Do Economic Reforms and Human Capital Explain Post-Reform Growth?

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Abstract

By employing a conventional production function, this study advances theoretical and empirical research on the role of economic reforms and human capital on the post-reform economic growth. We construct two unique indexes – a composite economic reform index and a human capital index – to perform a comparative analysis of a panel data model and to demonstrate that human capital and economic reforms have had a significant positive effect on economic growth in India and South Korea in the post-reform period. This positive effect is revealed in both contemporaneous and lagged estimations. The impact of reforms is found to be much stronger in South Korea than in India. This study also demonstrates the importance of time-invariant country-specific characteristics, and suggests that policies aimed to improve human capital accumulation have complementary effects on the efficacy of economic reforms.

Keywords: economic growth, human capital, economic reforms

JEL classification: O10, O15, O47, O53

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1. Introduction

Growth performance is a key issue for all economies distressed by poverty. One of the most important questions raised by economists and policy makers recently is why some countries grow faster and for extended periods, while others stagnate and remain poor.

Our enquiry into the causes of growth is motivated by the recognition that growth is the dominant condition for social and economic development of a country. Even though economic growth does not allow a society to overcome scarcity and to avoid opportunity cost, it increases the society's standard of living and makes the country better off. Empirical studies provide sufficient evidence on a significant positive impact of economic growth on income of the poor[1]. Therefore, to overcome poverty, policies that accelerate growth should be pursued. Social variables such as health, literacy, longevity, nutrition, and infant mortality are also found to be correlated with growth, although there is a larger scope for them to vary independently of income (Sen, 1999).

In this study, we employ a traditional theoretical model which builds on the idea that both a technological change and physical and human capital accumulation play a key role in economic growth. At the same time, we recognize that the growth process would decelerate without organized markets and the society would be deprived of a substantial part of its benefits. Taking into account the importance of economic reforms for market organization, we will investigate in-depth both the role of economic reforms and the role of human capital on economic growth.

It is widely believed that one of the key factors of the South Korean economic success is pragmatic market reforms (World Bank, 1993). On the other hand, Edwards (1992), and Levin

[1] See Dollar and Kraay (2001), Deininger and Squire (1996)

and Renelt (1992) argue that market reforms are associated with growth only in those economies that have appropriate human capital to absorb new developments efficiently. According to Nehru, Swanson, and Dubey (1995), East Asia has the highest average education stock and the highest growth rate of education stock among developing countries, while South Asia is at relatively low level in both categories. To this end, Rodrik (1996) attributes the success of reforms in East Asian economies to a better-educated labor force that might have simplified the establishment of a competent bureaucracy and have enhanced the productivity of interventions aimed at increasing private investment. Furthermore, Rodrik (1996), and Harvie and Pahlavani (2000) indicate that an impressive investment in human capital (education, in particular) have boosted South Korea's economic growth far beyond the level of other South and East Asian economies. Which one of these hypotheses is correct? This issue has not been resolved yet. We will investigate this issue in deeper detail in this paper.

By looking at the stylized facts, we recognize a significantly broader extent of human capital development in East Asia relative to the South Asian region. Considering the two large representatives of South Asia and East Asia – India and South Korea - it will be interesting to explore the factors that have worked behind their divergent paths of economic growth and explain the considerable differences between them.

In this paper, we will comparatively evaluate the impact of two factors - market reforms and human capital - along with their complementary effects on economic growth in India and South Korea in the post-reform period during the second half of the twentieth century. Our choice of countries is justified by the fact that India and Korea are the largest economies of the two regions under consideration, and were at a somewhat similar economic level in per capita

GDP when the reforms were initiated. And yet, the impact of reforms have differed significantly between these two economies.

In particular, we have the following objectives for this paper. We will perform a comparative analysis of the economic reforms and the movement of major economic variables before and after the reform implementation in India and South Korea. As no explicit data are available for market reforms and human capital, we develop a new methodology for determination and construction of two composite indexes - a reform index and a human capital index - to measure these determinates implicitly. We use a panel data model to test the hypotheses of the impact of economic reforms and human capital on economic growth in India and South Korea. Our model is based on a modified production function, which along with conventional factors of production incorporates composite reform and human capital indexes. Based on an empirical analysis of the economic reforms effects, we discuss policy implications and assess the soundness of economic reform policies.

The rest of the paper is structured as follows. Section 2 reviews the literature. Section 3 develops a simple econometric model to quantify empirically the impact of economic reforms and human capital accumulation on economic growth. Section 4 briefly introduces readers to the recent economic developments in India and South Korea with an assessment of market reforms outcomes, describes data, and performs empirical analysis based on a panel data model. Section 5 provides policy recommendations, explores avenues for further research, and offers conclusions.

2. Literature Review

Lately there has been a growing interest in the economic literature to explore theoretical models that capture the effect of economic reforms on economic growth. However, systematic

empirical studies have been carried out mostly in the context of transition economies of Eastern Europe and the former Soviet Union (Havrylyshyn and Wolf, 2001, Kushnirsky, 2001), or Latin American countries (Loayza and Palacios, 1997). These studies come to a general conclusion that even though initial conditions might generate pace for further growth, pragmatic economic policies ultimately are relevant for economic growth. In particular, macroeconomic stabilization, structural reforms, and institutional changes are found to be the key factors for achieving sustainable growth. Initial effects of reforms may be negative, however, growth performance is clearly better in the economies where stabilization solidified sooner and structural reforms advanced most. The effect of these reforms is found to last over several years.

According to Sachs and Warner (1995), trade liberalization is the most significant component of the economic reform program undertaken by any government. Sachs and Wagner (1995) argue that trade liberalization establishes a strong direct linkage between an economy and the world system. Consequently, it forces government to implement other reform programs such as price liberalization, budget restructuring, privatization, and deregulation under pressure from international competition. Using a cross-country measure of trade openness as a proxy for each country's orientation to the world economy, Sachs and Warner find that open economies grow 2.45 percentage points faster than closed economies. They conclude that international opening of the economy is the *sine qua non* of the overall reform process.

De Melo, Denzier, and Gelb (1996) improve upon the work of Sachs and Warner (1995) by constructing a composite index of reform process. They analyze the transitional experience of 26 countries in Central and Eastern Europe in 1989-1994 by creating a liberalization index, which combines the intensity and duration of economic reforms in three sectors - internal,

external, and private. This study is among the first to create a meaningful composite reform index and to explain the effect of several reform measures on growth.

In the De Melo et al (1996) tradition, Fisher, Sahay, and Vegh (1996) use the liberalization index to revise the impact of various reforms on the growth of transition economies in the pooled cross-country/time-series data model. They employ fixed effect panel regressions model and find that along with a cumulative liberalization index, country-specific fixed effects and a pegged exchange rate regime generate a positive impact on economic growth.

With a focus on the Middle East and North Africa (MENA) region in 1970 – 1999, Nabli and Veganzones-Varoudakis (2004) analyze the linkages between growth and macroeconomic stability, external stability, structural reforms, human capital, and physical infrastructure based on composite reform variables created by the principal component analysis[2]. The study illustrates that even though the growth performance of the MENA region has been disappointing due to lags in economic reforms, macroeconomic and external stability, human capital, and physical infrastructure are key variables for the reform process success in the developing world.

A vast amount of economic literature places a special attention on a country's human capital accumulation, and attributes economic growth to the ability of a country's existing human capital to innovate and adopt technology (Becker, 1964, Mankiw, Romer, and Weil, 1992).

More empirical studies on the effect of human capital on economic growth emerged with the availability of relatively better data in the 1990s. In particular, Barro (1991) finds that, given the initial level of GDP, the starting level of human capital as measured by the secondary school enrollment has a strong positive impact on economic growth. Using panel data for 100 countries

[2] Each indicator is created as a weighted sum of two-three principal components. For example, macroeconomic stability captures inflation, budget deficit as a percentage of GDP, and black market premium; structural reform index is composed of "natural trade openness", exports of oil and mining products, and private credit by deposit banks and other institutions.

over the 1960 -1990 period, Barro (1996) also demonstrates that the relationship between health status proxied by life expectancy at birth and subsequent growth is positive, roughly linear, and not affected by outliers. To this end, Barro (1991) argues that accumulation in human capital is a good strategy for the poorer countries to accelerate growth. In another study, Gemmel (1996) illustrates that the primary education mainly affects economic growth of the poorest economies, the secondary education affects growth of the middle-income countries, while the tertiary education impact is more important for the OECD group. In all cases, Gemmel (1996) finds that both the initial stock and subsequent growth of human capital impose a positive effect on economic growth. Hanushek and Kimko (2000) construct two alternative labor force quality measures from transformed students mathematics and science scores. Their results show that human capital quality has a stable, causal, and direct influence on economic growth in the OECD economies.

