign (-0.0798). It is interesting to discover the differentiation, but it is hard to draw any conclusion because there are only 13 low income countries in this category, and we have to treat the data from these countries with a grain of salt. ***Value Traded***, the stock market activity or liquidity indicators have similar relationships with financial institutions as those of ***Capitalization*** except the coefficients for the low income group are also above 0.3861.

Third, the correlation levels between ***Capitalization*** and ***Value Traded*** are at 0.6853 and 0.9046 for high and upper-middle income countries, while those for lower-middle and low income drop to 0.3587 and 0.3937. These results indicate that financial markets are more active and efficient in countries with relatively high income levels.

Fourth, in high income economies, though the real per capita GDP growth rate is positively correlated with financial institutions, the coefficients are as small as 0.0879 and 0.0961. However, those for ***Capitalization*** and ***Value Traded*** are more than ten times higher at 0.3833 and 0.1156. For the rest of the LDCs, most of the coefficients for GDP growth rate and financial systems are 0.3 or 0.4, and there is no obvious discrepancy between institutions and markets. The results also strongly indicate that institutions and markets perform differently in developed and developing countries.

This chapter treats ***Turnover Ratio*** as a reference instead of a factor under vigorous discussion since it is defined as the ratio of the value of total shares traded and market capitalization. It is based on the other two market indicators, ***Capitalization*** and ***Value Traded***, measuring the activity or liquidity relative to the market size.

Table 1.5: Correlation Matrix: High Income Countries (Annual Averages 1974-97)

	GDP per capita Growth Rate	Bank & Other Institutions	Bank	Capitalization	Value Traded	Turnover Ratio
GDP per capita Growth Rate	1.000000	-	-	-	-	-
Bank & Other Institutions	0.087946	1.000000	-	-	-	-
Bank	0.096054	0.811388	1.000000	-	-	-
Capitalization	0.383305	0.523593	0.579768	1.000000	-	-
Value Traded	0.115555	0.766147	0.771889	0.685344	1.000000	-
Turnover Ratio	0.064340	0.559197	0.523086	0.156331	0.773415	1.000000

Table 1.6: Correlation Matrix: Upper-middle Income Countries (Annual Ave. 1974-97)

	GDP per capita Growth Rate	Bank & Other Institutions	Bank	Capitalization	Value Traded	Turnover Ratio
GDP per capita Growth Rate	1.000000	-	-	-	-	-
Bank & Other Institutions	0.144703	1.000000	-	-	-	-
Bank	0.346897	0.857417	1.000000	-	-	-
Capitalization	0.406040	0.753458	0.574865	1.000000	-	-
Value Traded	0.380743	0.612710	0.477534	0.904569	1.000000	-
Turnover Ratio	-0.200167	-0.396707	-0.442958	-0.091694	0.131247	1.000000

Table 1.7: Correlation Matrix: Lower-middle Income Countries (Annual Ave. 1974-97)

	GDP per capita Growth Rate	Bank & Other Institutions	Bank	Capitalization	Value Traded	Turnover Ratio
GDP per capita Growth Rate	1.000000	-	-	-	-	-
Bank & Other Institutions	0.468007	1.000000	-	-	-	-
Bank	0.591274	0.956547	1.000000	-	-	-
Capitalization	-0.133981	0.571873	0.375395	1.000000	-	-
Value Traded	0.639560	0.700006	0.699508	0.358710	1.000000	-
Turnover Ratio	0.570114	0.421356	0.552280	-0.108304	0.660762	1.000000

Table 1.8: Correlation Matrix: Low Income Countries (Annual Ave. 1974-97)

	GDP per capita Growth Rate	Bank & Other Institutions	Bank	Capitalization	Value Traded	Turnover Ratio
GDP per capita Growth Rate	1.000000	-	-	-	-	-
Bank & Other Institutions	0.321497	1.000000	-	-	-	-
Bank	0.386749	0.935777	1.000000	-	-	-
Capitalization	-0.034257	0.169550	-0.079763	1.000000	-	-
Value Traded	0.692108	0.386118	0.414308	0.393736	1.000000	-
Turnover Ratio	0.667780	0.339194	0.390528	0.316257	0.953780	1.000000

1.5. Regression Results

Tables 1.9 – 1.12 report the pooled regression results with real per capita GDP growth rate as the economic development indicator. The impacts of financial institutions and markets on long run economic growth deviate among income groups.

For the high income countries, every financial market indicator has a positive and significant coefficient, which indicates that financial markets play active roles on economic development in developed countries. However, all of the financial institution measurements have negative signs, though most of the negative coefficients are not significant at the conventional confidence level. The result conflicts with the conclusions of the previous cross section studies that both stock market and banking development are positively correlated with economic growth (See Levine and Zervos, 1998, etc.). The inconsistency between the previous studies and our results is associated with separating the sample nations into four income groups. In the robustness analysis, we combine the 87 countries and run a single cross section study, and the regression result is consistent with those of the other scholars.

Table 1.9: Regression Results for 27 High Income Countries

Independent Variables	Dependent Variable: Real per Capita GDP Growth					
Bank & Other Institutions	-0.0010024 (0.599)	-0.0020537 (0.356)	-0.0005232 (0.795)			
Bank				-0.0071221 (0.006)	-0.0125227 (0.000)	____
Capitalization	0.0067903 (0.001)			0.0065746 (0.001)		
Value Traded		0.0081876 (0.049)			0.0089153 (0.030)	
Turnover Ratio			0.00774055 (0.001)			____

Notes: The first line of each result is the coefficient, and P-Value is in parentheses.
Dependent variables are the real per capita GDP growth rate. Explanatory variables: Bank = Private Credit by Deposit Money Banks to GDP; Bank & Institutions = Private Credit by Deposit Money Banks and Other Financial Institutions to GDP; Capitalization = Stock Market Capitalization / GDP; Value Traded = Stock Market Total Value Traded / GDP; Turnover = Stock Market Turnover Ratio; the independent variables also include logarithm of the real per capita GDP in the first of every four year period; logarithm of secondary School Enrollment; Government Consumption / GDP, Trade / GDP, and Inflation. The regression with Bank and Turnover Ratio as the market and institution indicator, respectively, could not be completed due to missing data.

Table 1.10: Regression Results for 21 Upper-middle Income Countries

Independent Variables	Dependent Variable: Real per Capita GDP Growth					
Bank & Other Institutions	-0.0483517 (0.003)	0.0032344 (0.765)	0.0030024 (0.705)			
Bank				-0.0350619 (0.062)	0.0093902 (0.564)	0.0058307 (0.661)
Capitalization	0.0433135 (0.000)			0.0339421 (0.000)		
Value Traded		0.021207 (0.081)			0.0177258 (0.145)	
Turnover Ratio			0.0068851 (0.239)			0.0070915 (0.216)

Notes: The first line of each result is the coefficient, the second line is Z, and P-Value is in parentheses.
Dependent variables are the real per capita GDP growth rate. Explanatory variables: Bank = Private Credit by Deposit Money Banks to GDP; Bank & Institutions = Private Credit by Deposit Money Banks and Other Financial Institutions to GDP; Capitalization = Stock Market Capitalization / GDP; Value Traded = Stock Market Total Value Traded / GDP; Turnover = Stock Market Turnover Ratio; the independent variables also include logarithm of the real per capita GDP in the first of every four year period; logarithm of secondary School Enrollment; Government Consumption / GDP, Trade / GDP, and Inflation.

Table 1.11: Regression Results for 26 Lower-middle Income Countries

Independent Variables	Dependent Variable: Real per Capita GDP Growth					
Bank & Other Institutions	0.02959 (0.033)	0.0137633 (0.175)	0.0096404 (0.401)			
Bank				0.0261316 (0.155)	0.0236462 (0.114)	0.011611 (0.390)
Capitalization	-0.0072259 (0.490)			0.0030436 (0.751)		
Value Traded		0.0260961 (0.000)			0.1184316 (0.000)	
Turnover Ratio			0.1334158 (0.000)			0.0264727 (0.000)

Notes: The first line of each result is the coefficient, and P-Value is in parentheses.
Dependent variables are the real per capita GDP growth rate. Explanatory variables: Bank = Private Credit by Deposit Money Banks to GDP; Bank & Institutions = Private Credit by Deposit Money Banks and Other Financial Institutions to GDP; Capitalization = Stock Market Capitalization / GDP; Value Traded = Stock Market Total Value Traded / GDP; Turnover = Stock Market Turnover Ratio; the independent variables also include logarithm of the real per capita GDP in the first of every four year period; logarithm of secondary School Enrollment; Government Consumption / GDP, Trade / GDP, and Inflation.

Table 1.12: Regression Results for 13 Low Income Countries

Independent Variables	Dependent Variable: Real per Capita GDP Growth					
Bank & Other Institutions	-0.0035687 (0.928)	-0.0060608 (0.900)	-0.0258412 (0.582)			
Bank				-0.0075648 (0.849)	-0.0153607 (0.775)	-0.0215226 (0.675)
Capitalization	-0.0043175 (0.909)			-0.0029132 (0.938)		
Value Traded		0.3046644 (0.029)			0.3333772 (0.021)	
Turnover Ratio			0.0149042 (0.426)			0.0137092 (0.474)

Notes: The first line of each result is the coefficient, and P-Value is in parentheses.
Dependent variables are the real per capita GDP growth rate. Explanatory variables: Bank = Private Credit by Deposit Money Banks to GDP; Bank & Institutions = Private Credit by Deposit Money Banks and Other Financial Institutions to GDP; Capitalization = Stock Market Capitalization / GDP; Value Traded = Stock Market Total Value Traded / GDP; Turnover = Stock Market Turnover Ratio; the independent variables also include logarithm of the real per capita GDP in the first of every four year period; logarithm of secondary School Enrollment; Government Consumption / GDP, Trade / GDP, and Inflation.

For the upper-middle income group, financial market coefficients are still positive, but half of the values are not significant at 90% confidence level. The negative coefficients of institutions reduce to one third of the total, though none of the positive values is significant.

Interestingly enough, for the lower-middle income countries, all financial institution measurements turn out to be positive, and one of the market indicators, ***Capitalization***, shows up to be negative. Similar to the institutional coefficients in the high income group, the negative value for market is not consistent with the previous studies, which universally conclude that financial markets and growth are positively correlated. However, it is necessary to emphasize that none of the previous empirical studies separate the sample countries into four income groups, and our cross section comparison study using Ordinary Least Square technology generates the same conclusion as the previous literature.

The results for the low income group are mixed and none of them except one is significant at 10 percent confidence level, which is associated with the fact that in some of the low income countries, financial systems are either poorly developed, or simply don't exist.

The basic regression results are consistent with our hypothesis that financial systems are correlated with income levels. Due to the requirements of an effective legal framework, low telecommunication and transportation costs, and good human capital, financial markets are more important in DCs instead of LDCs. While financial institutions such as banks and insurance companies are more popular than markets in LDCs. The coefficients of the other explanatory variables are consistent with the

previous studies: trade and secondary school enrollment have positive impacts on growth while government consumption and inflation have negative coefficients.

Table 1.13: Robustness Test for High Income Countries

Independent Variables	Dependent Variable: Real per Capita GDP Growth					
Bank & Other Institutions	-0.0013373 (0.598)	-0.0039613 (0.113)	-0.0015298 (0.507)			
Bank				-0.01006 (0.012)	-0.0130487 (0.000)	-0.0120751 (0.006)
Capitalization	0.0012031 (0.653)			0.0012952 (0.586)		
Value Traded		0.0094995 (0.031)			0.0105388 (0.009)	
Turnover Ratio			0.006203 (0.002)			0.0074329 (0.000)
Logarithm of Newspaper	0.0052142 (0.001)	0.0059934 (0.000)	0.0053733 (0.001)	0.0052186 (0.000)	0.0048666 (0.001)	0.0051904 (0.000)

Notes: The first line of each result is the coefficient, and P-Value is in parentheses.
Dependent variables are the real per capita GDP growth rate. Explanatory variables: Bank = Private Credit by Deposit Money Banks to GDP; Bank & Institutions = Private Credit by Deposit Money Banks and Other Financial Institutions to GDP; Capitalization = Stock Market Capitalization / GDP; Value Traded = Stock Market Total Value Traded / GDP; Turnover = Stock Market Turnover Ratio; the independent variables also include logarithm of the real per capita GDP in the first of every four year period; logarithm of secondary School Enrollment; Government Consumption / GDP, Trade / GDP, Inflation and the logarithm of the number of newspaper per 1000 people.

We run a wide array of robustness tests. First, the logarithm of the number of newspaper or TV set per 1000 people is added into the information set as the proxy of information and communication cost. We then substitute the dependent variable with real per capita GNP growth rate. Lastly, we add political stability or rule of law in the cross section study to test the influence of legal factors in economic growth. All the sensitivity analyses do not change the basic findings of this paper. We report only one test result in table 1.13, where the logarithm of the number of newspaper per 1000 people is added into the regression analysis as an additional explanatory variable. The sensitivity analyses in table 1.13 confirm the findings reported in table 1.9 that for high

income countries, financial markets are positively and significantly correlated with real per capita GDP growth rate, while institutions show negative correlation.

1.6. Conclusions

This chapter empirically investigates the relationship between financial systems and economic development. The 87 countries included in this study are divided into high, upper-middle, lower-middle and low income groups. With the cross-sectionally heteroskedastic and timewise autoregressive econometric technology, we find that financial institutions and markets do perform differently at different income levels.

As Table 1.9 and 1.13 indicated, in the high income countries, financial markets are positively and significantly correlated with real per capita GDP growth at 90% or 99% confidence level. For the upper-middle income group, markets still show positive coefficients, but only half of them are significant at 90% confidence level. For the lower-middle and low income nations, there are mixed results: ***Capitalization***, the market size indicator, has negative coefficient, but stock market total ***Value Traded*** and ***Turnover Ratio*** are positively related with the dependent variable. The regression results are consistent with our hypotheses that markets are more active in developed countries where law enforcement, legal framework, human capital, communication technology, and etc. reach relatively high standards to support and maintain the financial markets.