Numerous studies have been conducted to explore the importance of health in human productivity. Fogel (1994) estimates that improved gross nutrition accounts for roughly 30 percent of the growth of per capita income in Britain between 1790 and 1980. Bhargava, Jamison, Lau, and Murray (2001) demonstrate a positive effect of adult survival rates on economic growth at low levels of GDP, with the impact disappearing when the GDP per capita reaches 2123 PPP dollars. The authors estimate that a 1 percent gain in adult survival rates is associated with an average 0.05 percent increase in growth rates for the poorest countries. Exploring the alternative measures of health – life expectancy, average height of adult men, body mass index, and age of menarche (the onset of menstruation) for women - Bloom, Canning, and Sevilla (2004), and Weil (2005) confirm that health component of human capital has a positive and statistically significant effect on economic growth. The role of health remains

robust to variety of different microeconomic and historically calibrated estimates, as well as to the adjustments for HIV/AIDS in affecting mortality in the 1990s.

Finally, combining two components of human capital in the comparative analysis of the differences in growth between African countries and the rest of the world, Gyimah-Brempong and Wilson (2005) show that both components of human capital - education (as measured by average years of educational attainment) and health (as proxied by calorie intake and life expectancy) – exert a significant positive effect on growth. Moreover, in a study on the health contribution to economic growth with partially endogenous technical progress covering 53 countries over the 1965-1990 period, Jamison, Lawrence, and Wang (2003) reveal that accumulation of education accounts for 14 percent, while improvements in health as measured by the survival rate of males between age 15 and age 60 explain about 11 percent of growth during the same period.

Our survey of studies about the effect of market reforms and human capital accumulation on economic growth shows several gaps in the recent literature that we would like to fill in this paper. Most of the studies that analyze impact of market reforms deal with the transition economies of the former Soviet Union and Central Europe. These studies consider a uniform period for all countries to explore the after-reform effect on growth. Yet, timing of reform implementation differs significantly among countries. One may also question the economic foundations and theoretical justification of the inclusion of independent variables in the research. While in some cases independent variables clearly appear to be correlated, as a rule no information is provided about testing for correlation and multicollinearity. The majority of studies that analyze impact of reforms in transition economies considers only 4-6 years in time series observations, which does not seem sufficient to capture the dynamics of the reform effect

on growth. Finally, the studies above do not conduct a robustness check for the different proxies of reform measures to assess their impact. Therefore, the conclusions of these analyses could be attributed to the particular nature of data used as a proxy for the reform component.

Studies on the role of human capital in the developing world also suffer from several drawbacks. A significant portion of these studies consider either the education component, or the health component of human capital. In addition, proxies used for education component are unable to capture all aspects of the specific human capital concept[3]. Yet, the fundamental problem in the literature surveyed is lack of a composite measure of human capital. Only few studies employ both components of human capital – education and health – in the same empirical specification. However, an inclusion of two independent variables to proxy for one variable – human capital – may be inherently incorrect due high correlation between education and health, generating potential multicollinearity problem[4].

Addressing the above shortcomings, we will build upon the prior works by analyzing the effect of economic reforms and human capital accumulation on economic growth of two countries - India and South Korea - in greater detail. Our study will consider a much longer uniform post-reform period for both economies. We will also improve upon and contribute to the literature by conducting our empirical analysis based on a model with sound theoretical underpinnings. The fact that our study has considerably longer time series will help us make a meaningful interpretation of empirical results. In this paper, we will construct a composite

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[3]For example, the most widely used proxy for human capital is school enrollment ratio. But this proxy captures only the education component of human capital. Moreover, school enrollment is a flow variable. Secondary enrollment, in addition to the latter flaws, captures only a segment of education. Another common proxy -adult literacy rate- disregards any investment that occurs on top of basic literacy.

[4] According to Bloom, Canning, and Sevilla (2004), the correlation between health component (measured by life expectancy) and education component (proxied by average years of schooling) is 0.834.

reform index in some respect similar to De Melo et al (1995). As we are considering two countries with diverse types of reform, composition of the reform index will be made more relevant to specific economic realities. Hence, our study will differ from most studies by probing deeply into the individual country experience over time. We believe this is the first study to investigate the role of economic reforms on economic growth of India and South Korea with the use of a composite reform index.

In this paper, we will also improve upon previous research by constructing a composite human capital index that incorporates both education and health components. The new composite variable for human capital will be created based on the weights from principal components analysis (PCA)[5]. Such composite indices would, in our view, better explain economic growth in both cross-country and time series frameworks. Our human capital index would likely reduce the probability of misspecification and multicollinearity error because it will enter empirical specification as a single variable.

3. The Model

In this section, we develop an empirical model to ascertain the impact of three major types of market reforms and human capital development on economic growth in India and South Korea in the post-reform periods. The three major market reforms are trade liberalization, financial reform, and enterprise restructuring. We make a conventional assumption that economic reforms, if properly implemented, boost total factor productivity (TFP). Institutional changes that occur in the process are considered exogenous.

[5] Assuming that different variables used to proxy for human capital may move disproportionately, we describe the effect of variables by finding a linear combination of them.

We assume a continuous time infinite horizon economy with identical, rational agents. At time *t*, there is a normalized *L* number of workers in the economy. At each time *t*, production of a single homogenous good is represented by:

$$Q = AF(K, hL) \qquad (3.1)$$

where *Q* is the quantity of output produced per period of time, *A* is the total factor productivity, *F* is a general constant elasticity of substitution production function, *K* is a capital stock, *L* is the number of workers, *h* is the measure of human capital per worker, and *hL* is the total labor input in the economy.

According to Weil (2004), productivity *A* can be determined by two factors: technology *T*, that represents the knowledge about how factors of production are combined to produce output, and efficiency *E*, that measures how effectively given technology and factors of production are employed. The positive impact of reform measures such as trade liberalization, financial reform, and enterprise restructuring on both technology and efficiency components of the total factor productivity *A*, is well supported by Edwards (1998). For the purposes of our study, we establish the productivity term:

$$A = A_R(T(R,O), E(R,O)) = A_R(R,O), \qquad A_R > 0 \qquad (3.2)$$

where *R* is the reform factor, and *O* is a catch-all factor for all other effects not explained by *R*.

According to equation (3.2), a shock to the economy from market reforms will have a positive effect on total factor productivity A. A higher productivity will accelerate economic growth, and total production *Q* will reach a new higher level at the end of transition process.

The effects of trade liberalization, openness to foreign investments, and enterprise restructuring on economic growth are easily justified. Liberalization of trade, with reduction of

tariffs, subsidies, and quotas on imports and exports increases competition in the domestic market. In order to compete with imported products, domestic producers would have to increase their productivity. Similarly, exporters would need to increase quality and productivity of their output in order to compete in the world market. Thus, by engendering efficiency, trade liberalization will boost economic growth and overall production in the economy.

When the economy reduces restrictions on foreign investment, the level of capital inflows into the economy is likely to increase. In the absence of distortions, and with a rational maximizers' behavior, the hitherto inefficient economy should become more efficient[6]. Increased investment and enterprise restructuring will boost production directly by increasing the capital level, and indirectly by improving efficiencies in the production processes. New technologies and more efficient production methods associated with foreign investment will speed up the economic growth.

In a similar way, the effect of human capital on economic growth can be assessed. Improvement in human capital will make labor more efficient. According to equation (3.1), this will have a direct positive impact on the country's production.

Combining (3.1) with (3.2), and specifying the production function similar to Kushnirsky (2001), we use the following production function as a benchmark function in our estimations:

$$Q_{ij} = OK_{ij}^{\alpha}(hL)_{ij}^{\beta} R_{ij}^{\gamma} u_{ij}, \qquad j=1,\ldots,J \qquad (3.3)$$

where i denotes a country, j denotes an observation, u is an error term. In equation (3.3), the constant term O and all the exponents α, β, and γ are independent of the country index i.

[6] However, if trade distortions are present in the economy, foreign investments may further increase production of a "wrong" good and make the economy even more inefficient.