On the other hand, financial institutions are positively correlated with real per capita GDP growth rate in the lower-middle income countries. However, the coefficients have mixed signs in the upper-middle income group, furthermore, in the high income economies, the results are overwhelmingly negative even if most of them are not significant. For the low income group, we have to admit first that due to the small

sample size (13 countries) and the questionable reliability of the data sources, future research is required for the investigation of institutions and markets. Table 1.12 shows that most of the financial system measurements have negative coefficients though none of them is significant at the conventional confidence level. These results imply that in the low income countries, financial systems may not function properly, if they function at all.

This chapter indicates that financial markets and institutions play different roles in different income groups. At a specific income level, financial institutions and markets do not necessarily both have positive and significant impacts on economic growth, as previous study concluded. For example, in the high income countries, markets are positively and significantly correlated with real per capita GDP growth rate, but institutions have negative and insignificant coefficients.

This study also strengthens the understanding of some of the explanatory variables with the econometric technique that hasn't been used for financial systems studies before: the cross-sectionally heteroskedastic and timewise autoregressive model. Our analyses are consistent with previous research, indicating that international trade and education are positively correlated with the growth rate, but government consumption and inflation have negative impacts on long run economic growth.

Apart from the above contributions, there are a number of limitations that deserve future research. First, this chapter does not consider financial dualism, a common practice in many LDCs. The informal financial systems not only vary from country to country, but also prevail mainly in the rural areas. Thus it is a daunting task to measure financial dualism or generalize the experience from one to the other developing

countries. Second, we have to treat the data from some developing countries with caution, and the questionable data may generate biased regression results. Finally, our study covers 87 countries over a 24-year period, which is the longest time series data available for some developing countries. Since this chapter adopted the four-year average data for economic development measurements, and indicators of financial systems and variables in the information set to reduce the short-term disturbances and business cycle effects, the limited time series observation for each country is not sufficient to investigate causality between economic development and financial systems.

Appendix

Appendix 1.1: Country Classification

27 High Income Countries

Australia	Austria	Belgium	Canada
Cyprus	Denmark	Finland	France
Germany	Greece	Hong Kong, China	Iceland
Ireland	Israel	Italy	Japan
Korea, Rep.	Luxembourg	Netherlands	New Zealand
Norway	Singapore	Spain	Sweden
Switzerland	United Kingdom	United States	

21 Upper-middle Income Countries

Argentina	Barbados	Botswana	Brazil
Chile	Costa Rica	Croatia	Czech Rep.
Hungary	Latvia	Lithuania	Malaysia
Mauritius	Mexico	Oman	Panama
Poland	Saudi Arabia	Slovak Rep.	Uruguay
Trinidad and Tobago			

26 Lower-middle Income Countries

Bolivia	Bulgaria	China	Colombia
Ecuador	Egypt, Arab Rep.	El Salvador	Fiji
Guatemala	Honduras	Iran, Islamic Rep.	Jamaica
Jordan	Morocco	Namibia	Paraguay
Peru	Philippines	Romania	Russian Federation
South Africa	Sri Lanka	Swaziland	Thailand
Tunisia	Turkey		

13 Low Income Countries

Armenia	Bangladesh	Ivory Coast	Ghana
India	Indonesia	Kenya	Mongolia
Nepal	Nigeria	Pakistan	Zambia
Zimbabwe			

* Source: World Bank Country Classification.

Appendix 1.2: Data Description

1.2.1: Economic Growth Indicators

Initial Real per Capita GDP	Logarithm of the real per capita Gross Domestic Product (constant 1995 US$) in the first of every four-year period from 1974 to 1997. There are 6 observations for each country: in year 1974, 1978, 1982, 1986, 1990, and 1994.
Real per Capita GDP Growth	Annual growth rate of per capita Gross Domestic Product based on constant 1995 U.S. dollars. Population is the midyear level.
Real per Capita GNP Growth	Annual growth rate of Gross National Product per capita based on constant 1995 U.S. dollars.

1.2.2: Bank and Financial Institution Development Indicators

Private Credit by Deposit Money Banks / GDP	Claims on the private sector by deposit money banks divided by Gross Domestic Product. This banking sector development indicator concentrates on credit issued by intermediaries other than the central bank, and it measures the activity of financial intermediaries in one of its main function: channeling savings to investors.
Private Credit by Deposit Money Banks and Other Financial Institutions / GDP	This indicator is defined similar to the previous one except that it includes claims by both deposit money banks and other financial institutions. Other financial institutions include bank like institutions such as savings bank, mortgage banks and finance companies, insurance companies, private pension and provident funds, pooled investment schemes and development banks.

1.2.3: Stock Market Development Indicators

Stock Market Capitalization / GDP	The value of listed shares divided by Gross Domestic Product, indicating the size of the stock market.
Stock Market Total Value Traded / GDP	Defined as total shares traded on the stock market exchange divided by Gross Domestic Product, measuring the activity or liquidity of the stock markets.
Stock Market Turnover Ratio	An efficiency indicator of the stock market; defined as the ratio of the value of total shares traded and market capitalization, measuring the activity or liquidity of a stock market relative to its size.

Appendix 1.2: Data Description

1.2.4: Other Indicators

Secondary School Enrollment (% gross)	Logarithm of the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown.
Government Consumption (% of GDP)	General government final consumption expenditure as the percentage of GDP.
Trade (% of GDP)	The sum of exports and imports of goods and services measured as a share of gross domestic product.
Inflation, GDP deflator (annual %)	Measured by the annual growth rate of the GDP implicit deflator, the ratio of GDP in current local currency to GDP in constant local currency. This indicator shows the rate of price change in the economy as a whole.
Television sets (per 1,000 people)	Number of television sets in use per 1,000 people.
Research and development expenditure (% of GNI)	The ratio of current and capital expenditures (including overhead) on creative, systematic activity intended to increase the stock of knowledge and Gross National Income. Both fundamental and applied research and experimental development work are included.

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Chapter Two

Regional Economic Integration in East Asia

2.1. Introduction

Regional economic integration has been one of the distinguishing features of the post-war world. In Europe, the European Union (EU)[7] has evolved from a loose custom union toward a monetary integration, and the number of member states has enlarged from the original 6 into 15. The achievements of the EU are not only economic, but also political: it has played a major role in boosting the agricultural products in the member countries, in improving intra-regional trade and cooperation, and in sustaining peace and stability. Though some goals have not been achieved, Europe "may have to be satisfied with a half loaf rather than a full loaf, at least in the short run (Kondonassis, 1989)." In North America, Mexico joined the US-Canada Free Trade Agreement, and these three nations formed the North America Free Trade Area (NAFTA) in the early 90s. Compared with EU, which is dominated by the developed countries, NAFTA is the combination of both developed and developing economies. There are some other developing country integration schemes such as the Central American Common Market (CACM), the Mercado Común del Sur (MERCOSUR), the East African Common Market (EACM), and the Association of Southeast Asian Nations (ASEAN).

East Asia[8] has nearly a 1.9 billion population, and its economic reform strategies and growth miracles are impressive from many perspectives in the past twenty years. The

[7] The European Union (EU) was founded on November 1st, 1993. It was formerly known as the European Economic Community (EEC) or European Community (EC).

[8] Following the World Bank publication "Innovative East Asia: The Future of Growth" by Shahid Yusuf (2003), East Asia is defined as China, Hong Kong (China), Indonesia, Japan, the Republic of Korea, Malaysia, the Philippines, Singapore, Taiwan (China), Thailand, and Vietnam.

future performance of East Asia will strongly influence the trajectory of international trade and the improvement of world wealth. East Asia countries have been investigating the possibility of building a cooperative regional block to leverage economic growth decades ago, but due to the differences in country size, culture, linguistic, and political influence from the United States and former Soviet Union, the integration process has been slow and preliminary. Since the1990s, East Asia has been an active member in the Asia Pacific Economic Community (APEC).

This chapter reviews the theory and the history of regional economic integration, and investigates the problems and prospects in the integration process in East Asia. China is the most populous and spacious country in this region, and has steadily become an important force in the global economic arena and political forum. China's involvement in regional economic integration would not only improve regional economic prosperity, but also increase political stability and balance the world power. Based on theory, there is no real economic integration in East Asia so far, but we believe that East Asian countries would gain from the future regional cooperation and integration, and China will play a crucial role in this process.

The structure of the chapter is as follows. Section II discusses the development of economic integration theories. Section III reviews the history of regional economic integration. Experiences from the previous integration schemes are summarized in Section IV. Section V investigates the problems and prospects in the integration process in East Asia, followed by Section VI discussing the economic integration process in East Asia, especially China's potential role on improving regional economic prosperity and political stability, and Section VII concludes.

2.2. Theories of Regional Economic Integration

The classical economic integration theory has been the so-called static effects introduced by Viner (1950) and Lipsey (1960). Unfortunately, the empirical tests aimed at quantifying the static effects are very difficult. As Kondonassis and Malliaris (1996) point out that most of the arguments about the static effects are verbal instead of detailed computation. Furthermore, according to the limited empirical studies, the static effects are quite small, if not negative. In order to explain the surging wave of regionalism, researchers developed the theory of dynamic effects (Balassa 1961, Kreinin 1964, Motta and Norman 1996, et al.). Dynamic effects include the various ways through which the participating countries could improve their total factor productivity and economic growth rates, for example, technology transfer, competition, capital flow, and economic reform. Since the regional economic integration theory has evolved mainly from the developed country experiences, Brown (1961), Johnson (1965), El-Agraa (1989), Plummer (1997) and other scholars also investigate the feasibility of integration theory in the developing country framework.

2.2.1. Static Effects

Even before the publication of *The Custom Union Issue*, an influential book by Jacob Viner (1950), custom union was widely accepted as one of the regional economic integration formats. The idea was based on the principles of international trade. Regional economic integration was considered a stepping-stone to globalization, and the ultimate goal of free trade could optimize the benefit from comparative advantage, division of labor, and economy of scale. In his book, Viner brings up two challenging questions: whether custom union would lead to free trade, and whether trade creation

could outgrow trade diversion. Viner introduces the concepts of trade creation as the replacement of the expensive domestic products by cheaper imports from a partner, and trade diversion as the replacement of the cheaper initial imports from the outside world by more expensive imports from a partner (El-Agraa, 1989). Economists have been working on these two questions, but so far there is no consensus conclusion.

Many theoretical discussions attempt to solve the first question, would the custom union lead to free trade. The custom union theory emphasizes that similar country size, geographical location, and cultural origins are the prerequisites of successful regionalism, but the current integration procedure shows many new features. Ethier (1998) compares the "new regionalism" since the late 1980s and the "old regionalism" in the 50s and 60s. He argues that the current integration connects the big economies with the small ones, and the developed countries with less developed nations. For example, Mexico in NAFTA, and the Eastern European countries in EU are much smaller economies than the U.S. and Germany, respectively. The small members in the regional economic bloc usually experience reforms in trade policy, industrial structure, and political system. Ethier embeds the above characteristics into a trade model to prove that regional economic integration results from the multilateral liberalism, and facilitates and strengthens global free trade. Scholars such as Riezman (1985) and Yi (1996) share the similar conclusion as that of Ethier, though they take different approaches. On the other hand, some researchers argue that the rising regional economic integration in Europe, America and Asia would hinder world free trade. McLaren (2002) interprets the regionalism as a coordination failure. If a regional trade bloc is formed, member countries would invest within the group, and become more specialized toward each other.

However, the non-bloc nations would be isolated, and the demand for multilateral free trade would diminish.

Calculating the trade creation and trade diversion effects has been a challenging task. Kreinin and Plummer (1992) adopt the commodity matching method to assess the impacts of NAFTA, the enlargement of EC, and the Single Market Program in Europe (EC-92) on ASEAN and South Korea. They estimate that with the tariff removal effect only, the trade diversions of ASEAN exports to North American and Europe are 4% and 8%, respectively, and those of South Korea are 5% in both cases. Six years later, Kreinin and Plummer re-investigate the question and study the ex post effects of EC-92 on the exports of ASEAN and China. With the import growth approach and gravity model, the authors conclude that EC-92 has had negative effects on the exports of ASEAN and China, especially in light manufacturing and some electrical machinery industries. Hufbauer and Schott (1992) strengthen Kreinin and Plummer's studies by arguing that NAFTA may reduce the exports from other Latin American except Mexico in industries such as apparel and agriculture.

2.2.2. Dynamic Effects

Dynamic effects could be summarized into several categories: regional economic integration increases the market size, thus firms and industries could benefit from economies of scale. The expansion of markets within the region would attract more foreign direct investment (FDI) or other forms of capital inflow; the improved capital mobility could lead to a boom in infrastructure investment, and prohibit the free-ride attempt on the public goods of the neighbor countries. Integration not only stimulates the trade in goods, but also the transfer of technology and the flow of ideas. When foreign

firms exploit the easier access in the region, domestic firms are forced to lower costs and enhance competition. Last but not least, integration could also increase the institutional harmonization and regional political stability, and facilitate the economic reform.

The theoretical analyses of trade creation and trade diversion are well established, but the dynamic effects are hard to capture with a single model because of the series of separated phenomena (Brada and Mendez, 1988). As a result, researchers have been focusing on one or two specific factors of the dynamic effects, and discuss the pros and cons of the impacts of regional economic integration.

For example, Rivera-Batiz and Romer (1991) demonstrate that in a world with two similar developed economies, integration would induce the flow of ideas, which is central to economic growth. The authors consider two models with different specifications of the research and development sectors, and they believe that integration could encourage the exploitation of economy of scale in the R & D sector, which further increases the long run Gross Domestic Product (GDP) growth rate. Motta and Norman (1996) construct a three-country, three-firm model to investigate the impact of integration on FDI. They find that with the larger market size and easier accessibility, economic integration more likely leads to the intra-regional export platform FDI, which means the investing firms mainly supply the countries in the regional bloc, reduce product prices and increase total surplus by intra-regional exports. Scholars also investigate other dynamic effects such as integration and competitive discipline (Fung, 1992), economic reform (Sachs and Warner, 1995), and sunk cost (Owen and Ulph, 2002). There is no doubt that economists have developed good understandings of the

impacts of regional economic integration, notwithstanding the fact that the overall measurement of the dynamic effects is still pending future research effort.