Next, we modify the base production function (3.3) to make the effect of one independent variable country specific:

$$Q_{ij} = OK_{ij}^{\alpha}(hL)_{ij}^{\beta} R_{ij}^{\gamma_i} u_{ij}, \qquad (3.4)$$

$$Q_{ij} = O_i K_{ij}^{\alpha}(hL)_{ij}^{\beta} R_{ij}^{\gamma} u_{ij}, \qquad (3.5)$$

In production function (3.4), the output elasticity with respect to reform index is country specific. Modification (3.5) will allow us to ascertain the significance of time-invariant country-specific exogenous factors on economic growth.

We further modify the benchmark production function (3.3) to make the effect of two independent variables – a time-invariant exogenous factor and a reform - country specific:

$$Q_{ij} = O_i K_{ij}^{\alpha}(hL)_{ij}^{\beta} R_{ij}^{\gamma_i} u_{ij}, \qquad (3.6)$$

The functions above are log-estimated with various approaches to evaluate how different paths of economic reforms and human capital accumulation affect the growth of a country.

4. Empirical Study

The main objective of this section is to perform an empirical analysis of the impact of economic reforms and human capital accumulation on economic growth in India and South Korea in the post-reform period. Section 4.1 comparatively outlines economic reforms in the two countries. Description of the data and their sources follow. Section 4.3 introduces the methodology of estimations and presents results based on panel regression models. Section 4.4 performs sensitivity analyses.

4.1. Comparative Review of Reform Policies

We begin with an overview of Indian and South Korean experience in macroeconomic reforms, and then discuss trade reforms, enterprise restructuring, industry structure evolution, capital account liberalization, and financial sector reform measures adopted by these economies in the post-reform period.

Macroeconomic reform in India was primarily driven by a fiscal crisis in the early 1990s. In order to improve the fiscal situation, the Indian government introduced a key reform in the tax system. However, the tax revenue as a percentage of GDP actually decreased in the 1990s and the fiscal deficit stayed near 5 percent as late as 2000. The effect of reforms was not very effective by any measure. In contrast, macroeconomic reform in South Korea has been effective from the very beginning. In 1966-1967, the Korean government substantially enlarged tax revenues by increasing tax base and by reforming tax administration.

As both India and South Korea followed an import-substitution development policy prior to reform implementation, trade liberalization did not play a significant role in their economies. In order to increase competitiveness of its exports, India implemented a major exchange rate reform only in the early 1990s. Imports were also liberalised by removing quantitative restrictions and by gradually decreasing tariff rates. Yet, tariff rates in India were relatively high compared to East Asian countries until 2002. One of the notable features of Indian exports dynamics is a sharp increase in its service exports. A less repressive regulation and an inflow of foreign investment are the two key factors that explain the success of service sector in India. In contrast, the Korean government implemented a major exchange rate reform much earlier, in the mid 1960s. Reforms in the Korean imports were mainly implemented by removing quantitative barriers rather than by decreasing tariffs. Moreover, a trade reform in South Korea was characterized by a consistent government support in expanding the export market and incentives

in the form of tax reduction for export income. As a result, in South Korea, the share of the manufacturing sector in GDP increased significantly in the post-reform period.

India implemented financial reforms in early 1990s. These reforms included interest rate deregulation, opening up the banking sector to private and foreign banks, and reduction of government interventions in credit allocation. Prudential regulations following Basel Committee recommendations significantly improved bank supervision. New rules were enacted to manage the securities market. Similarly, South Korea introduced the first step of financial sector reforms by deregulating interest rates. Control over bank credits was reduced, and the banking sector was partially opened to foreign banks and private banks in the late 1960s to early 1970s.

Since independence, India's economy was dominated by huge public sector enterprises. In the 1990s, the government removed subsidies and preferential access to bank loans for these enterprises. A sharp reduction in the number of areas reserved for the public sector enterprises improved incentives for private participation and foreign direct investment (FDI). Disinvestments in the form of reduction of government equity in public sector enterprises were implemented. Reduced government regulation and bureaucratic red tape along with a larger amount of FDI contributed to a surprising growth of the Indian service sector. Unlike India, the Korean economy was not dominated by public sector enterprises at the beginning of economic reform. The Korean government restructured the public sector in the late 1960s to the early 1970s by mainly selling unprofitable public enterprises, and reorganizing other enterprises geared towards economic development. Important steps were taken in order to remove favourable treatment of large conglomerates and to enact legislation regulating monopolies.

4.2. Data Description

For empirical study, we confine our dataset to the periods when the major economic reforms were implemented in both countries. Arguably, the defining initial year of a major economic reform in South Korea is 1965, with a second wave of changes initiated in the late 1970s. As for India, Rodrik and Subramanyam (2004) point out that even though the first hesitant market-oriented reform took place in the mid 1980s, the more decisive reform occurred only in 1991. Driven by a relatively shorter post-reform period in India, we consider a twelve-year post-reform period. To maintain symmetry in data, we confine our dataset to 1966-1977 in case of South Korea, and to 1992-2003 in case of India.

The variables in our empirical analysis for both India and Korea are as follows:

GDP (Q): GDP in 2000 constant US dollars comes from the World Development Indicators (WDI) 2005. The World Bank defines this as the sum of gross value added of all resident producers in the economy adjusted for taxes and subsidies.

Labor (L): Total labor force comes from the WDI 2005. The World Bank uses International Labor Organization (ILO) definition of economically active population to determine total labor force. It includes both employed and unemployed, but excludes homemakers, other unpaid caregivers, and workers in the informal sector. Taking into account a thriving informal sector in India, and a relatively undeveloped data collection procedures in Korea in the 1960s, we acknowledge that labor force data in both countries might be biased and should be treated with caution.

Capital Stock (K): As no explicit data available for the capital stock, we convert Larson et al. (2000) 1967-1992 capital stock database in 1990 US dollars to 2000 constant US dollars. We further extend the dataset to the remaining years of the 1960-2003 period. Specifically, we

use the Larson et al. (2000) fixed capital deflator to convert total capital stock in 1990 constant US dollars to current US dollars. We then employ the GDP deflator from the WDI 2005 to convert the total capital stock in current US dollars to constant 2000 US dollars. We expand the capital stock data over the 1960-2003 period by applying a perpetual inventory method (PIM):

$$K_t = K_{t-1} + I_t - D_t \qquad (4.1)$$

where K_t is a capital stock at time *t*, K_{t-1} is a capital stock at time (*t-1)*, I_t is investment at time *t*, and D_t is a depreciation at time *t*. We use gross capital formation data from WDI 2005 as a proxy for investment (*I*) and assume that the depreciation rate is 5 percent, which according to the recent economic literature is close to reality.

Reform Index (R): We construct two composite reform indices R1 and R2 in the style of De Melo et al (1996)[7]. Taking into account the specifics of economic reforms in India and South Korea, our indices are weighed average of three reform indicators - trade reform, financial reform, and enterprise restructuring. The distinction between R1 and R2 is based on different approaches to measure effectiveness of trade reform, as explained below.

Trade Reform: To measure trade reform**,** we use two indices: 1) volume of trade, or sum of imports and exports as a percentage of GDP in 2000 constant US dollars, and 2) value of imports in 2000 US constant dollars as a percentage of aggregate consumption. Figures 4.1 and 4.2 show these indices for India and South Korea in the period of interest.

[7] The De Melo et al (1996) reform index is a weighted average of three reform indicators: 1) price liberalization and competition, 2) trade and foreign exchange regime, and 3) privatization and banking reform.

Figure 4.1.Volume of Trade as a Percentage of GDP in India and South Korea, 1960-2003

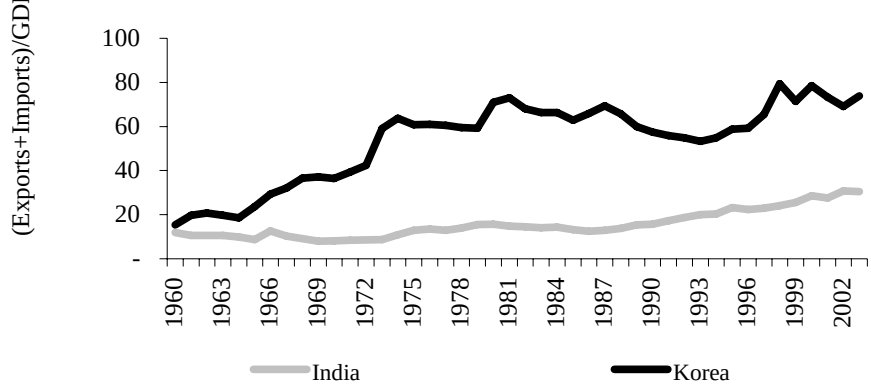
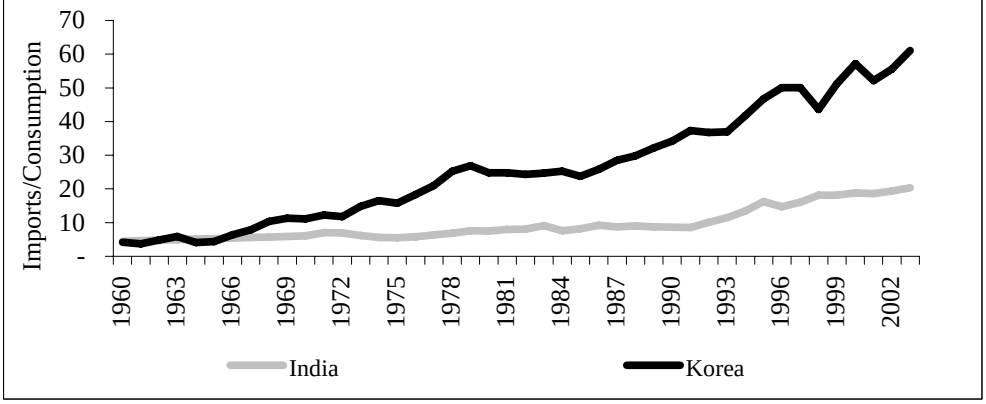


Figure 4.2. Share of Imports in Aggregate Consumption in India and South Korea, 1960-2003



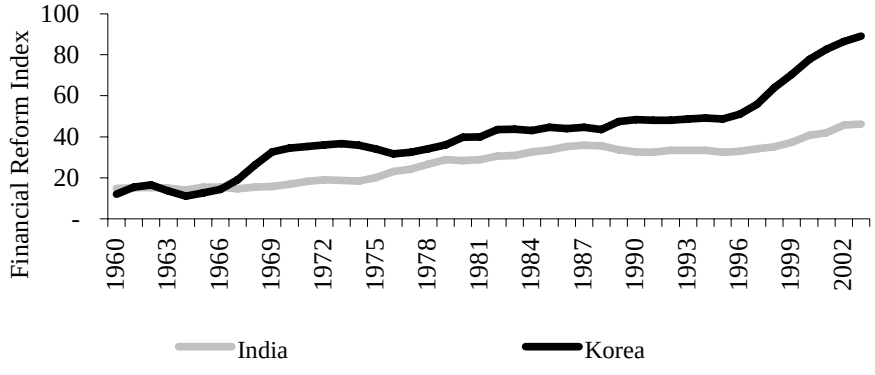
The volume of trade as a percentage of GDP in 2000 constant US dollars is available from the WDI 2005. Assuming that changes in this index are driven by policy changes[8], we use outcome-based measures to evaluate effectiveness of trade reforms. Specifically, the effectiveness of trade reforms is judged meaningfully by an increase in the trade volume it generates. In addition, we employ the share of imports in aggregate consumption to be an alternative indicator of trade reform effectiveness. As imports of consumption goods are heavily

[8] Loayza and Palacios (1997)

restricted in the developing world, the second indicator perhaps is a more reliable estimate for a repressive trade policy[9].

Financial Reform: The major purpose of financial reforms is to assign greater flexibility in determining interest rates and allocating credit to market forces. It is generally expected that reforms in financial sector would lead to this sector's faster development and further expansion. Similar to trade reform measures, we justify variables measuring financial reform effectiveness by the outcome-based approach. Our financial reform index consists of the following two variables, with equal weights: 1) a ratio of broad money to GDP (M2/GDP) that measures a level of financial development in the economy[10]; 2) a ratio of domestic credit to private sector to GDP that approximates a reduction of government intervention in bank lending. All variables employed in the construction of this index come from the WDI 2005. Figure 4.3 shows dynamics of the financial reform indices in India and South Korea in 1960-2003.

Figure 4.3. Finansial Reform Index in India and South Korea, 1960-2003



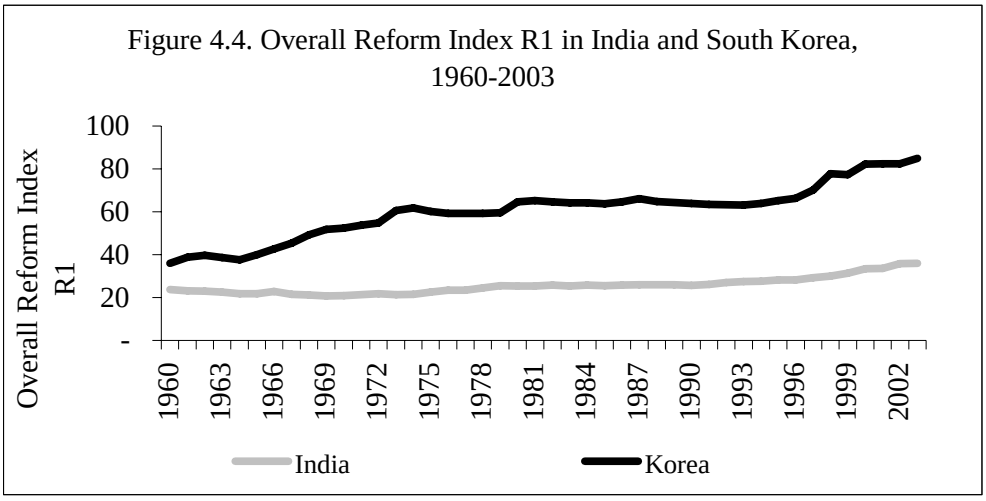
[9] Following Edwards (1993), we also performed evaluation of the Structure Adjusted Trade Intensity (SATI) to control for country's size, GDP, transport cost and other relevant variables. This alternative measure of trade reform effectiveness produced no significant results that might have changed our choice.

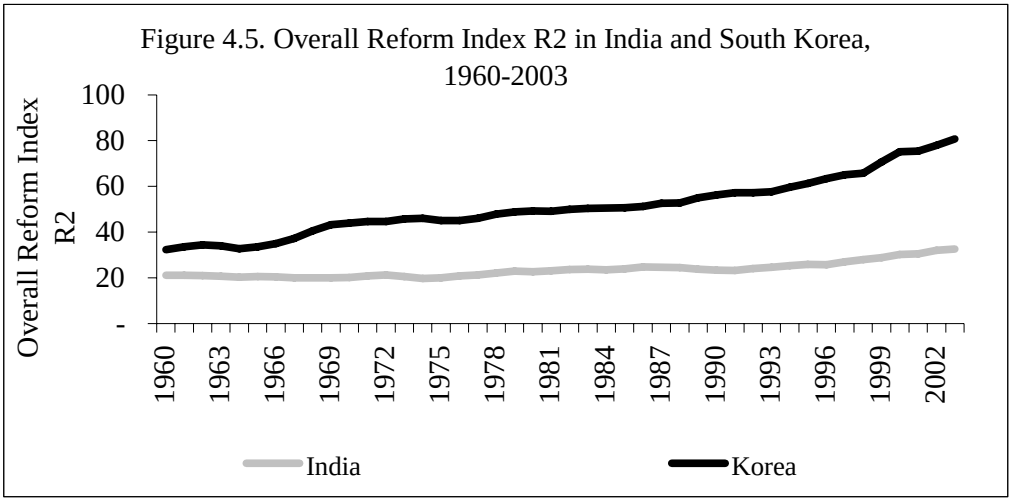
[10] M2/GDP is assumed to move upward with reforms in financial sector.

Enterprise Restructuring: As an economy pursues reform measures to restructure enterprises from public to private ownership, or enacts new laws encouraging private sector participation in various economic activities, the private sector share of employment and value added are most likely to increase. Considering data availability, we employ two variables that capture enterprise restructuring effect on the economy: 1) private sector share of total employment (in India), and 2) private sector share of value added (in South Korea). The private sector share of employment data were obtained from the Reserve Bank of India; the data on private sector share of total value added in South Korea come from Kang (1989) and the Bank of Korea. These two measures of enterprise restructuring are highly correlated, and thus reduce the probability of errors due to an apparent asymmetry in reform index composition.