2.2.3. Regionalism in Less Developed Countries

The theories of regional economic integration are mainly constructed on the experiences of developed countries. However, less developed countries possess many special characteristics that are not common in the developed nations. Plummer (1997) analyzes why the developing countries are special in the real sectors, as well as in financial and political systems. For developing countries, in the financial sector, the income gap is wider, the financial systems and price mechanism are distorted, financial risk and information costs tend to be higher, and the exchange rate regimes are less flexible. In the real sector, unemployment rates are higher, and the markets are smaller; and politically, developing countries tend to offer less democracy, but more uncertainty. Furthermore, less developed nations have lower voice and less power in the international organizations. Brown (1961), Robson (1968), Johnson (1965), and El-Agraa (1989) investigate the feasibility of adopting the integration theories for the less developed countries. Their considerations are based on the following three aspects: trade creation and trade diversion, terms of trade, and the dynamic effects. They believe that even if developing and developed countries have different structures, the benefits of regionalism have even bigger scope for less developed nations. However, the differences should be emphasized and justified.

2.3. History of Regional Economic Integration

In a broad sense, regional economic integration has been prevalent since the early 19th century. The first industrial revolution empowered the Western European countries

with military abilities to conquest the primitive societies in Africa, Asian, and America. The technology breakthrough in transportation, communication, and medication facilitated the European settlement and investment in the colonies. Meanwhile, the gold and silver standards were widely adopted, and the Napoleonic Code became the foundation of many of the international legal institutions (Sachs and Warner, 1995). The network of preferential trade arrangements and bilateral treaties between colonial empires and independent countries played a crucial role in promoting exports and the overall economic growth in the developing world.

World War I and the Great Depression of the 1930s severely interrupted the economic integration process. Not only in the developing nations, but also in the U.S. and European countries, protectionism characterized the government policies and academic arguments. For example, the Hawley-Smoot Tariff Act in 1930 brought the highest protective level in the history of the U.S. After President Hoover signed the act, the U.S. foreign trade suffered a sharp decline, and the depression intensified. Moreover, the act brought retaliatory tariff acts from other countries such as the British Abnormal Importations Act implemented in 1931. Many countries abandoned currency convertibility and started to impose tariff and non-tariff trade barrier. Even Keynes, the great economist, wrote in his 1933 lecture *National Self-Sufficiency,* "I sympathize, therefore, with those who would minimize, rather than with those who would maximize, economic entanglements between nations... Let goods be homespun whenever it is reasonably and conveniently possible; and, above all, let finance be primarily national." The Second World War marked the utter collapse of the international economic systems. It is the Marshall Plan aid program which re-introduced the spirit of cooperation in

Europe, and with the signing of the Treaty of Paris in 1951 and the rising of the European Coal and Steel Community in 1952, the European Economic Community (EEC) was established in 1957 (Kondonassis, 2001 a). The EEC has induced and preceded numerous forms of regional economic integration, and it has been the most significant one over the years.

Following the establishment of the EEC, the European Free Trade Agreement (EFTA) was formed in 1960 with seven members: the U.K., Austria, Denmark, Norway, Portugal, Sweden, and Switzerland. The U.K. was the most enthusiastic advocate of the EFTA since it wasn't ready to commit itself to the EEC, which adopted a common agriculture policy and aimed at the political unity of the Western Europe. Instead, the U.K. preferred to have free trade in the industrial sectors only in order to keep the advantage of *Commonwealth preference*, meanwhile open up the European market for its industrial products (El-Agraa, 1989). However, the U.K. and Denmark joined the EEC in 1973, and left the EFTA with only relatively smaller economies.

In the developing world, there are many themes of regional economic integration. For example, in Africa, the Economic Community of West African States was established in 1975, the Southern African Customs Union was formed in 1969, and the Economic Community of the Countries of the Great Lakes was created in 1976. In Latin America, the Central American Common Market was formed in 1960, and in the same year, the Latin American Free Trade Association was established. The Andean Group and Caribbean Community were formed in the late 60s and early 70s, respectively. In Asia, the Association of South-East Asian Nations was founded in 1967, and in East

Europe, the communist countries formed the Council for Mutual Economic Assistance in 1949.

With the exception of EEC, most of the regional economic integration initiatives of the 50s and 60s experienced uneven and inconsistent development process, and some of them amounted to nothing or even ended in the 70s and early 80s. However, since the late 80s, there has been a new wave of regional cooperation and integration. The EEC enlarged from the original six members into fifteen, and ten former communist nations in the central or Eastern Europe have been invited to join in 2004. The prominent regional schemes include the North American Free Trade Agreement (NAFTA) formed by the U.S., Canada and Mexico in 1994, the Mercado Común del Sur (MERCOSUR) signed by Argentina, Brazil, Paraguay and Uruguay in 1991, and the Asia Pacific Economic Cooperation (APEC) founded in 1989. APEC has become a community with twenty-one diverse countries in the Asia-Pacific region accounting for half of the global GNP, over 50% of the merchandise trade, and two-fifths of the world population (Gershman, 1998). Currently, there are more than one hundred regional arrangements in the world.

2.4. Experiences from the Previous Regional Integration Schemes

History indicates that "the world is a roller coaster, in which we all go up and down together; or at least down" (Streeten, 1989). The tragedy of September 11th and the war on Iraq warn the regional organizations and institutions to take more responsibilities. In addition to the traditional economic prosperity and political stability, religious tolerance, culture fusion, and policy reform also become the prerequisites of future economic development. Regionalism has been facilitating cooperation and improving economic

growth from many dimensions, and the lessons and experiences from the previous integration scheme would provide better understanding of how the mechanism works.

Kondonassis and Malliaris (1996) have an excellent summary of the old lessons from Customs Union, which is the most common format of regionalism. They argue that in order to take advantage of the division of labor and economy of scale, the bigger the size of the integration project, the better the chance to enlarge market and reduce trade diversion; the increased market size and reduced tariff among member countries could intensify competition and improve economic efficiency; and the initial high tariff level usually guarantees the stronger impacts of trade creation than that of trade diversion.

Regional integration couldn't be achieved overnight; instead, it requires foresight, determination, and consistent effort from all the participating nations. The EU has been one of the most successful integration schemes. The circulation of Euro in 2002 indicates years of culmination of macroeconomic convergence, fiscal and monetary integration, institutional building, and regulatory harmonization (Arroyo, 2002). Politically, "(through EEC), a reconciliation between France and Germany has been achieved ending the conflicts which had led to wars in Europe every few decades (Kondonassis, 2001)." Indeed, forty-six years after signing the Treaty of Rome, the EU has become an important force to maintain peace in Europe and in the world.

Economic integration is accompanied by the flow of ideology and philosophy. For example, Canada, Mexico and the U.S. launched the integration framework NAFTA in 1994. In spite of the temporary setback in agriculture sectors, Mexico has been making steady progress in improving infrastructure, tackling poverty, and building a modern society. Furthermore, the spirit of freedom and democracy has never been deeper and

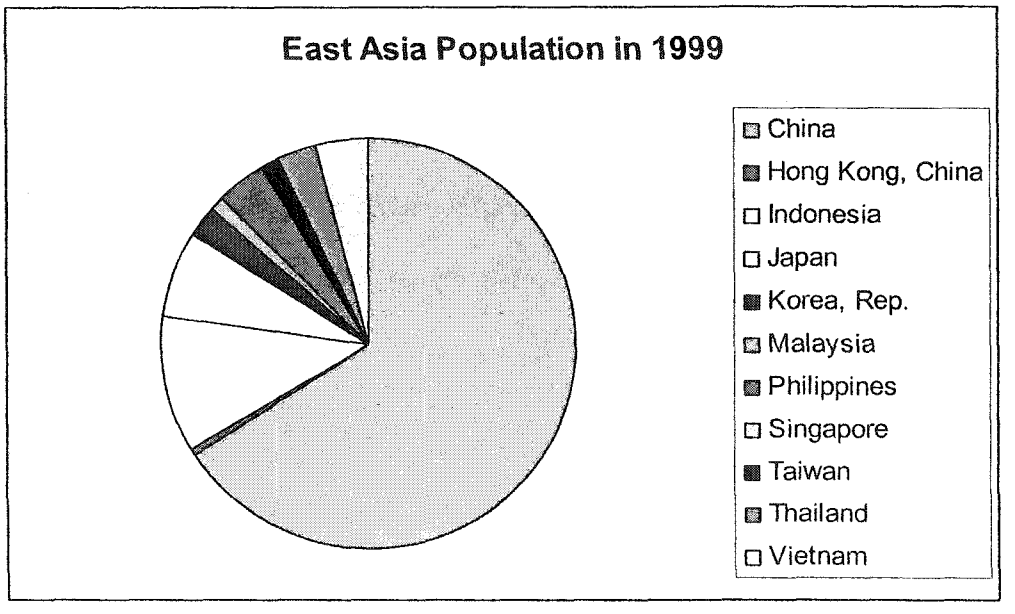
stronger. In 2000, Vicente Fox, a former Coca-Cola executive, was elected the president of Mexico, marking the first democratic transition of power in Mexico's history.

2.5. Problems and Prospects of Regionalism in East Asia

2.5.1. Problems and Concerns

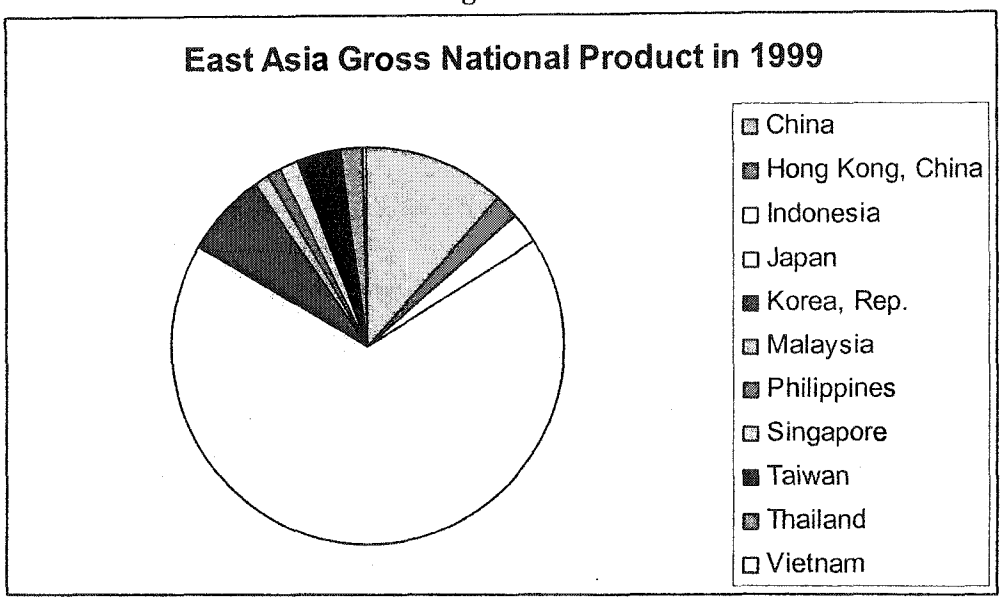
East Asia consists of eleven countries and regions with tremendous differences in size, linguistics, religion, the average national income, and the development stage. China has a population of 1.3 billion, which counts for more than 68% of the total population in East Asia. Japan and the four newly industrialized economies (NIE): Hong Kong (China), Singapore, Taiwan (China), and the Republic of Korea enjoy high income level and living standard; Malaysia, China, Philippines, and Thailand are in the middle income category; while Indonesia and Vietnam belong to the low income group[9]. Figures 2.1 and 2.2 present the comparison of population and Gross National Product (GNP) of the eleven regions in 1999, respectively.

Figure 2.1



[9] The classification is based on the World Bank data and statistics. More information is available at http://www.worldbank.org/data/countryclass/classgroups.htm

Figure 2.2



Data Source of Figure 2.1 and 2.2:
Taiwan population data is from the Austrian National University International Economic Data Bank, GNP data is from the National Statistics of Taiwan. The rest of the data is based on the World Bank Development Indicator, 2001.

Figure 2.1 and 2.2 partly explain why till the early 90s, the East Asia economic integration had been nothing but remote possibilities. Many economists believe that the geographical proximity and the similarity in development process are the fundamental elements of a successful regional arrangement. However, in East Asia, Japan alone provides more than 60% of the total production, and China shares almost 70% of the population.

Some of the major concerns of the economic integration in East Asia include (1) whether China, with its abundant low cost labor and natural resources, would threaten the neighboring less developed nations—a phenomena called "big fish eats small fish"; (2) how could developing countries protect their infant industries from the impact of Japanese imports; and (3) whether integration would increase the possibility of financial contagion and crisis. Political factors also influence the integration process: after the Second World War, China, the former Soviet Union, North Korea and Vietnam had been

in the communist coalitions, but Japan and NIE had close relationships with the U.S. and the Western European countries. It may be true that most of the political tensions had been released after the collapse of the former Soviet Union, but there are still unsolved issues between China and Taiwan, and emotional difficulties among people in Republic of Korea and China toward Japanese because of the invasion during the World War II.

2.5.2. Prospects and Potentials

Notwithstanding the challenges, there are tremendous potentials and bright prospects for East Asia economic integration.

Economically, the eleven East Asia countries could be grouped into three categories. The leading role is played by Japan, followed by the NIE group, and the third category consists of the five ASEAN countries and China. The three-layer development structure facilitates the trade, capital, and technology flow not only from Japan to the second and third layers, but also from the second category to the rest of the middle or low income economies. The trade relationships among the three categories are more of complement rather than substitute features. The "flying geese" development pattern partly explains the East Asia growth miracle in the past twenty years.

Table 2.1 shows the export and import directions of the East Asia countries in 1991 and 2000. In 1991, the export total in East Asia is 795,238 million dollars, and by 2000, it increases by more than 110% to 1,670,296 million dollars. The import is also more than doubled, reaching 1,460,307 million dollars in 2000.