We construct an overall reform index as a weighted average of the three reform measures by assigning equal weights to trade reform index, financial reform index, and enterprise restructuring index. Appendix A shows the construction of overall composite reform indices R1 and R2 for India and South Korea in the post-reform years. Figures 4.4 and 4.5 depict dynamics of these composite reform indices in two countries in 1960-2003.

Figure 4.4. Overall Reform Index R1 in India and South Korea, 1960-2003





Human Capital (h): It has been established in economic theory that human capital is one of the most significant sources of economic growth. Nevertheless, the empirical research has not yet produced convincing results to ascertain the importance of it for economic growth. The main problem lies in the construction of a human capital variable, which is not directly measurable.

In order to proxy a human capital for the Asian region, most empirical studies (Harvie and Pahlavani, 2006, Song, 1990, Guesan, 2004) rely more on data availability rather than on a theoretical definition. The variables commonly used as a proxy for human capital are investment in education, secondary or total school enrollment ratio, literacy rate, and average years of schooling. However, all these ratios have several disadvantages[11]. In addition, the above mentioned studies omit health component of the human capital variable.

In our judgment, a plausible variable for human capital should take into account returns on all types of investments that human beings undertake in order to increase their future well-being and production potential. Therefore, using conceptual foundations of the term, we construct a composite human capital index, which captures both major components of human capital – education and health. The composite human capital variable is created as a weighted

[11] See Barro (1991), Nehru et al (1995), Gemmel (1996), Hanushek and Kimko (2000), and Wobmann (2003)

average of the two indices –average years of schooling and life expectancy at birth - based on a principal component analysis.

Data on the years of formal schooling received, on average, by adults over age 15, defined as **average years of schooling**, are available from Barro and Lee (2000) for 1960-2000. We use a linear interpolation method to estimate missing observations. Data on **life expectancy at birth,** or the number of years a newborn infant would expect to live if prevailing patterns of mortality at the time of her birth were to stay the same throughout her life, come from the WDI 2005.

To address the issue of comparability of indices, we set India's average years of schooling and life expectancy at birth in 1960 to unity, and normalize the rest of schooling and life expectancy data respectively. Appendix B shows construction of the human capital variable for India and South Korea. Figure 4.6 depicts the dynamics of human capital indices in two countries in 1960-2003.

Figure 4.6. Human Capital Index in India and South Korea, 1960-2003

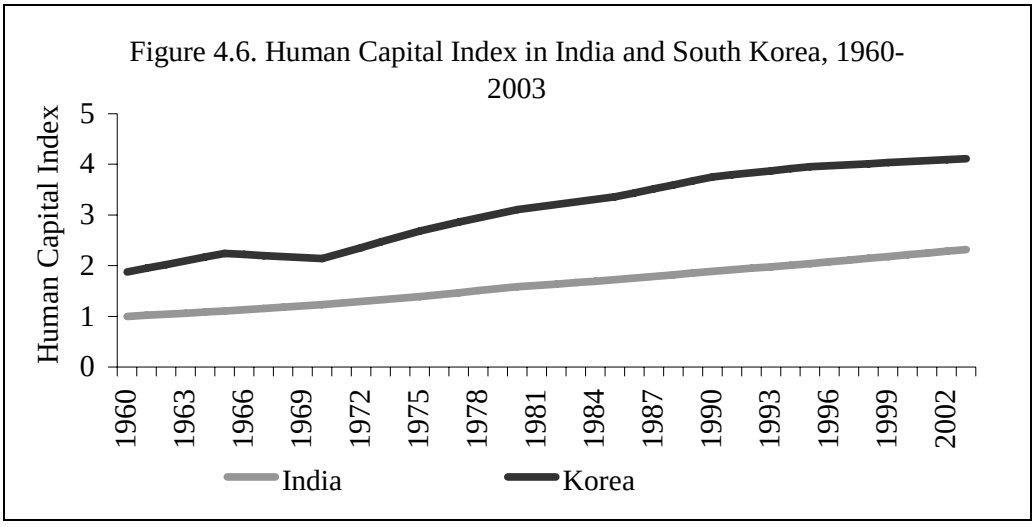


Table 4.1 provides a summary of definitions and sources of variables used in this study.

Table 4.1. Variables for the Empirical Analysis and Index Composition

Variable	Definition	Source

Y	Gross Domestic Product, in constant 2000 US dollars	World Development Indicators 2005
hL	Human capital augmented labor	Below
L	Total labor force, or economically active population	World Development Indicators 2005
h	Human capital index, assigns equal weight to: a) average years of schooling b) life expectancy at birth	a) Barro and Lee (2000) b) World Development Indicators 2005
K	Physical capital, in constant 2000 US dollars	World Development Indicators 2005 and Larson et al (2000)
R	Reform index, assigns equal weights to trade reform index, financial reform index, and enterprise restructuring index	Below
Trade Reform Index	a) (Exports + Imports)/GDP and b) Imports/Consumption	World Development Indicators 2005
Financial Reform Index	Assigns equal weights to the M2/GDP, and the ratio of domestic credit to private sector to GDP	World Development Indicators 2005
Enterprise Restructuring Index	a) Private sector share of total employment (India) and b) private sector share of value added (South Korea)	a) *Handbook of Indian Economy* by the Reserve Bank of India b) Bank of Korea, National Accounts 1970-1987; Kang (1989)

4.3. Empirical Results from a Panel Data Model

To investigate the effect of reform measures on economic growth of both India and South Korea, we estimate panel regressions based on equations (3.3) and (3.4) in logarithmic forms. Results of estimations are summarized in Table 4.2.

Table 4.2. Panel Regression Results with Constant Intercept
Dependent Variable: Ln(Q)

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Constant	7.654*	6.995*	6.620*	3.914*	15.238*	15.391*
	(0.396)	(0.442)	(2.106)	(1.191)	(4.936)	(3.296)
Ln(hL)	0.594*	0.520*	0.714*	0.889*	0.122	0.019
	(0.048)	(0.031)	(0.237)	(0.141)	(0.307)	(0.192)
Ln(K)	0.118*	0.185*	0.082	0.065	0.182*	0.242*
	(0.044)	(0.032)	(0.084)	(0.050)	(0.056)	(0.026)
Ln(R1)	1.023*				-1.152	
	(0.105)				(1.412)	
Ln(R2)		1.152*				-1.324
		(0.083)				(0.953)
Ln(R1)-India			0.896*			
			(0.224)			
Ln(R1)-South Korea			0.994*			
			(0.098)			
Ln(R2)-India				0.799*		
				(0.146)		
Ln(R2)-South Korea				1.093*		

				(0.067)		
Ln(hL)*Ln(R1)					0.111	
					(0.072)	
Ln(hL)*Ln(R2)						0.125*
						(0.049)
Regression F-value	3568.556	7042.050	2411.397	7711.998	2717.879	5964.655
Adjusted R^2	0.998	0.999	0.998	0.999	0.998	0.999

Notes: standard errors are in parentheses below
* denotes significant at 5% level

Columns (1) and (2) of Table 4.2 show estimation results of the model (3.3) with reform indices R1 and R2, respectively. Coefficients by Ln(hL), Ln(K), Ln(R1), and Ln(R2) are positive and significant at the 5 percent level. Hence, the results from these estimations support our hypothesis that both the economic reforms and the human capital augmented labor exert a positive effect on economic growth.

Columns (3) and (4) of Table 4.2 present estimation results of equation (3.4) with reform indices R1 and R2, respectively. In order to explore the impact of reforms in a comparative perspective, we allow the coefficients of reform indices to vary. Coefficients by Ln(hL), Ln(R1) and Ln(R2) remain positive and significant at the 5 percent level in both cases, however the coefficients by Ln(K) turn out to be insignificant. In an alternative modification (3.4), we acknowledge a considerably higher impact of reform measures on economic growth in South Korea relative to India (0.994 vs. 0.896, and 1.093 vs. 0.799 in estimations (3) and (4), respectively).

We include an interaction effect between the reform index and the human capital augmented labor to explore the possibility of any complementary role between them. Columns (5) and (6) in Table 4.2 present the results of corresponding estimations. The coefficient of the interaction term is positive and significant at the 5 percent level when R2 represents the reform measure. The coefficient is positive and significant at the 15 percent level with the R1. These

results reveal complementarities in the role of economic reforms and human capital, via labor market restructuring, in particular. As indicated by adjusted R^2, all six estimations in Table 4.2 have a high explanatory power.

As the timing of reform implementation may not coincide with the actual impact of outcome-based reform measures on economic growth, Nabli and Veganzones-Varoudakis (2004) highlight the importance of considering lags in the analysis of reform outcomes in the developing world. In addition, we hypothesize that even if there is an immediate effect of reform measures, i.e. associated with the removal of quantitative restrictions, the impulse response of growth will continue over time[12]. To explore this possibility, we introduce estimations of our baseline models (3.3) and (3.4) with lags (Table 4.3). We assume that one year is sufficient to capture the lagged effects of reform implementation.

Table 4.3. Panel Regression Results with Constant Intercept and Lagged Reform Index
Dependent Variable: Ln(Q)

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Constant	8.509*	7.662*	7.884*	5.716*	15.137	16.876*
	(0.475)	(0.387)	(2.029)	(1.228)	(8.035)	(2.908)
Ln(hL)	0.629*	0.536*	0.707*	0.790*	0.201	-0.022
	(0.058)	(0.041)	(0.251)	(0.132)	(0.522)	(0.183)
Ln(K)	0.067	0.158*	0.042	0.068	0.134	0.224*
	(0.058)	(0.043)	(0.104)	(0.056)	(0.102)	(0.038)
Ln(R1(-1))	0.993*				-0.954	
	(0.118)				(2.356)	
Ln(R2(-1))		1.091*				-1.664
		(0.091)				(0.889)
Ln(R1(-1))-India			0.910*			
			(0.205)			
Ln(R1(-1))-South Korea			0.973*			
			(0.101)			
Ln(R2(-1))-India				0.849*		
				(0.117)		
Ln(R2(-1))-South Korea				1.049*		
				(0.075)		
Ln(hL)*Ln(R1(-1))					0.099	

[12] We also acknowledge that lags in the impact of reforms will be more considerable in an economy, where market forces had not been well developed or played a significant role prior to reforms.

					(0.118)	
Ln(hL)*Ln(R2(-1))						0.140* (0.046)
Regression F-value	3283.793	6636.768	2343.252	5474.001	2428.031	6091.425
Adjusted R^2	0.998	0.999	0.998	0.999	0.998	0.999

Notes: standard errors are in parentheses below
* denotes significant at 5% level

The results of lagged estimations agree with the results from Table 4.2, where all variables are contemporaneous. The effects of lagged Ln(R1) and Ln(R2) in Table 4.3 are positive and significant at the 5 percent level, which again supports our hypothesis that economic reforms have accelerated economic growth in India and South Korea in the post-reform period. Columns (3) and (4) show a relatively higher impact of reform indices on economic growth in South Korea relative to India. Columns (5) and (6) demonstrate results similar to those in Table (4.2).

To investigate the effect of country-specific time-invariant factors on economic growth in India and South Korea, we perform an estimation of our baseline model with fixed effects. In Table 4.4, columns (1) and (2) show estimation results of equation (3.5); columns (3) and (4) show estimation results of equation (3.6). The respective estimations of lagged model alternatives are reported in corresponding columns of Table 4.5. The coefficients of reform indices are positive and significant in all cases. The larger value of the fixed effect intercept for South Korea indicates a higher effect of country-specific time-invariant factors (such as initial state of economy, income distribution, demographic transition, legal system, democracy, cultural tradition etc) in South Korea relative to India.

Table 4.4. Panel Regression Results with Fixed Effects
Dependent Variable: Ln(Q)

	(1)	**(2)**	**(3)**	**(4)**
Ln(hL)	0.787*	0.772*	0.573*	0.813*

	(0.169)	(0.078)	(0.233)	(0.220)
Ln(K)	0.091	0.130*	0.230*	0.109
	(0.047)	(0.027)	(0.098)	(0.099)
Ln(R1)	0.818*			
	(0.159)			
Ln(R2)		0.915*		
		(0.091)		
Ln(R1)-India			1.047*	
			(0.241)	
Ln(R1)-South Korea			0.489*	
			(0.152)	
Ln(R2)-India				0.875*
				(0.238)
Ln(R2)-South Korea				0.969*
				(0.184)
Fixed effects-India	5.138	4.111	4.912	4.009
Fixed effects-South Korea	5.847	4.939	7.346	4.583
Regression F-value	2799.919	7812.220	2411.397	5941.108
Adjusted R^2	0.998	0.999	0.998	0.999

Notes: standard errors are in parentheses below
* denotes significant at 5% level

Table 4.5. Panel Regression Results with Fixed Effects and Lagged Reform Index
Dependent Variable: Ln(Q)

	(1)	**(2)**	**(3)**	**(4)**
Ln(hL)	0.815*	0.775*	0.594*	0.588*
	(0.222)	(0.092)	(0.263)	(0.166)
Ln(K)	0.042	0.101*	0.215	0.204
	(0.066)	(0.036)	(0.121)	(0.083)
Ln(R1(-1))	0.787*			
	(0.217)			
Ln(R2(-1))		0.875*		
		(0.096)		
Ln(R1(-1))-India			1.003*	
			(0.234)	
Ln(R1(-1))-South Korea			0.384	
			(0.258)	
Ln(R2(-1))-India				1.067*
				(0.168)
Ln(R2(-1))-South Korea				0.660*
				(0.158)
Fixed effects-India	6.059	5.052	5.080	5.390
Fixed effects-South Korea	6.756	5.823	7.798	7.227
Regression F-value	3568.556	6380.055	2411.397	5369.141
Adjusted R^2	0.998	0.999	0.998	0.999

Notes: standard errors are in parentheses below
* denotes significant at 5% level

In order to analyze the impact of human capital on economic growth, we estimate our benchmark production function (3.3) by replacing the human capital augmented labor variable with the raw labor variable. The outcome of estimations is shown in Table 4.6, where columns (1) and (2) report estimation results of a contemporaneous model, with reform indices R1 and R2, respectively; columns (3) and (4) report estimation results of the corresponding lagged models.

Table 4.6. Panel Regression Results with L Replacing (hL)
Dependent Variable: Ln(Q)

	(1)	**(2)**	**(3)**	**(4)**
Constant	6.242* (0.655)	5.843* (0.808)	6.790* (0.557)	6.246* (0.726)
Ln(L)	0.560* (0.064)	0.456* (0.040)	0.592* (0.074)	0.463* (0.050)
Ln(K)	0.184* (0.060)	0.270* (0.044)	0.143 (0.071)	0.258* (0.053)
Ln(R1)	1.234* (0.155)			
Ln(R2)		1.286* (0.135)		
Ln(R1(-1))			1.232* (0.171)	
Ln(R2(-1))				1.232* (0.146)
Regression F-value	2350.414	2811.817	2375.205	3011.540
Adjusted R^2	0.997	0.997	0.997	0.998

Notes: standard errors are in parentheses below
* denotes significant at 5% level

Coefficients of Ln(K) are positive and significant at the 5 percent level in three out of the four estimations. Coefficients of reform indices are positive and significant at the 5 percent level in both contemporaneous and lagged cases. When the human capital variable is omitted, the impact of the raw labor on economic growth is found to be much lower compared to similar

estimations in Tables 4.2 and 4.3, where the human capital augmented labor is taken into considerations.

4.4. Sensitivity Analysis

By changing assumptions of the benchmark model, we analyze the robustness of our results in two alternative specifications.

First, we employ capital stock data found using a PIM (4.1) with a 10 percent capital depreciation rate instead of a conventional 5 percent rate. It has been established in the economic literature that capital is not used efficiently in highly regulated economies. Inefficient capital is usually scrapped or reorganized when the economy opens up. Therefore, generally depreciation rates will be higher in countries undergoing transformation from a regulated economy to an open economy[13]. Table 4.7 shows results of a sensitivity analysis with a 10 percent capital depreciation rate.