Table 2.1: Export & Import Destinations of East Asia Countries in 1991 & 2000

	China				Japan			
	Export 91	Export 00	Import 91	Import 00	Export 91	Export 00	Import 91	Import 00
World (Million US$)	71910	249297	63791	206132	314786	479249	236999	379511
China %					2.7	6.3	6	14.5
Japan %	14.3	16.7	15.7	20.1				
NIE % (1)	51.4	26.7	36.5	30.7	21.3	23.9	11.5	12.3
ASEAN % (2)	3	4.4	4.3	8.2	8.1	9.9	11.6	13.5
East Asia Total %	**68.6**	**47.8**	**56.6**	**59**	**32.1**	**40.1**	**29.2**	**40.3**
US %	8.6	20.9	12.6	10.9	29.3	30	22.6	19.1
EU % (3)	9.9	15.3	14.6	15	20.4	16.4	14.5	12.3

	Hong Kong				Korea			
	Export 91	Export 00	Import 91	Import 00	Export 91	Export 00	Import 91	Import 00
World (Million US$)	98577	201860	100255	212805	71870	172268	81525	160481
China %	27.1	34.6	37.7	43.1	1.4	10.7	4.2	8
Japan %	5.4	5.5	16.4	12	17.2	11.9	25.9	15
NIE %	8.9	6.8	18.1	16.9	12.6	14.2	4.1	6
ASEAN %	3.8	3.5	3.8	5.9	6.4	8.2	5.9	8.7
East Asia Total %	**45.2**	**50.4**	**76**	**77.9**	**37.6**	**44.9**	**40.1**	**37.7**
US %	22.7	23.3	7.6	6.8	25.9	21.9	23.2	18.2
EU %	18.8	15.2	9.7	8.7	14.7	13.6	13.1	9.8

	Singapore				Taiwan (4)			
	Export 91	Export 00	Import 91	Import 00	Export 91	Export 00	Import 91	Import 00
World (Million US$)	59025	137804	66293	134545	76195	148122	63293	140010
China %	1.5	3.9	3.4	5.3				
Japan %	8.7	7.5	21.3	13.8				
NIE %	13.1	17.4	9.9	10.6				
ASEAN %	22.3	26.4	18.9	24.4				
East Asia Total %	**45.6**	**55.2**	**53.5**	**54.1**	**28.9**	**40.6**	**15.7**	**28.6**
US %	19.8	17.3	15.8	14.1				
EU %	14.7	13.2	13	11.3	17.4	15	13.4	11.2

	Indonesia				Malaysia			
	Export 91	Export 00	Import 91	Import 00	Export 91	Export 00	Import 91	Import 00
World (Million US$)	29142	62124	25869	33515	34349	98135	36648	82199
China %	4.1	4.5	3.2	6	1.9	3.1	2.2	3.9
Japan %	36.9	23.2	24.5	16.1	15.9	13	26.1	21.1
NIE %	21	23.8	18.2	22.3	33.8	30	26	27.1
ASEAN %	3.2	6.7	3.3	7.9	5.6	7.6	4.4	9.6
East Asia Total %	**65.2**	**58.2**	**49.1**	**52.4**	**57.2**	**53.7**	**58.8**	**61.8**
US %	12	13.7	13.1	8.5	16.9	20.5	15.4	16.6
EU %	13.1	14	20	12.4	15.2	13.7	15.3	10.8

Table 2.1: Export & Import Destinations of East Asia Countries in 1991 & 2000 (Con.)

	Philippines				Thailand (5)			
	Export 91	Export 00	Import 91	Import 00	Export 91	Export 00	Import 91	Import 00
World (Million US$)	8767	39783	12786	33808	28428	69057	37591	61924
China %	1.5	1.7	1.9	2.3	1.2	4.1	3.1	2.8
Japan %	20.2	14.1	19.7	17.8	18.1	14.8	29.4	23.8
NIE %	12.1	22.8	20.2	22.6	16.2	18.9	19	21.6
ASEAN %	4.6	7.1	5.7	8.4	3.6	8.8	4.3	9.4
East Asia Total %	**38.4**	**45.7**	**47.5**	**51.1**	**39.1**	**46.6**	**55.8**	**57.7**
US %	35.9	28.7	20.4	15.8	21.3	21.3	10.6	10.7
EU %	19.2	17.2	10.9	8.8	22.7	15.7	16.5	10

	Vietnam (6)			
	Export 91	Export 00	Import 91	Import 00
World (Million US$)	2189	12597	2483	15377
China %	0.9	6.7	0.7	11
Japan %	32.8	19	6.4	14.1
NIE %	34.6	13.3	45.4	42.8
ASEAN %	4.1	9	3.2	12.5
East Asia Total %	**72.4**	**48.1**	**55.7**	**80.5**
US %	0	6.2	0	2.5
EU %	5.5	26.7	12.3	8.3

Data Source: International Monetary Fund Direction of Trade Statistics Yearbook 1997 and 2001.
(1). NIE include Hong Kong, South Korea, Singapore, and Taiwan.
(2). ASEAN include Indonesia, Malaysia, Philippines, Thailand, and Vietnam.
(3). European Union (EU) include Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom.
(4). There is only limited data for Taiwan in the IMF Yearbook and other data sources.
(5). In the case of Thailand, the data of export to and import from Taiwan in 2000 is not available, thus it is substituted by 1999 data.
(6). In the case of Vietnam, the 1991 world export and import volume is the DOTS instead of IFS value because of the data limitation.

The intra-regional trade shares of most of the East Asia countries are more than half of their total trade values. For example, 16.7% of China's export goes to Japan in 2000, and another 26.7% goes to the four NIE—Hong Kong, Korea, Singapore, and Taiwan; the total export directed to the East Asia area is 11.6% higher than that of the combination of the U.S. and the EU. Meanwhile, 59% of the Chinese import comes from countries in this region. In Japan, both the regional export and import increased about

10% from 1991 to 2000. As of 2000, East Asia absorbed 40.1% of Japan's export and provided 40.3% of the import.

Hong Kong and Singapore show stronger dependence on the intra-regional trading relationship compared with that of Republic of Korea and Taiwan. The former two NIE share 45.2% to 77.9% of their trade in this region compared with those of 15.7% to 44.9% in the latter two. Indonesia, Malaysia, Philippines, Thailand, and Vietnam are also closely related to the intra-regional trade partners. In 2000, the intra-regional trade of each of the five ASEAN counts about at least half of the total trade value. But interestingly enough, all the five nations heavily rely on Japan and the NIE, and the trading volumes with China or the other ASEAN stay in single digit levels.

East Asia is dominated by less developed countries, and macroeconomic stability has been a critical and fundamental requirement for the future success of development strategy. Indeed, "even short term bouts of instability can haunt an economy for many years," many East Asia economies are still dealing with the aftermath of the 1997 financial crisis (Plummer, 1997). Regional economic integration could support stable macroeconomic policies in several ways. First, integration agreement requires the exchange rate stability and low inflation to sustain its proper function; second, members must share information, encourage stable fiscal and monetary polices, and participate in "peer pressure" to reduce unstable polices; third, intellectual property and environment are usually better protected by the regional cooperation, which will further facilitate technology transfer and increase foreign direct investment; last but not least, regionalism encourages the domestic policy reforms of its member states and improves the international attention and recognition of the whole region.

Politically, the East Asian region has never been in a better era of cooperation and interdependence. After the World II, the former Soviet Union and the U.S. had been the leaders of the communism and capitalism coalition. The economic and culture communication was frozen between the two superpowers, and the armaments were heavily placed around the Korean Peninsula. Furthermore, most of the East Asia countries also took a hard line stance (Jeong & Choe, 2001). Gorbachev's political reform and the transformation of the former Soviet Union turn the regional interrelations into a whole new page. Republic of Korea and China established diplomatic relations in 1992, and the "Sunshine Policy" brought the presidents of the two Koreas together in 2000. Meanwhile, the peaceful return of Hong Kong in 1997, the deepening of the market economy reform, and the successful WTO access in 2001 all indicate China's commitment to keep peace, to pursue development, and to follow international rules and orders.

However, the ever-changing world never stops challenging human beings with more dilemmas. The terrorist attack has rung the alarm of the importance of mutual understanding between different cultures and religions. East Asia consists of complicated religious and ethnic groups. For instance, 87% and 60 % of the population are Muslin in Indonesia and Malaysia, respectively, followed by various other groups such as Buddhist, Christian, and Hindu. In addition, President Bush's declaration of North Korea as one of the "Axes of Evil" in his State of the Nation address, and North Korea's admittance of the possession of nuclear weapons further deteriorate the already vulnerable international stability. Joseph Nye, dean of the Harvard's Kennedy School of Government argues that in this information age, the worst strategy to fight terrorism is to

isolate people in the unfriendly regions from the rest of the World. If the confliction between the U.S. and North Korea could be investigated in a bigger framework, the concern of "unintended consequences" could be effectively reduced or eliminated. East Asia is certainly in a pivotal position to advocate mutual understanding and cooperation.

2.6. Regional Integration Process in East Asia

Regionalism in East Asia is still in the preliminary stage. The important steps taken by the eleven countries are the active participation of APEC, the inauguration of the ASEAN Free Trade Area (AFTA), and the bilateral trade negotiations among some member states.

APEC was created in 1989 as a means of economic dialogue, but it has grown into a forum for ensuring and facilitating trade and investment liberalization, and for improving development cooperation in the Asia-Pacific region. There are twelve original members: Australia, Brunei Darussalam, Canada, Indonesia, Japan, Malaysia, New Zealand, the Philippines, Singapore, Republic of Korea, Thailand and United States. China, Hong Kong, and Taiwan joined APEC in 1991, followed by Mexico and Papua New Guinea in 1993, Chile in 1994, and Peru, Russia, and Vietnam in 1998. Currently, APEC includes twenty-one members with a population of over 2.5 billion and a combined GDP of 19 trillion US dollars, which account for 47 percent of world trade[10]. Its sheer size and the membership composition have made APEC a rising star in the international arena.

The principle of APEC is to have the sub-regional trading arrangements consistent with the WTO rules, thus by participating APEC, the member states would increase the confidence in multilateral liberalization and reduce concerns about being excluded from the preferential approaches. Even if both the voluntary characteristic of APEC and the

[10] The statistics is from the APEC website at http://www.apecsec.org.sg

diversity of the member economies contribute to the slow and difficult liberalization process, the reinforcement of economic reform in developing countries and the dynamic effects such as technology transfer from DCs to LDCs promise the bright aspects of the Asia-Pacific economic integration (Plummer 1997). APEC's economic focus has been broadened to security issues after the terrorist attack on September 11th, 2001, and the health care cooperation because of the outbreak of severe acute respiratory syndrome (SARS).

Since its inception in 1991, China has been actively taking part in various APEC activities and played an important role in forming the cooperation policies and strategies. Meanwhile, APEC has provided China an opportunity to demonstrate its determination on continuing domestic economic reform, on integrating with the rest of the world, and on promoting regional prosperity.

In 2002, China is the 6th largest trading nation with more than 50% of its export to and import from its East Asia neighbors. Some researchers believe that even if China is the most tempting market in the world, it poses a threat to the rest of the East Asia countries with its abundant natural resources and low cost labor, therefore, other less developed countries in this region should reduce the dependency on China (Park, 1996). Contrary to the above argument, we believe that the relationships between China and the other East Asia economies are more complimentary than competing: Japan and NIE provide China with capital, technology, advanced management philosophy, and export markets, while China contributes its abundant low cost labor and natural resources. China also creates a deeper and more intensive horizontal division of labor in East Asia area. For instance, Taiwan shifted many of the declining industries into mainland China

to extend the product life cycle; Hong Kong also took advantage of the language and ethnic affinity with China, and became a key beneficiary of the intensive economic integration with China. Table 2.2 indicates that in 1999, NIE alone contributes 56.74% of the capital inflow in China, who has been one of the biggest recipients of foreign direct investment in the world. Though China and the ASEAN compete in some light manufacturing sectors, they also complement each other with primary or raw materials.

Due to the different political systems, rules of law and social structures, China and some of the other East Asia countries have been criticized for invading the intellectual property right and human right. APEC has become a forum for China and its alliances to pursue understanding and support, and to solve those problems.

APEC and WTO are mutually reinforcing in facilitating trade liberalization (Yang and Huang, 1999). APEC is based on consensus and peer group pressure to recognize the diversity of economies and legitimize mutual interdependence, while WTO imposes legal rules and regulations, which provide better security for members' market access, and further encourages market opening and enhance policy coordination.

Table 2.2: Major Foreign Direct Investment Participants in China in 1999

Country/Region	FDI Outflow (US$100million)	Investment in China (US$100million)	Share in China%
Japan	227.43	29.73	7.37
Hong Kong	198.95	163.63	40.58
Singapore	39.43	26.42	6.55
Taiwan	44.20	25.99	6.45
Korea	25.48	12.75	3.16
NIE Total	**308.06**	**228.79**	**56.74**
US	1509.01	42.16	10.46

Data Sources: the World Investment Report of the UN & the Foreign Trade Statistics of Chinese Ministry of Foreign Trade and Economic Cooperation.

The WTO access in November 2001 is China's milestone for trade and economic development, and it offers China the chance to play even more important role in the world and regional economy.

The impacts of China's WTO membership to other developing countries include: (1) the expansion of Chinese export market; (2) increased supply of export into international markets; (3) stronger competition in the third markets, and (4) bigger volume of inward and outward foreign direct investment to and from China (Martin, Bhattasali, and Li 2003). It is true that China will bring stronger competitions in the third market in apparel, textiles, and electronic industries, which require more regional cooperation to resolve the challenge. On the other hand, China's liberalization in agriculture and service industry will considerably increase the demand for raw material, natural resources, and services such as telecommunication, finance and insurance. China is expected to import more from other East Asia countries, and to provide this region with cheaper intermediate products. In general, China brings in more opportunities rather than threats to the rest of the East Asia region.

In 2001, China proposed a new free trade area covering the ASEAN and China. A year later, with the inauguration of the Asia Free Trade Area (AFTA), the intra-ASEAN tariff rates have been lowered to 5%, and the reduction applies to 90% of products. The goal is to reach zero tariff rates within AFTA by 2010. The original AFTA members include Indonesia, Malaysia, Philippines, Singapore and Thailand, while Vietnam is expected to join in 2006 and reach zero tariff rates by 2015.

Beside the above preferential trading agreements, some East Asia countries also proposed bilateral trade arrangements and started the negotiations. For instance,

Singapore and Japan passed an agreement encompassing facilitation and service sector issues in 1999; Republic of Korea and Japan established the "Japan-Korea Economic Agenda 21" and "South Korea-Japan IT Cooperation" initiatives in 1999 and 2000, respectively.

The integration and development strategies are aimed at promoting cross border trade flow, maintaining stability, and pursing sustainable long run economic growth. However, in order for them to succeed, East Asia countries need to separate economics and politics at the beginning stage. Furthermore, adequate mechanisms need to be created for reducing inter and intra country income disparity, building welfare and pension systems, protecting intellectual property rights, and introducing harmonized rules and standards.

2.7. Concluding Remarks

"Regionalism rules (Ethier, 1998)." Since the late 1980s and early 1990s, a new wave of regional economic integration has swept the globe: from Africa to North America, from Asia to Central America, and from Europe to Oceania, there are many regional initiatives and attempts. However, regional integration is not a new phenomenon; it once prevailed in the 19th century when the European civilization started to build the colony empires and in the 1950s after the World War II.

This chapter reviews the history of regional economic integration, and discusses the theoretical underpinning of the integration process. Viner (1950) and Lipsey (1960) set the foundation of theories of trade creation and diversion, but due to the difficulties in empirically testing the static effects, the dynamic effects covering various factors such as

technology transfer, competition, capital flow, and economic reform are also vigorously investigated.

Based on the experiences from the existing regional integration schemes, this chapter argues that there are tremendous potentials and bright prospects for East Asia economic integration. Economically, the three development layer characteristic in the eleven East Asia countries facilitates trade, capital, and technology flows from developed countries to less developed nations, and from the high income regions to the middle and low income economies. The intra-regional trade data further demonstrates that the three groups of countries are more of complements than substitutes. Politically, the collapse of the former Soviet Union opens an era of inter-dependence in East Asian. Other events such as the establishment of the diplomatic relationship between China and Republic of Korea, the "Sunshine Policy" for the two Koreas, and the peaceful return of Hong Kong back to China also indicates that East Asian has never been in a better atmosphere for regional cooperation since the Cold War. Meanwhile, East Asia is in a pivotal position to advocate mutual understanding and to balance the world power.

All the East Asia countries are members of the APEC; meanwhile, they all belong to WTO except Vietnam. Even if regionalism in East Asia is still in the preliminary stage, the active participation in APEC and WTO will contribute and promote the economic cooperation and political coordination in this region. China has become an important force in both the economic and political forums. Contrary to the negative view that China threatens the rest of the East Asia developing countries, this chapter argues that China's involvement in regional economic integration not only improves regional economic prosperity, but also strengthens political stability.

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Chapter Three

Infrastructure as a Determinant of Foreign Direct Investment Inflows

3.1. Introduction

Foreign direct investment (FDI) is one of the major forms of international capital flow. Due to the sluggish global economy, and the uncertain international political environment, the amount of FDI inflows has been decreasing considerably in the major developed countries in the past few years. But in contrast, FDI flows to some developing nations have grown rapidly. For example, China became the largest FDI recipient in 2002 with almost 53 billion USD of inflows (OECD, 2003). Though there is no consensus on the role of FDI for long run economic growth, most researchers agree that for developing countries, with transition economies in particular, FDI has a positive impact on economic development since FDI is the amalgamation of stable investment funds, advanced technology, efficient managerial skills, and easier access to the world market (Chuang and Lin, 1999, Buckley, Clegg and Wang, 2002, Oliva and Rivera-Batiz, 2002, etc.).

Many countries see attracting FDI as an important development strategy, and extensive studies have been conducted to investigate the determinants of FDI. Lim (2001) has a detailed summary of the determinants of FDI. Theoretically, the size of the host market, agglomeration effect, low labor cost, fiscal incentive, friendly business climate, and trade openness should have positive impacts on FDI, while high transportation cost, bureaucratic red tape, and political instability would repel FDI.

However, empirical studies indicate that few factors have a consistent significant influence on FDI inflows.

This chapter attempts to investigate the role of infrastructure on FDI inflows. We define infrastructure as a broad concept including both physical and social perspectives. Physical infrastructure provides and delivers the services such as energy, water, sanitation, transportation, and communication, which are necessary for daily life (World Bank). Social infrastructure is captured by Governance indicators measuring the political, institutional and legal environment within which individuals accumulate skills and firms produce output (Hall and Jones, 1999, Globerman and Shapiro, 2002 and Kaufmann, Kraay and Mastruzzi, 2003). It is difficult to measure the quality of infrastructure development, especially for some developing countries, where data is neither available nor accurate. Most of the previous studies choose one of the physical infrastructure indicators to represent the rest of the sectors. For example, Cheng and Kwan (2000) take on all roads (km/km^2 of land mass), high-grade paved roads (km/km^2 of land mass), and railways (km/km^2 of land mass), respectively, as the physical infrastructure measurements. However, any single indicator could produce an inconsistent or biased result, which could weaken the strength of the argument. We implement the principal component analysis to construct a comprehensive infrastructure measurement. The different sectors such as energy, transportation, and telecommunication all have their own voices in our study.

This chapter also contributes to the literature in some other ways. First, to our understanding, this is the first study to expand the concept of infrastructure to both physical and social perspectives, and to investigate their impacts on FDI inflows.

Bougheas, Demetriades, and Mamuneas (2000) argue that the modeling of "soft" infrastructure such as institutional framework and legal system would yield important insights into economic development; however, most researchers only focus on physical infrastructure.[11] There are a few exceptions in the literature confirming the close relationships between social infrastructure and productivity, FDI, and economic growth, but the role of physical infrastructure is not emphasized, or not even mentioned (Globerman and Shapiro, 2002, Hall and Jones 1999, etc.).

Second, we use the newly published governance indicators to measure social infrastructure. The governance indicators are drawn from 25 separate data sources constructed by 18 different organizations, and it is the most comprehensive and accurate governance infrastructure measurement available for most countries in the world (Kaufmann, Kraay, and Mastruzzi, 2003). It includes six aggregate governance clusters capturing the political stability, government effectiveness, regulatory quality, rule of law, the control of corruption, and the process that authorities are selected and replaced. This data set covers 199 regions for 4 time periods: 1996, 1998, 2000, and 2002, and the time series feature makes the panel investigation of the role of governance infrastructure possible for the first time.

Third, this paper provides both cross section and panel data analyses to study the infrastructure determinant on FDI inflows. There are large amount of sample countries for both of the ordinary least squares and random effect models. In the panel study, our

[11] For example, Fox and Porca (2001) conclude that physical infrastructure such as telecommunication and electricity is essential to support and facilitate economic activities in the rural areas. Yilmaz and Dinc (2002) examine the impact of telecommunication infrastructure on the service sectors' output growth in different states in the U.S., and their study indicates that the states accruing positive benefits are those that efficiently use the telecommunication infrastructure.

data is from 1995 to 2002, which captures the most recent changes in FDI inflows and infrastructure availabilities.

The rest of the chapter is organized as follows: Section II introduces the principal component analysis, and builds the comprehensive physical and governance infrastructure indexes for a wide range of countries. Section III discusses the econometric methodology. Section IV explains the variables and the data source. In section V, we discuss the regression results, and section VI concludes.

3.2. Construction of Infrastructure Index with Principal Component Analysis

3.2.1. Principal Component Analysis

Principal component analysis is a statistical technique for factor analysis. The purpose of this method is to summarize the complex high dimensional data into a few dimensions, where each dimension is called a principal component. Each component represents a linear combination of the variables. The first principal component accounts for as much variation in the data as possible, and the next principal component accounts for as much of the variation unexplained by the previous principal components as possible. We adopt this technique and build the comprehensive physical and governance infrastructure indexes based on the first principal component since it explains about 60% of the variance of physical infrastructure and more than 80% of the variance of governance infrastructure.

Our physical infrastructure measurements have different scales. For example, the energy availability is represented by the amount of electric power consumed by each person, while the transportation capacity is indicated by the percentage of paved road over total road. In order to eliminate the different scales for the sample countries, we

assume that each group of physical infrastructure indicators is normally distributed, and the raw data is transferred by the standardizing formula. However, the standardization process is not necessary for the aggregate governance infrastructure indicators since they are constructed with the unobserved components model, and all the values are between –3 and +3.

3.2.2. Physical and Governance Infrastructure Measurements

The aspects of physical infrastructure captured by the cross section study and panel data investigation are slightly different due to data limitation. Appendix 3.1 lists all the physical infrastructure measurements. For the cross section data, the measurements include factors such as energy, transportation, telecommunication, communication, sanitation, and water source. Unfortunately, in order to maintain a legitimate amount of sample countries, the sanitation and water source indicators are substituted by the air transport and passenger car measurements in the panel data set for the period of 1995 to 2000. However, even if the infrastructure indicators are reduced to only three in 2001 and 2002, almost half of the observations do not have the physical infrastructure index values.

Governance Infrastructure Indicators cover the process by which governments are selected, monitored and replaced, the capacity of the government to effectively formulate and implement sound policies, and the respect of citizens and the state for the institutions that govern economic and social interactions among them (Kaufmann, Kraay, and Mastruzzi, 2003). There are six aggregate governance measurements constructed by the unobserved components model: Voice and accountability; Political stability; Government effectiveness; Regulatory quality; Rule of law; and Control of corruption.

Both the cross section and panel studies include 86 countries, but there are slight differences in the individual countries in the two data sets because of the data availability. The country names are listed in the appendix 3.2 and 3.3, respectively.

3.2.3. Infrastructure Index

The eigen values and eigen vectors for the cross section physical infrastructure measurements are reported in Table 3.1. Since the first component explains 65% of the variance, it is legitimate to adopt the first principal component to represent the combined variance of the eight physical infrastructure measurements. Then Factor loading, the weight of each infrastructure indicators is derived. Physical Infrastructure Index for the cross section study is calculated and ranked in Appendix 3.4.[12] Governance Infrastructure Index is also computed and listed in Appendix 3.4.

Table 3.1: PCA of Cross Section Physical Infrastructure Measurements (95-02)

	Component 1	Component 2	Component 3	Component 4
Eigen Value	5.206010	1.197568	0.599760	0.368145
Variance Proportion	0.650751	0.149696	0.074970	0.046018
Cumulative Proportion	0.650751	0.800447	0.875417	0.921435
Variable	Eigen Vectors1	Eigen Vector2	Eigen Vector3	Eigen Vector4
Energy Use	0.394918	-0.235789	-0.004939	0.141873
Electric Power	0.398509	-0.271018	0.026352	0.062626
Health Expenditure	0.379024	-0.314683	0.031142	-0.141564
Paved Roads	0.237807	0.524392	-0.769759	-0.171016
Phone Lines	0.409822	-0.127713	-0.042064	-0.178577
TV Sets	0.387834	-0.082726	-0.163066	0.167810
Sanitation	0.286345	0.520095	0.310776	0.699286
Water Source	0.290959	0.450874	0.529944	-0.614502

Note: Data source: World Development Indicators (2003); the PCA result is computed by Eviews 4.

[12] The formula to derive Factor loading is: $FactorLoading = EigenVector * \sqrt{EigenValue}$

The United States scores the highest in physical infrastructure index, and the top five countries are all classified as high income OECD nations, while the bottom ten nations are dominated by African developing economies. In the Governance Infrastructure Index, the United States slips to 9th, and Singapore, an emerging market, is ranked 4th. The bottom ten countries in the governance index are some African developing countries, transition nations in central and east Europe, and Iraq. For developed countries, the physical and governance infrastructure ranks are quite balanced, but for some developing countries, the comparison between the two indexes is very dramatic. For instance, Iraq is ranked 44th, and India is listed as 73rd in the physical index, but they drop to 86th and rise to 35th in the governance index, respectively.

We follow the PCA procedure for the panel data set to compute the infrastructure indexes for each of the 86 countries for four points of time from 1995 to 2002 (the four observations are the average of 95-96, 97-98, 99-00, and 01-02). The physical index is reported in Appendix 3.5, and the governance index is in Appendix 3.6. There is not much change in the inter-country ranks among the four points of time, which indicates that it takes time to improve the infrastructure quality and capability. Similar to the cross section infrastructure index, developed countries are more stable in terms of their ranks over time, and the higher ranks are filled with the high income OECD countries except Qatar in the physical index and Singapore in the governance index. For the developing countries, the notable change in the physical index is the upward move of Sri Lanka from 71st in 1996 to 62nd in 1998 and 2000. In the governance index, the good improvements include Romania, from late the 50s to 48th in 2002, and Sri Lanka from the early 60s to

51st. On the other side, there is also downward mobility such as Indonesia drops from 64th in 1996 to about 80th in 1998, 2000 and 2002.

3.3. Econometric Framework

This chapter adopts two econometric techniques to examine the determinants of physical and governance infrastructure on FDI inflows. The Ordinary Least Square (OLS) study includes 86 countries over the 1995-2002 periods. The random effect panel investigation uses data averaged every two years from 1995 to 2002, thus there are four observations for each of the 86 sample countries.

3.3.1. OLS Cross Section Analysis

The basic regression equation for the cross section data is

$$Ln(FDIInflow_i) = \alpha + \beta_1 PhysicalInfrastructure_i + \beta_2 GovernanceInfrastructure_i + \beta_3 X_i + \mu_i$$

Where the dependent variable is the logarithm of FDI inflows to a country, μ_i is the White heteroskedasticity consistent standard error, and X_i represents the conditional information set, including the measurements of real income, government expenditure, education indicator, trade openness, tax rate, population, and exchange rate.