Table 4.7. Sensitivity Analysis 1: Panel Regression Results with Constant Capital Depreciation Rate 10% Dependent Variable: Ln(Q)

	(1)	**(2)**	**(3)**	**(4)**
Constant	7.494* (0.450)	6.543* (0.488)	5.523* (2.125)	3.392* (1.119)
Ln(hL)	0.646* (0.038)	0.576* (0.025)	0.869* (0.231)	0.956* (0.130)
Ln(K)	0.076 (0.039)	0.145* (0.029)	0.018 (0.069)	0.036 (0.041)
Ln(R1)	1.110* (0.090)			
Ln(R2)		1.281* (0.079)		
Ln(R1)-India			0.805* (0.289)	
Ln(R1)-South Korea			1.006* (0.110)	
Ln(R2)-India				0.787*

[13] For additional discussion, see Havrylyshyn and Wolf (2001)

				(0.176)
Ln(R2)-South Korea				1.122*
				(0.077)
Regression F-value	3158.363	5925.877	2411.062	7288.845
Adjusted R^2	0.988	0.999	0.998	0.999

Notes: standard errors are in parentheses below
* denotes significant at 5% level

Compared to results in Table 4.2, the estimated coefficients in Table 4.7 do not change signs and significance. Both reform indices R1 and R2 impose a positive effect on economic growth, with a higher reform impact in South Korea than in India.

Secondly, we change composition of the overall reform indices R1 and R2 by using different weights for three reform components. According to Sachs and Warner (1995), trade reform and financial reform are the most important transformations in a highly regulated economy, with trade reform generally being a catalyst for other reforms. In both countries - India and South Korea - enterprise restructuring faced a serious opposition from special interest groups, and as a result was implemented gradually. Therefore, to check the robustness of our model, we decrease weight of enterprise restructuring, and increase weights of a trade and financial reform in the overall composite reform index. Instead of equal weights, trade reform, financial reform, and enterprise restructuring are assigned weights of 0.4, 0.4, and 0.2, respectively in the sensitivity model 2. Table 4.8 shows results of the sensitivity analysis with modified weights in composite reform indices.

Table 4.8. Sensitivity Analysis 2: Panel Regression Results with Constant Reform Index and Weights 0.4, 0.4, 0.2
Dependent Variable: Ln(Q)

	(1)	**(2)**	**(3)**	**(4)**
Constant	9.629*	9.489*	6.556*	3.857*
	(0.473)	(0.652)	(2.309)	(1.384)
Ln(hL)	0.609*	0.511*	0.938*	1.142*
	(0.041)	(0.031)	(0.236)	(0.149)

Ln(K)	0.044 (0.049)	0.111* (0.043)	-0.042 (0.071)	-0.074 (0.046)
Ln(R1)	0.968* (0.086)			
Ln(R2)		1.088* (0.090)		
Ln(R1)-India			0.580* (0.258)	
Ln(R1)-South Korea			0.864* (0.084)	
Ln(R2)-India				0.409* (0.173)
Ln(R2)-South Korea				0.942* (0.060)
Regression F-value	2664.648	3292.155	2205.382	6483.701
Adjusted R^2	0.997	0.998	0.997	0.999

Notes: standard errors are in parentheses below
* denotes significant at 5% level

Similar to the benchmark case (Table 4.2), the estimated coefficients of models (3.3) and (3.4) with modified weight in composite reform indices continue to produce a significant positive impact on economic growth in India and South Korea in the post-reform period. One noticeable difference is a sharp decrease in India's reform coefficient compared to South Korea. This adjustment suggests that, even though trade liberalization and financial reforms were vital for the both countries' economic growth, enterprise restructuring played a more important role in India relative to South Korea. This phenomenon might be explained by the presence of high initial distortions in India, and a consequent less efficient implementation of trade and financial reforms in this economy.

Overall, results of our analyses lend support to the hypothesis that economic reforms positively contributed to economic growth in India and South Korea in the post-reform period. This positive effect is present both in contemporaneous and lagged estimations. Our results on the role of economic reform in economic development agree with De Melo et al (1996), Fisher et al (1996), and Havrylyshyn and Wolf (2001). While the previous studies focus on transition

economies of Central Europe and former Soviet Union, this study expands empirical growth literature by studying the effect of economic reforms in India and South Korea.

The larger effect of reforms on South Korean economic growth has been consistent in models with a constant intercept. However, in the fixed effects model, we obtain a higher coefficient of reform index for South Korea only in one out of four cases. Results from the fixed effects model suggest that while economic reform has a positive effect on economic growth, time-invariant, country-specific initial conditions cannot be neglected.

A relatively equal distribution of income in South Korea in the early 1960s might have been one of potential factors behind these beneficial initial conditions (Rodrik, 1996). We realize that income equality could have facilitated better governance in South Korea relative to India in three ways. First, policymaking and reform implementation was much easier in Korea due to a lack of influential property-owning class. Secondly, the absence of acute inequality did not create an urgency to redistribute income on the government, and, thus, undercut reform efforts. Thirdly, as the government was free to pursue economic objectives, it supervised bureaucracy closely and removed any obstacles to the reform process.

It is our perception that high distortions in the Indian economy at the beginning of reform implementation might have contributed to a relatively higher impact of a composite reform index in the fixed effect estimations in India rather than in South Korea. Results of our fixed effect estimations once again lend support to the conventional view in reform literature that the higher are the initial distortions in an economy, the more beneficial is the impact of reform on the economic growth. Therefore, even a modest reform implementation in India could have generated a substantial productivity growth captured by the fixed effect model.

In this study, we have found a significant interaction between the reform indices and the human capital augmented labor. In general, this interaction can be explained as follows. When a domestic firm finds opportunities to utilize appropriately educated labor and low-cost financing, it receives a *per se* incentive to increase production. Economic reforms can result in higher economic growth when the labor market is flexible enough to allow workers move directly to sectors that matches their skills. In a comparative estimation, we demonstrate that the magnitudes of coefficients of the human capital augmented labor variable are higher relative to their counterparts in regressions with the raw labor. This shows that human capital itself has a positive impact on economic growth.

5. Policy Implications

By drawing on the findings of this study, the objective of this section is to provide recommendations to policy makers both in India and South Korea. These recommendations are also aimed to attract attention of a wide range of international organizations, as well as authorities in the developing countries that are at initial stages of reform implementation, or are planning to devise and launch a new economic reform program. In particular, we will focus on economic implications of three major reforms – trade reform, financial reform, and enterprise restructuring – as well as policies aimed to improve human capital accumulation in the developing countries.

Quantitative trade restrictions create incentives for rent seeking, and deprive governments of revenues. They may also create monopolistic control and hinder competition and innovation. One significant advantage of reforming trade by removing quantitative restrictions lies in the absence of adverse effect on the government revenue experience due to this removal. Therefore, even economies with fiscal deficit can afford implementation of these reform measures. Both

countries in our study removed quantitative trade restrictions at the beginning of their economic reform. Yet, compared to India, Korea reaped a significantly larger benefit due to a faster removal of restrictions. Therefore, taking the initial country constraints, we recommend removing the quantitative restrictions early in the reform process. This could also generate revenues to cushion any adverse effect from the reduction of tariffs. Moreover, a success in revenue generation might create a positive impression among various stakeholders and pave the way for reforms in other spheres.

A sensitivity analysis that we perform suggests that trade reforms and financial reforms played a relatively more significant role in economic growth in South Korea rather than in India. Related outcome-based measures (such as index of openness, share of imports in consumption, ratio of broad money to GDP, etc) show much steeper trend in South Korea in the post-reform period. A hesitant approach to reform implementation is the primary factor behind less effective reform outcomes in India. The Indian financial sector, in particular, still has numerous barriers against the ownership by foreign companies[14]. As India is quickly marching towards becoming a vibrant and highly sophisticated economy, demand for risk management products will increase from both individuals and businesses. Allowing foreign insurers will expose the domestic market to advanced risk management techniques, which in turn will foster growth in the economy.

Unambiguously, trade reforms should precede capital account liberalization. While a trade reform is usually accompanied by a depreciation of the exchange rate, which increases competitiveness of exports, capital account liberalization brings an influx of foreign capital chasing higher returns and appreciates the domestic currency. Therefore, if implemented

[14] e.g., the ceilings for ownership by foreign insurers are exceedingly low

together, liberalization of capital accounts and trade reform may decrease the effectiveness of the latter.

India is unique among developing economies in having a huge service sector, exceeding a half of GDP. Economic reforms at the beginning of the 1990s played a critical role in the growth of services. Privatisation, deregulation, and FDI created a positive shock to the hitherto stagnant service sector. The introduction of new technology also generated efficiency. But the service sector requires a more highly educated labor force compared to industry. Since the majority of the Indian population is not highly educated, it is important for India to undertake greater investment in industrial production, building on the success of its service sector. An increase in industrial production would generate new opportunities for employment for the less educated poor strata in rural India.