3.3.2. Random Effect Panel Model

The panel data provides some major advantages over the simple cross section or time series data. First, the panel data increases the degree of freedom and reduces the collinearity among the independent variables, which further improves the efficiency of the econometric analysis (Hsiao, 2003). Second, the panel procedure exploits the dynamic changes over time. Third, compared with the OLS model, the panel investigation could reduce or eliminate the biased results from the unobserved country specific effect.

This chapter adopts the random effect model based on the fact that the 86 countries in this study are chosen purely because of data availability. We do not make any inferences conditional on certain effects such as income level or development stage that are in the sample, instead, we make unconditional inferences with respect to the population of all effects (Hsiao, 2003). The model is in the form of

$$Ln(FDIInflow_{it}) = \beta_1 PhysicalInfrastructure_{it} + \beta_2 GovernancInfrastruture_{it} + \beta_3 X_{it} + \mu_{it}$$

The conditional information set X_{it} includes income level, government consumption, primary school enrollment ratio, total population, and trade openness indicators. The error term μ_{it} is the combination of a common constant α and a cross section specific variable ε_i that is uncorrelated with the residual ν_{it}; the relationship could also be summarized by the mathematical presentation

$$\mu_{it} = \alpha + \varepsilon_i + \nu_{it},\ E(\varepsilon_i \nu_{it}) = 0$$

3.4. Data and Summary Statistics

The data for this research are from three major sources. The dependent variable measuring FDI inflows is from the United Nation Conference of Trade and Development (UNCTAD) data set (2003). The governance infrastructure index is computed from the governance indicators constructed by Kaufmann, Kraay, and Mastruzzi (2003). The physical infrastructure index and the explanatory variables in the conditional information set are from the World Bank publication, World Development Indicator (2003).

Our choice of the control variables in the information set is based on the previous literature. Personal income standard is measured by GDP per capita in constant 1995 USD; human capital level is captured by the primary school enrollment; government consumption is calculated as the final expenditure over GDP; the openness of the

economy is represented by total trade as the percentage of GDP, and the potential market size is indicated by total population. We also include the highest marginal corporate tax rate and the real effective exchange rate in the cross section study; however, they are not available in the panel study in order to reduce the amount of missing variables.

Table 3.2 shows the summary statistics and correlation matrix using the cross section data averaged from 1995 to 2002. We could see the considerable variation from the summary statistics. For example, the mean FDI inflow is 5471.678 million USD, and the standard deviation is 19003.51. The United States receives the highest amount of FDI inflows, an average of 149056.2 million USD in the eight year period, followed by the United Kingdom and China with 56689.75 and 43081.75 million, respectively. The second highest FDI recipient in the developing world is Brazil, hosting about half of the amount in China. Iraq, Yemen, Libya and Gabon are the four countries with negative FDI flows in our sample, and Gabon has the minimum value of –310.25 million.

Table 3.2: Summary Statistics and Correlation Matrix

	FDI Inflow	Physical Index	Governance Index	GDP per Capita	Primary School	Government Consumption	Trade	Popu lation
Mean	5471.678	0.07804	-0.35265	4719.314	98.95364	13.976	72.128	60591648
Maximum	149056.2	17.70036	10.36083	31503.22	149.6948	26.613	190.32	1.25E+09
Minimum	-310.25	-8.494916	-8.06423	112.9047	49.524	4.5421	20.107	387000
Std. Dev.	19003.51	5.301111	4.469123	8081.803	16.11269	4.8929	30.943	1.80E+08

	Log(FDI Inflow)	Physical Index	Governance Index	Log(GDP Capita)	Primary School	Government Consumption	Trade	Log(Popu Lation)
Log(FDI)	1							
Phy Index	0.619079	1						
Gov Index	0.65438	0.817061	1					
Log(GDP)	0.661059	0.866372	0.863803	1				
Pschool	0.360544	0.210583	0.26348	0.409264	1			
Gov Con	0.282581	0.544632	0.46398	0.463834	0.063084	1		
Trade	-0.12274	0.188362	0.146857	0.126821	0.071304	0.3248	1	
Log(Popu)	0.435876	-0.127345	-0.13784	-0.15944	-0.02231	-0.155	-0.545	1

Note: In the correlation matrix, FDI inflow, GDP per capita and Population are in the logarithm format.

The correlation matrix suggests that FDI inflows are closely related to physical and governance infrastructure and per capita income: the correlation coefficients are equal to 0.62, 0.65, and 0.66. The infrastructure index is highly correlated with income level having a coefficient value of 0.86, but it is negatively associated with population size. Trade openness is positively correlated with all the variables except FDI inflows, and interestingly enough, population is on the opposite side of trade openness, negatively correlated with any of the measures except FDI inflows.

3.5. Empirical Results

This chapter evaluates the impacts of physical infrastructure and governance infrastructure on FDI inflows with the OLS procedure and the random effect model. The dependent variable is the logarithm of FDI inflows, and we test the determinant of infrastructure with different combinations of a group of explanatory variables.

Table 3.3 shows the results of the cross section study. We report six estimations with heteroskedasticity consistent standard errors. The first column represents the simplest regression equation and the sixth column reports the most complicated equation given the data available. Both Physical and Governance infrastructures are positively correlated with FDI inflows. Half of the Governance Infrastructure coefficients are significant at the conventional statistic level; however, those of Physical Infrastructure are overwhelmingly insignificant. Government expenditure, exchange rate, and corporate tax rate have negative impacts on FDI though the impacts are not significant. Trade openness, income level and population in the host country all have positive coefficients, but only those of primary school enrollment and population are significant in most of the equations.

The cross section result confirms our hypothesis that infrastructure plays an important role in attracting FDI. Furthermore, it suggests that potential market size and human capital level are the two most important factors among various indices that have positive relationships with FDI.

Table 3.3: Cross Section Results of the Determinants of FDI Inflows

	(1)	(2)	(3)	(4)	(5)	(6)
Physical Infrastructure	0.100656 (0.0807)	0.057894 (0.4041)	0.083228 (0.2342)	0.085525 (0.2208)	0.048661 (0.2730)	0.081977 (0.2523)
Governance Infrastructure	0.169778 (0.0093)	0.098578 (0.1879)	0.113290 (0.1571)	0.151864 (0.0471)	0.145434 (0.0235)	0.147266 (0.1346)
Logarithm of GDP Per Capita		0.420008 (0.1555)	0.200111 (0.5594)	0.175877 (0.5725)	0.424184 (0.1142)	0.250581 (0.6062)
Primary School Enrollment			0.023475 (0.1280)	0.022681 (0.1243)	0.017013 (0.0996)	0.039043 (0.0371)
Government Expenditure				-0.02976 (0.4016)	-0.01157 (0.6895)	-0.036790 (0.5067)
Trade Openness					0.005586 (0.2125)	0.009385 (0.2065)
Logarithm of Population					0.786930 (0.0000)	0.923567 (0.0000)
Corporate Tax Rate						-0.034273 (0.2770)
Exchange Rate						-0.011197 (0.7544)
Constant	6.442976 (0.0000)	3.320465 (0.1283)	2.662293 (0.1957)	3.338462 (0.1233)	-11.6876 (0.0001)	-12.48636 (0.0976)
Adjusted R^2	0.3996	0.412517	0.432210	0.472927	0.764276	0.774914
N	82	79	79	77	76	34

Note: P value is in the parenthesis; the covariance is white heteroskedasticity consistent.
Data is from WDI (2003), UNCTAD (2003), Kaufmann etc. (2003), and author's calculation.

Table 3.4 reports a set of random effect panel investigations, where the infrastructure index is estimated with different combinations of conditional information variables. The first column assesses the relationship between FDI and infrastructure, a common constant, and individual country effect. Both physical and governance infrastructures have a positive impact on FDI, but only the governance infrastructure coefficient is

significant at the conventional level. Column 2 suggests that with one more explanatory variable, the logarithm of GDP per capita measuring income level, the governance infrastructure is still positively and significantly associated with FDI inflows. The regression result also indicates that with a 1% improvement in social infrastructure, there will be a 0.15% increase in FDI. However, the coefficient of physical infrastructure changes to be negative, though it is not significant. Column 1 and 2 represent the basic regression analyses with data covering four points of time—1995-1996, 1997-1998, 1999-2000, and 2001-2002. For the rest of the studies, the fourth observation for each country is omitted because of the missing data. Thus the number of observations in the first two columns is around 290, while those in the other four columns are from 219 to 231.

Table 3.4: Random Effect Panel Study of the Determinants of FDI Inflows

	(1)	(2)	(3)	(4)	(5)	(6)
Physical Infrastructure	0.013517 (0.6862)	-0.03627 (0.3953)	-0.05476 (0.4921)	0.041222 (0.4410)	-0.00046 (0.9952)	0.003690 (0.9478)
Governance Infrastructure	0.239005 (0.0000)	0.149545 (0.0039)	0.124282 (0.0339)	0.196065 (0.0001)	0.145192 (0.0123)	0.152561 (0.0010)
Logarithm of GDP Per Capita		0.536851 (0.0126)	0.466846 (0.0724)		0.313356 (0.2114)	0.447728 (0.0180)
Primary School Enrollment			0.042191 (0.0000)	0.037965 (0.0000)	0.038952 (0.0000)	0.033084 (0.0000)
Government Expenditure				-0.02306 (0.0007)	-0.02359 (0.0008)	-0.02246 (0.0008)
Trade Openness				6.04E-10 (0.6954)	4.82E-10 (0.7537)	-6.15E-10 (0.6782)
Logarithm of Population						0.694952 (0.0000)
Adjusted R^2	0.882255	0.881148	0.881856	0.885493	0.886666	0.892775
N	296	281	231	229	219	219

Note: P value is in the parenthesis.
Data is from WDI (2003), UNCTAD (2003), Kaufmann etc. (2003), and author's calculation.

Column 3 investigates the impact of school enrollment on FDI inflows, while column 5 includes two more independent variables based on the third estimation: government expenditure and trade openness. Column 3 and 5 share similar findings that governance infrastructure and school enrollment are positively correlated with the dependent variable at 95% and 99% confidence levels, respectively. Physical infrastructure has a negative but insignificant impact on FDI, which is contrary to the performance of trade openness and GDP per capita, with positive and insignificant coefficients.

Column 4 and 6 assess the role of infrastructure given other explanatory indices. The regression coefficients of infrastructure indicators are all positive, but those of the physical index are not significant; however, the governance infrastructures are significant at a 99% confidence level. The rest of the variables have consistent results with that of other regression equations, and the logarithm of population has a positive and significant impact on FDI.

The cross section study and panel data examinations indicate that governance infrastructure has a consistent positive and significant impact on FDI inflows, while the relationship between physical infrastructure and FDI is positive in the cross section study, but mixed in the random effect panel data model. Our findings suggest that infrastructure, governance infrastructure in particular, is an important determinant of FDI inflows, and it is necessary to improve the quality of governance infrastructure in order to attract more direct foreign investment flows. This chapter strengthens the arguments of Hall and Jones (1999), and Globerman and Shapiro (2002) by providing the comprehensive infrastructure index constructed with PCA, and by implementing the random effect econometric technique. The empirical results based on the developing

countries only data set do not change the main conclusion, thus they are not reported in the paper; instead, they are available through the author.

It is necessary to point out the limitations of this study. First, our data mainly comes from the World Development Indicator (2003), which is one of the best data sources for research related to a broad range of developing countries. However, even some of the data has to be treated with caution because of the differences in data collecting, calculating and documenting methods. Second, our sample countries included in the cross section and panel study are not exactly the same, but we try to include as many countries as possible. Third, the random effect model covers only four points of time, which is too short to provide any accurate conclusions about the dynamic changes of the explanatory variables such as physical and governance infrastructures.

3.6. Conclusion

FDI counts for about one fourth of the international capital flows, and it is considered as a reliable source of funds associated with the provision of managerial and information services, advanced technology, and efficient marketing strategies. FDI not only facilitates economic growth, but also advocates democratic political environment, better culture understanding and more tolerance on different beliefs and religions. Many countries, developing and transition economies in particular, provide special tax incentives to attract FDI.

The purpose of this chapter is to investigate whether physical and governance infrastructures have positive impacts on FDI inflows. In addition, we construct a comprehensive infrastructure index with principal component analysis. The Physical Infrastructure Index is built on energy, transportation, telecommunication, sanitation,

water, and communication measurements, while most of the previous literature use only one of those indicators to represent the whole physical infrastructure development. The Governance Infrastructure Index covers Voice and accountability, Political stability, Government effectiveness, Regulatory quality, Rule of law, and Control of corruption; the six aggregate governance measurements are constructed by Kaufmann, Kraay, and Mastruzzi (2003).

The simple OLS results suggest that both physical and governance infrastructures are positively related with FDI inflows; however, the physical infrastructure coefficients are not significant at the conventional statistic level. The random effect panel model indicates that governance infrastructure has positive and significant impact on FDI, while physical infrastructure has mixed results. The results also confirm the previous literature that human capital and market size play a positive role on FDI, and government consumption is negatively correlated with FDI inflows.

The empirical results indicate that governance infrastructure is an important determinant of FDI inflows, and it is necessary to improve the quality of governance infrastructure in order to attract more direct foreign investment flows. Our findings strengthen the literature by providing the comprehensive infrastructure index constructed with PCA, and by implementing both the OLS and the random effect econometric techniques.

APPENDIX

Appendix 3.1: Physical Infrastructure Measurements

Cross Section Data	Panel Data	
95-02	95-96, 97-98 and 99-00	01-02
1. Commercial energy use (kg of oil equivalent per capita) 2. Electric power consumption (kwh per capita) 3. Health expenditure per capita (current USD) 4. Roads, paved (% of total roads) 5. Telephone mainlines (per 1,000 people) 6. Television sets (per 1,000 people) 7. Improved sanitation facilities (% of population with access) 8. Improved water source (% of population with access)	1. Commercial energy use (kg of oil equivalent per capita) 2. Electric power consumption (kwh per capita) 3. Health expenditure per capita (current USD) 4. Roads, paved (% of total roads) 5. Telephone mainlines (per 1,000 people) 6. Television sets (per 1,000 people) 7. Air transport, freight (million tons per km) 8. Passenger cars (per 1,000 people)	1. Air transport, freight (million tons per km) 2. Telephone mainlines (per 1,000 people) 3. Television sets (per 1,000 people)

Note: Data are from the World Bank Publication: World Development Indicator (2003).

Appendix 3.2: Cross Section Country List

Albania	Cuba	Iraq	Nigeria	Tanzania
Algeria	Cyprus	Jamaica	Oman	Thailand
Angola	Dominican Rep.	Jordan	Pakistan	Trinidad Tobago
Australia	Ecuador	Kazakhstan	Panama	Tunisia
Austria	Egypt, Arab Rep.	Kenya	Paraguay	Turkey
Azerbaijan	El Salvador	Korea, Rep.	Peru	Ukraine
Bangladesh	Ethiopia	Kyrgyz Republic	Philippines	United Kingdom
Benin	Finland	Lebanon	Romania	United States
Bolivia	Gabon	Libya	Saudi Arabia	Uruguay
Brazil	Georgia	Lithuania	Senegal	Uzbekistan
Bulgaria	Ghana	Malta	Singapore	Venezuela, RB
Cameroon	Guatemala	Mexico	Slovak Republic	Vietnam
Canada	Haiti	Moldova	South Africa	Yemen, Rep.
Chile	Honduras	Morocco	Sri Lanka	Zimbabwe
China	Hungary	Mozambique	Sudan	
Colombia	India	Myanmar	Sweden	
Congo, Rep.	Indonesia	Netherlands	Syrian Arab Rep.	
Costa Rica	Iran, Islamic Rep.	Nicaragua	Tajikistan	

Appendix 3.3: Panel Data Country List

Algeria	Cyprus	Israel	Nigeria	Thailand
Angola	Czech Republic	Italy	Norway	Trinidad and Tobago
Argentina	Denmark	Jamaica	Oman	Turkey
Armenia	Ecuador	Japan	Pakistan	Ukraine
Austria	Egypt, Arab Rep.	Kazakhstan	Panama	Uni. Arab Emirates
Azerbaijan	El Salvador	Kenya	Peru	United Kingdom
Bahrain	Estonia	Korea, Rep.	Philippines	United States
Bangladesh	Ethiopia	Kuwait	Poland	Uruguay
Belarus	Finland	Latvia	Qatar	Venezuela, RB
Belgium	France	Lithuania	Romania	Zimbabwe
Bolivia	Gabon	Malaysia	Senegal	
Brazil	Gambia, The	Malta	Singapore	
Brunei	Greece	Mexico	Slovak Republic	
Bulgaria	Guatemala	Moldova	Slovenia	
Cameroon	Hungary	Morocco	South Africa	
Chile	Iceland	Mozambique	Spain	
Colombia	India	Netherlands	Sri Lanka	
Costa Rica	Indonesia	New Zealand	Sudan	
Cuba	Ireland	Nicaragua	Sweden	

Appendix 3.4: Cross Section Infrastructure Index (95-02)

Country Name	Physical Index	Rank	Country Name	Governance Index
United States	17.70035606	1	Finland	10.36082877
Canada	14.83582711	2	Netherlands	10.33770063
Sweden	14.3005602	3	Sweden	9.733911013
Finland	12.98859935	4	Singapore	9.665012107
Australia	10.87145937	5	United Kingdom	9.411237918
Netherlands	10.5290046	6	Canada	9.161846024
United Kingdom	10.19539755	7	Australia	9.16103567
Austria	9.664434374	8	Austria	8.918037709
Singapore	8.16527557	9	United States	8.414120537
Malta	6.490247375	10	Chile	6.373660258
Cyprus	5.271118158	11	Cyprus	5.31802471
Slovak Republic	4.62156366	12	Hungary	4.813576991
Korea, Rep.	4.459274026	13	Malta	4.740779609
Bulgaria	4.167696333	14	Costa Rica	4.641019432
Trinidad Tobago	3.776840452	15	Uruguay	3.89004626
Hungary	3.569632453	16	Oman	3.358101778
Uruguay	3.535483828	17	Korea, Rep.	3.10833092
Ukraine	3.403303133	18	Trinidad Tobago	2.505314051
Saudi Arabia	3.068717039	19	Lithuania	2.312462877
Lebanon	2.540676725	20	Slovak Republic	2.268495752
Kazakhstan	1.671673923	21	South Africa	1.648712188
Lithuania	1.239205069	22	Tunisia	1.395584231
Georgia	0.912414147	23	Thailand	1.201538041
Jamaica	0.868215656	24	Panama	1.120112838
Moldova	0.768015426	25	Jordan	0.991917894
Chile	0.538960482	26	Jamaica	0.256645761
Libya	0.510552484	27	Brazil	0.219187113
Oman	0.397411304	28	Morocco	0.147898745
Uzbekistan	0.349885396	29	Bulgaria	0.131583957
Thailand	0.325974181	30	Mexico	-0.024757971
Jordan	0.200075887	31	El Salvador	-0.068711989
South Africa	0.189234737	32	Philippines	-0.165891228
Turkey	-0.009537297	33	Benin	-0.312857097
Azerbaijan	-0.191805516	34	Saudi Arabia	-0.336349388
Costa Rica	-0.210269438	35	India	-0.536501727
Egypt, Arab Rep.	-0.378631616	36	Romania	-0.621698895
Iran, Islamic Rep.	-0.382111639	37	Dominican Rep.	-0.706750745
Cuba	-0.502804616	38	Ghana	-0.858807826
Panama	-0.667526129	39	Egypt, Arab Rep.	-0.990001423
Venezuela, RB	-0.692137277	40	Peru	-1.005462547
Mexico	-0.737612765	41	Bolivia	-1.069479383
Brazil	-0.76548296	42	Turkey	-1.221195682
Colombia	-1.081637623	43	Lebanon	-1.229383564

Country Name	Physical Index	Rank	Country Name	Governance Index
Iraq	-1.088965351	44	China	-1.506869444
Tajikistan	-1.288132299	45	Sri Lanka	-1.527622374
Algeria	-1.301055338	46	Senegal	-1.640441105
Kyrgyz Republic	-1.302254362	47	Nicaragua	-1.98347392
Tunisia	-1.405570114	48	Moldova	-2.167138801
Albania	-1.80934567	49	Honduras	-2.185075437
Romania	-1.927713772	50	Tanzania	-2.419952191
Ecuador	-2.096221031	51	Albania	-2.50692735
Dominican Rep.	-2.116388889	52	Gabon	-2.549668117
Sri Lanka	-2.222431245	53	Colombia	-2.5891082
Paraguay	-2.264672631	54	Mozambique	-2.641181145
Syrian Arab Rep.	-2.383449876	55	Guatemala	-2.653552438
El Salvador	-2.577567421	56	Vietnam	-2.852446505
Guatemala	-2.647062082	57	Bangladesh	-2.90295174
Morocco	-2.750149155	58	Kyrgyz Republic	-2.973453119
Philippines	-2.833775159	59	Ecuador	-3.007305634
Honduras	-3.066412128	60	Ethiopia	-3.155783366
Gabon	-3.099212282	61	Venezuela, RB	-3.2230325
Pakistan	-3.114840695	62	Kazakhstan	-3.281845859
Peru	-3.174439638	63	Cuba	-3.526060491
Zimbabwe	-3.257834494	64	Ukraine	-3.545131737
China	-3.302749858	65	Iran, Islamic Rep.	-3.772971175
Indonesia	-3.442499167	66	Paraguay	-3.874662069
Nicaragua	-3.606196175	67	Pakistan	-3.980940411
Bolivia	-3.647289044	68	Indonesia	-4.042800861
Sudan	-3.682726928	69	Georgia	-4.05819759
Ghana	-3.927755047	70	Syrian Arab Rep.	-4.141006435
Senegal	-4.017408787	71	Kenya	-4.16613881
Vietnam	-4.047837971	72	Yemen, Rep.	-4.336367883
India	-4.256671907	73	Zimbabwe	-4.457959182
Tanzania	-4.421636152	74	Cameroon	-4.524935919
Bangladesh	-4.565784627	75	Azerbaijan	-4.848260945
Yemen, Rep.	-4.656544158	76	Algeria	-5.592445834
Kenya	-4.725514635	77	Haiti	-6.117449878
Myanmar	-4.912775385	78	Uzbekistan	-6.12463593
Cameroon	-4.917401366	79	Nigeria	-6.241104104
Nigeria	-4.995679444	80	Congo, Rep.	-6.47666926
Mozambique	-6.085779816	81	Libya	-6.963136464
Benin	-6.294751787	82	Myanmar	-7.694984253
Angola	-6.620404986	83	Tajikistan	-7.815639257
Haiti	-6.909551326	84	Sudan	-8.064225926
Congo, Rep.	-7.308986396	85	Angola	-8.083417414
Ethiopia	-8.494915733	86	Iraq	-10.75163715

Appendix 3.5: Panel Data Physical Infrastructure Index

Country Name	95-96	Country Name	97-98	Rank	Country Name	99-00	Country Name	01-02
U S	15.36649	U S	15.62931	1	U S	15.28326	U K	4.137163
Norway	10.67825	Qatar	10.76809	2	Qatar	10.58808	Sweden	4.036623
Qatar	8.949312	Norway	10.43008	3	Norway	10.49744	Japan	4.017061
Sweden	8.542309	Iceland	8.573755	4	Iceland	10.28574	Norway	3.66495
Japan	8.51056	Sweden	8.007424	5	Sweden	7.806735	Denmark	3.57102
France	8.070216	Japan	7.849972	6	Japan	7.467465	France	3.061341
Iceland	7.710062	France	7.427187	7	Denmark	7.391673	Netherlands	2.860006
Denmark	7.319141	Finland	7.333305	8	Finland	6.833946	Finland	2.215992
Finland	7.150749	Denmark	7.040181	9	France	6.724003	Korea, Rep.	2.168353
U K	7.001772	U K	6.488019	10	U K	6.593845	Malta	1.73422
Netherlands	6.859871	Netherlands	6.427378	11	Netherlands	6.016923	Latvia	1.685811
Belgium	6.005483	Belgium	5.690344	12	Belgium	5.369148	Qatar	1.685169
Austria	5.85505	Austria	5.292957	13	Austria	4.748869	Belgium	1.675181
NewZealand	4.757979	UA Emirates	4.655481	14	Kuwait	4.601135	Singapore	1.670108
Kuwait	4.643748	New Zealand	4.461252	15	UA Emirates	4.534063	New Zealand	1.615877
UA Emirates	4.574496	Kuwait	4.437232	16	Singapore	4.155552	Austria	1.446582
Singapore	4.406737	Singapore	4.340778	17	NewZealand	4.034906	Estonia	1.169164
Italy	4.280401	Italy	4.204881	18	Italy	3.870014	CzechRep.	0.953934
Israel	3.984552	Israel	3.96474	19	Israel	3.868809	Cyprus	0.883265
Bahrain	3.548034	Ireland	3.515094	20	Ireland	3.516386	Brunei	0.850171
Spain	3.536084	Spain	3.342225	21	Spain	3.357573	Kuwait	0.225004
Korea, Rep.	3.30316	Bahrain	3.235156	22	Korea, Rep.	3.18908	UA Emirates	0.15038
Greece	3.260404	Korea, Rep.	3.217327	23	Bahrain	3.102044	SlovakRep.	0.141299
Ireland	3.172558	Greece	3.146063	24	Greece	2.877175	Brazil	-0.08317
Malta	2.958126	Malta	3.0153	25	Malta	2.819524	Turkey	-0.10333
Brunei	2.286705	Brunei	2.674927	26	Czech Rep.	2.191277	Chile	-0.26868
Czech Rep.	2.13824	Czech Rep.	2.339894	27	Slovenia	2.168273	Argentina	-0.38956
Slovenia	1.959447	Slovenia	2.205253	28	Brunei	2.034423	Colombia	-0.65984
Cyprus	1.480261	Cyprus	1.555557	29	Cyprus	1.590477	Malaysia	-0.6676
Slovak Rep.	1.120035	Slovak Rep.	1.084054	30	Slovak Rep.	0.948988	Thailand	-0.72902
Bulgaria	1.102524	Uruguay	1.06227	31	Uruguay	0.858714	Moldova	-0.81704
Uruguay	0.992399	Bulgaria	0.880723	32	Bulgaria	0.724441	Azerbaijan	-0.90619
Estonia	0.856068	Estonia	0.75558	33	Latvia	0.644169	Armenia	-1.09905
Ukraine	0.458517	Lithuania	0.562175	34	Estonia	0.607184	Sudan	-1.11919
Lithuania	0.41361	Latvia	0.360536	35	TrinTobago	0.371512	EgyptArabRep	-1.25853
Latvia	0.284546	Hungary	0.328052	36	Lithuania	0.364834	Ecuador	-1.27268
Hungary	0.19215	Ukraine	0.238732	37	Hungary	0.345248	South Africa	-1.34142
Belarus	0.114072	Belarus	0.101588	38	Ukraine	0.151578	Cuba	-1.40829
Trin&Tobago	0.020669	Trin&Tobago	0.056252	39	Poland	-0.07939	Philippines	-1.67007
Oman	-0.089102	Poland	-0.18246	40	Belarus	-0.08228	Indonesia	-1.74178
Poland	-0.371223	Oman	-0.2734	41	Oman	-0.35408	Morocco	-1.75899
Kazakhstan	-0.70661	Malaysia	-0.95935	42	Malaysia	-1.03995	Pakistan	-1.81715
Malaysia	-0.992188	Kazakhstan	-1.08338	43	Argentina	-1.05028	Sri Lanka	-1.85615
Moldova	-1.028731	Argentina	-1.10346	44	Kazakhstan	-1.14211	India	-1.94573
Thailand	-1.204834	Thailand	-1.12167	45	Thailand	-1.18477	Nigeria	-2.23736
Argentina	-1.220514	Moldova	-1.25991	46	Jamaica	-1.46605	Kenya	-2.33528
Armenia	-1.318163	Armenia	-1.41376	47	Turkey	-1.49138	Bangladesh	-2.37851
Azerbaijan	-1.323173	Azerbaijan	-1.46269	48	Azerbaijan	-1.49573	Algeria	NA
Jamaica	-1.6177	Jamaica	-1.46449	49	Romania	-1.53792	Angola	NA