Economic reforms can fully utilize their potential in a labor market devoid of excessive regulation. Social safety nets, including reasonable unemployment allowance and retraining, should be provided to laid-off workers during an enterprise restructuring process. But this discretion must be exercised carefully, without creation of any disincentives for workers such as a withdrawal from labor force due to too generous unemployment benefits. A flexible labor market will enhance the effectiveness of economic reforms and accelerate economic growth.

Our analysis shows that human capital, being a driving force of economic growth, also exerts an indirect effect by complementing economic reforms. A higher level of human capital in South Korea at the beginning of its reform implementation to a certain extent explains Korea’s economic success. While India is unique in having a very successful tertiary education system, its primary education is in a poor state, which is evidenced by a low literacy rate. Therefore, primary education system is vital for the Indian effort to improve human capital. More funding,

adequate teacher training, and improved infrastructure should lead towards that goal. Vocational education can be provided to people who do not intend to pursue higher education.

At the beginning of economic reform implementation, India was characterized by a higher level of child mortality and a lower life expectancy at birth, both contributing to a relatively low weighted average human capital index when compared to South Korea. The lack of essential nutrients may stunt a child physically and mentally from birth. To this end, the government should ensure intake of essential nutrition for every child. Providing a meal rich in nutrients during school hours could be an option. More spending on healthcare infrastructure and training of medical personnel are essential for a better health care and human capital development as such.

Based on the empirical analyses in our study, we provide the following summary of policy implications, which will be relevant to any developing country exploring the ways to pursue economic reforms and accelerate growth. First, economic reforms such as trade liberalization, financial reform, and enterprise restructuring play an important role in economic growth. The more distorted is an economy; the greater is the benefit from economic reforms. Secondly, initial conditions in an economy prior to reform implementation are important factors of reform effectiveness. Reform measures should take into account the state of institutions and social implications of the income distribution. Thirdly, either active or gradual reform measures benefit the economy. Introduction of widespread reform measures is more suitable for an economy with a strong, determined government. Gradual reforms, which are more successful in an economy with acute distortions, should be primary targeted into the areas likely to generate most welfare gains. Fourth, human capital is critical for economic growth. Appropriate human

capital increases the efficiency of labor force. Both education and health components of human capital should be taken into account when designing a policy to improve human capital.

6. Conclusions

In this paper, we analyzed the impact of economic reforms and human capital on economic growth in India and South Korea in the post-reform period.

We constructed a modified production function that along with a conventional factor of production - physical capital- incorporates a composite reform index and augmented labor and show the effect of various reform measures and human capital accumulation on economic growth. We decomposed the total factor productivity into a reform factor and a catchall factor, which captures other implicit influences. We further decomposed augmented labor into raw labor and human capital. By constructing two unique indices - a composite economic reform index and a human capital index - we explored the transitional dynamics of a growth in total factor productivity generated by trade reform, financial reform, enterprise restructuring, schooling, and improvements in life expectancy. We estimated several modifications of our baseline production function to reflect more accurately variable effects of economic reforms in India and South Korea.

Our analysis suggests that economic reforms and human capital accumulation impose a significant positive effect on economic growth. This positive effect is revealed both in contemporaneous and lagged estimations of panel data models. The impact of reform turns out to be stronger for South Korea when a model with a constant intercept is estimated.

We also have explored a possibility of an interaction between economic reforms and human capital augmented labor variable. In accordance with the traditional economic literature, which suggests that having appropriate human capital is important in advancing the opportunities

opened by reforms, our analysis confirms that reforms aimed on the improvement of human capital, e.g. reforms in labor market, investment in education and healthcare, will have a complementary effect on the efficacy of economic reforms. To ascertain the strength of the effect of human capital on economic growth, we estimated the model with raw labor (i.e. without augmentation effect from human capital). The comparison of models with raw labor and with human capital augmentation reveals a significantly higher effect on economic growth when the estimation employs a human capital augmented variable.

In conclusion, our investigation opens a broad avenue for further research. We recognize that economic reforms and human capital accumulation are important factors for explaining growth in India and South Korea. As such, it is interesting to employ a multivariate maximum likelihood cointegration technique in order to explore the long-run interaction between economic growth, reform measures, and human capital development in these countries. Finally, the model can be empirically tested for a broader range of East Asian countries that recently implemented market reforms and significantly improved their human capital.

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Appendix A

Construction of Reform Indices

Table A.1. Construction of Overall Reform Index for India, 1992-2003

Year	Trade Reform Index 1	Trade Reform Index 2	Financial Reform Index	Enterprise Restructuring Index	Overall Reform Index (R1)	Overall Reform Index (R2)
1992	18.75	10.06	33.39	28.79	26.98	24.08
1993	20.04	11.46	33.37	28.98	27.46	24.60
1994	20.37	13.50	33.38	28.90	27.55	25.26
1995	23.21	16.23	32.42	29.04	28.22	25.90
1996	22.36	14.74	32.91	29.57	28.28	25.74
1997	22.96	16.08	34.23	30.53	29.24	26.95
1998	24.13	18.18	35.03	30.84	30.00	28.02
1999	25.47	18.15	37.34	31.03	31.28	28.84
2000	28.54	18.84	40.65	30.95	33.38	30.15
2001	27.58	18.62	41.97	30.98	33.51	30.53
2002	30.82	19.42	45.64	31.09	35.85	32.05
2003	30.47	20.32	46.12	31.20	35.93	32.55

Table A.2. Construction of Overall Reform Index for South Korea, 1966-1977

Year	Trade Reform Index 1	Trade Reform Index 2	Financial Reform Index	Enterprise Restructuring Index	Overall Reform Index R1	Overall Reform Index R2
1966	29.37	6.38	14.29	12.30	42.69	35.02
1967	32.09	7.89	19.04	16.15	45.31	37.24
1968	36.59	10.39	26.18	20.99	49.32	40.59
1969	37.09	11.27	32.68	26.51	51.79	43.18
1970	36.48	11.09	34.47	28.99	52.32	43.85
1971	39.38	12.22	35.20	28.99	53.66	44.61

1972	42.33	11.82	36.07	30.07	54.85	44.68
1973	59.08	14.79	36.69	31.47	60.55	45.79
1974	63.68	16.50	35.89	28.52	61.73	46.00
1975	60.87	15.81	34.08	26.99	60.10	45.09
1976	60.92	18.35	31.63	25.71	59.22	45.03
1977	60.58	20.94	32.38	27.45	59.19	45.97

Appendix B

Construction of a Human Capital Variable

Table B.1. Construction of a Human Capital Variable for India, 1992-2003

Year	Average Years of Schooling	Life Expectancy at Birth	Normalized Average Years of Schooling	Normalized Life Expectancy at Birth	Composite Human Capital Variable
1992	4.27	60.15	2.54	1.36	1.95
1993	4.35	60.57	2.59	1.37	1.98
1994	4.44	60.98	2.64	1.38	2.01
1995	4.52	61.40	2.69	1.39	2.04
1996	4.63	61.82	2.75	1.39	2.07
1997	4.74	62.24	2.82	1.40	2.11
1998	4.84	62.43	2.88	1.41	2.15
1999	4.95	62.62	2.95	1.41	2.18
2000	5.06	62.80	3.01	1.42	2.21
2001	5.17	63.09	3.08	1.42	2.25
2002	5.28	63.38	3.14	1.43	2.29
2003	5.38	63.42	3.20	1.43	2.32

Table B.2. Construction of a Human Capital Variable for Korea, 1966-1977

Year	Average Years of Schooling	Life Expectancy at Birth	Normalized Average Years of Schooling	Normalized Life Expectancy at Birth	Composite Human Capital Variable
1966	5.29	57.17	3.15	1.29	2.22
1967	5.20	57.66	3.09	1.30	2.20
1968	5.10	58.41	3.04	1.32	2.18
1969	5.01	59.17	2.98	1.33	2.16
1970	4.91	59.93	2.92	1.35	2.14
1971	5.25	60.68	3.12	1.37	2.25
1972	5.59	61.44	3.33	1.39	2.36
1973	5.92	62.26	3.53	1.40	2.47
1974	6.26	63.07	3.73	1.42	2.58

1975	6.60	63.89	3.93	1.44	2.68
1976	6.86	64.71	4.08	1.46	2.77
1977	7.12	65.52	4.24	1.48	2.86