Country Name	95-96	Country Name	97-98	Rank	Country Name	99-00	Country Name	01-02
Romania	-1.724124	Turkey	-1.54464	50	Armenia	-1.56217	Bahrain	NA
Turkey	-1.753732	Chile	-1.7054	51	Chile	-1.56993	Belarus	NA
South Africa	-1.77255	Romania	-1.75998	52	Moldova	-1.69137	Bolivia	NA
Venezuela, RB	-1.962599	Brazil	-1.92221	53	Brazil	-1.9632	Bulgaria	NA
Chile	-2.039432	South Africa	-2.05362	54	Mexico	-2.03266	Cameroon	NA
Brazil	-2.117511	Venezuela, RB	-2.08492	55	South Africa	-2.12418	Costa Rica	NA
Mexico	-2.327855	Mexico	-2.19334	56	Venezuela	-2.189	El Salvador	NA
Cuba	-2.474694	Costa Rica	-2.37802	57	Costa Rica	-2.24148	Ethiopia	NA
Costa Rica	-2.485304	Panama	-2.57899	58	EgyptArabR	-2.36592	Gabon	NA
Panama	-2.537826	Cuba	-2.58827	59	Panama	-2.44713	Gambia, The	NA
EgyptArabRep	-2.585348	EgyptArabRep	-2.59359	60	Colombia	-2.54114	Greece	NA
Algeria	-2.902139	Colombia	-2.6228	61	Cuba	-2.59068	Guatemala	NA
Colombia	-2.972113	Sri Lanka	-2.80467	62	Sri Lanka	-2.78859	Hungary	NA
Morocco	-3.127882	Algeria	-2.9349	63	Algeria	-2.96375	Iceland	NA
Indonesia	-3.319982	Morocco	-3.16312	64	Morocco	-3.15814	Ireland	NA
India	-3.512791	Ecuador	-3.36189	65	Gabon	-3.19503	Israel	NA
El Salvador	-3.597301	Indonesia	-3.38752	66	El Salvador	-3.27914	Italy	NA
Ecuador	-3.620927	El Salvador	-3.44809	67	Ecuador	-3.31117	Jamaica	NA
Zimbabwe	-3.672888	India	-3.53692	68	Indonesia	-3.3937	Kazakhstan	NA
Pakistan	-3.774857	Zimbabwe	-3.70606	69	Sudan	-3.51509	Lithuania	NA
Peru	-3.778715	Pakistan	-3.75854	70	Pakistan	-3.64231	Mexico	NA
Sri Lanka	-3.869929	Peru	-3.78584	71	India	-3.70999	Mozambique	NA
Philippines	-3.995789	Gabon	-3.83529	72	Zimbabwe	-3.76367	Nicaragua	NA
Sudan	-4.022218	Philippines	-4.00683	73	Peru	-3.77169	Oman	NA
Gabon	-4.058328	Guatemala	-4.00781	74	Guatemala	-3.83878	Panama	NA
Guatemala	-4.078584	Sudan	-4.0756	75	Philippines	-3.8907	Peru	NA
Gambia, The	-4.14207	Gambia, The	-4.14016	76	Bolivia	-4.08183	Poland	NA
Bolivia	-4.172146	Bolivia	-4.16025	77	Gambia, The	-4.11718	Romania	NA
Senegal	-4.343827	Nigeria	-4.21604	78	Nigeria	-4.20336	Senegal	NA
Nicaragua	-4.385575	Senegal	-4.36729	79	Senegal	-4.33693	Slovenia	NA
Nigeria	-4.404807	Nicaragua	-4.44305	80	Nicaragua	-4.39908	Spain	NA
Angola	-4.527456	Angola	-4.55068	81	Cameroon	-4.65757	Trin.&Tobago	NA
Cameroon	-4.693684	Cameroon	-4.70526	82	Kenya	-4.67453	Ukraine	NA
Kenya	-4.695723	Kenya	-4.73133	83	Mozambique	-4.72854	United States	NA
Mozambique	-4.745315	Mozambique	-4.77696	84	Angola	-4.74959	Uruguay	NA
Ethiopia	-4.820581	Ethiopia	-4.87905	85	Ethiopia	-4.85424	Venezuela, RB	NA
Bangladesh	-4.95748	Bangladesh	-4.95887	86	Bangladesh	-4.88293	Zimbabwe	NA

Appendix 3.6: Panel Data Governance Infrastructure Index

Country Name	95-96	Country Name	97-98	Rank	Country Name	99-00	Country Name	01-02
New Zealand	9.6227	Netherlands	10.63	1	Finland	10.811	Finland	11.008
Netherlands	9.4638	Finland	10.28	2	Netherlands	10.554	Netherlands	10.4
Norway	9.2	New Zealand	10.19	3	Iceland	10.469	Denmark	10.355
Denmark	9.1173	Denmark	10.06	4	Singapore	10.187	New Zealand	10.219
Finland	9.0568	Norway	10.006	5	Sweden	9.8286	Iceland	10.199
Singapore	9.0486	U K	9.9187	6	Denmark	9.7519	Sweden	10.198
Sweden	8.9686	Sweden	9.6886	7	U K	9.6029	Norway	9.8664
U K	8.4831	Singapore	9.6508	8	New Zealand	9.3024	Singapore	9.5249
Austria	8.1987	Ireland	9.1883	9	Ireland	9.1974	United Kingdom	9.3527
Ireland	8.0494	Iceland	8.8559	10	Austria	9.1253	Austria	9.3103
United States	8.0121	Austria	8.7945	11	Norway	8.8437	Ireland	8.8455
France	7.1125	U S	8.663	12	U S	8.771	Belgium	8.215
Belgium	6.8616	Spain	7.4425	13	Spain	7.7638	United States	7.9551
Iceland	6.7485	France	7.043	14	France	6.8604	France	7.3184
Japan	6.0083	Belgium	6.3773	15	Belgium	6.8345	Chile	7.2788
Chile	5.7618	Japan	6.346	16	Japan	6.8036	Spain	7.204
Spain	5.3908	Chile	5.7796	17	Chile	6.5041	Malta	6.4906
Israel	4.9271	Italy	5.7209	18	Cyprus	5.5036	Japan	6.4452
Cyprus	4.8618	Cyprus	5.7195	19	Costa Rica	5.4793	Slovenia	5.5425
Czech Rep.	4.2908	Hungary	5.211	20	Estonia	5.0326	Hungary	5.3753
Italy	4.026	Malta	4.98	21	Hungary	4.9955	Estonia	5.2759
Brunei	3.8611	Costa Rica	4.758	22	Slovenia	4.9928	Italy	5.2676
Slovenia	3.825	Slovenia	4.6131	23	Italy	4.8442	Cyprus	4.9939
Costa Rica	3.6029	Israel	4.3899	24	Uruguay	4.8205	Greece	4.8551
Hungary	3.4893	Poland	4.1389	25	Greece	4.6831	Czech Republic	4.5494
Malaysia	3.3841	Czech Rep.	4.0746	26	Israel	4.4331	Costa Rica	4.5373
Greece	3.3394	Greece	3.9383	27	Malta	4.3052	U A Emirates	4.2313
Uruguay	3.2906	Oman	3.772	28	Qatar	3.921	Uruguay	3.9095
Estonia	3.1668	Estonia	3.7155	29	Oman	3.8944	Poland	3.8636
Malta	3.0636	Qatar	3.6589	30	Czech Rep.	3.8126	Lithuania	3.8589
Korea, Rep.	2.9563	Uruguay	3.3655	31	U A Emirates	3.7474	Korea, Rep.	3.8198
Poland	2.8455	Malaysia	2.9888	32	Poland	3.664	Latvia	3.5499
Oman	2.2735	Trin. Tobago	2.9529	33	Korea, Rep.	3.1537	Slovak Republic	3.4883
U A Emirates	2.2687	U A Emirates	2.7394	34	Trin. Tobago	2.9858	Oman	3.4399
Trin. Tobago	2.0328	Korea, Rep.	2.4373	35	Kuwait	2.5546	Israel	3.3416
Argentina	1.9624	Kuwait	2.4094	36	Lithuania	2.5244	Brunei	3.1165
Slovak Republic	1.5085	Argentina	1.9974	37	Slovak Rep.	2.5151	Bahrain	3.1138
Qatar	1.4248	Latvia	1.8246	38	Brunei	2.2587	Qatar	2.7761
Kuwait	1.3871	Lithuania	1.6317	39	Latvia	2.2311	Malaysia	2.5957
South Africa	1.2189	Bahrain	1.5985	40	South Africa	2.0216	South Africa	2.1906
Lithuania	1.1747	Slovak Rep.	1.5052	41	Bahrain	1.7855	Kuwait	2.1209
Latvia	1.0544	Panama	1.5021	42	Malaysia	1.7432	Trinidad Tobago	1.9171
Thailand	0.9934	Brunei	1.2899	43	Panama	1.6101	Bulgaria	1.4162
Jamaica	0.3991	South Africa	1.1167	44	Thailand	1.3617	Thailand	1.4111
Panama	0.3483	Thailand	0.9785	45	Argentina	1.2969	Panama	0.8681
Bahrain	0.2578	Philippines	0.9169	46	El Salvador	1.0385	Mexico	0.7088
Philippines	0.0417	El Salvador	0.8244	47	Morocco	0.8603	Brazil	0.0933
Brazil	-0.203	Morocco	0.5807	48	Jamaica	0.8012	Romania	-0.021
Mexico	-0.609	Brazil	0.242	49	Brazil	0.6893	Jamaica	-0.196

Country Name	95-96	Country Name	97-98	Rank	Country Name	99-00	Country Name	01-02
Morocco	-0.622	Bolivia	0.2387	50	Bulgaria	0.5103	Morocco	-0.232
India	-0.785	Jamaica	-0.066	51	Mexico	0.2323	Sri Lanka	-0.603
Turkey	-0.834	India	-0.231	52	India	-0.107	Senegal	-0.928
Romania	-0.837	Mexico	-0.478	53	Egypt, A. Rep.	-0.165	India	-1.022
Bulgaria	-0.893	Bulgaria	-0.533	54	Gambia, The	-0.357	El Salvador	-1.087
Egypt, Arab Rep.	-1.033	Romania	-0.568	55	Philippines	-0.492	Philippines	-1.227
El Salvador	-1.199	Peru	-0.65	56	Peru	-0.774	Peru	-1.238
Moldova	-1.209	Egypt, A. Rep.	-0.723	57	Bolivia	-1.085	Turkey	-1.433
Colombia	-1.326	Ethiopia	-0.99	58	Romania	-1.093	Gabon	-1.614
Bolivia	-1.382	Turkey	-1.123	59	Senegal	-1.391	Egypt, Arab Rep.	-2.018
Peru	-1.399	Moldova	-1.437	60	Turkey	-1.5	Nicaragua	-2.073
Sri Lanka	-1.467	Gambia, The	-1.591	61	Mozambique	-1.968	Bolivia	-2.163
Zimbabwe	-1.552	Nicaragua	-1.669	62	Sri Lanka	-2.092	Armenia	-2.242
Gambia, The	-1.672	Guatemala	-1.864	63	Nicaragua	-2.098	Mozambique	-2.376
Indonesia	-1.745	Sri Lanka	-1.951	64	Guatemala	-2.48	Moldova	-2.484
Senegal	-2.066	Bangladesh	-1.999	65	Bangladesh	-2.508	Guatemala	-2.989
Armenia	-2.106	Senegal	-2.108	66	Gabon	-2.59	Gambia, The	-3.045
Nicaragua	-2.114	Ecuador	-2.21	67	Kazakhstan	-2.968	Argentina	-3.284
Ecuador	-2.256	Colombia	-2.222	68	Colombia	-3.151	Ukraine	-3.42
Venezuela, RB	-2.284	Venezuela, RB	-2.24	69	Armenia	-3.316	Colombia	-3.65
Bangladesh	-2.692	Zimbabwe	-2.454	70	Venezuela, RB	-3.375	Ecuador	-3.747
Cuba	-2.791	Armenia	-2.522	71	Moldova	-3.473	Cuba	-3.857
Ukraine	-2.9	Gabon	-2.669	72	Cameroon	-3.614	Kazakhstan	-3.866
Kenya	-3.146	Mozambique	-2.828	73	Ethiopia	-3.689	Bangladesh	-4.412
Ethiopia	-3.213	Kazakhstan	-2.926	74	Ecuador	-3.821	Algeria	-4.499
Gabon	-3.281	Cuba	-3.396	75	Pakistan	-3.874	Kenya	-4.607
Kazakhstan	-3.291	Pakistan	-3.4	76	Cuba	-3.875	Ethiopia	-4.657
Guatemala	-3.316	Ukraine	-3.52	77	Ukraine	-4.22	Pakistan	-4.7
Mozambique	-3.346	Cameroon	-3.92	78	Kenya	-4.403	Indonesia	-4.734
Pakistan	-3.832	Kenya	-4.428	79	Azerbaijan	-4.434	Venezuela, RB	-4.968
Belarus	-4.552	Azerbaijan	-4.615	80	Indonesia	-4.866	Cameroon	-5.183
Azerbaijan	-4.809	Indonesia	-4.785	81	Belarus	-5.319	Azerbaijan	-5.381
Algeria	-5.235	Belarus	-5.136	82	Algeria	-5.45	Belarus	-5.592
Cameroon	-5.31	Nigeria	-6.143	83	Nigeria	-5.468	Nigeria	-6.777
Nigeria	-6.441	Algeria	-6.905	84	Zimbabwe	-6.241	Zimbabwe	-7.516
Angola	-7.417	Angola	-7.825	85	Sudan	-7.753	Angola	-7.658
Sudan	-8.58	Sudan	-7.835	86	Angola	-9.16	Sudan	-7.811

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